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Focus on Success

A REVIEW OF THE FLORIDA SUNSHINE STATE STANDARDS FOR RIGOR AND ALIGNMENT TO COLLEGE READINESS

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Executive Summary

The Florida Department of Education has asked the College Board to conduct an evaluation of the Florida *Sunshine State Standards* for grades 6-12 in language arts and mathematics in terms of their rigor and alignment to college readiness. The College Board views itself as a partner with the state of Florida committed to helping the state connect all students to success upon graduating from high school, whether that be in college or the world of work. The College Board offers this review of the *Sunshine State Standards* within the context of this partnership, believing that this review and its recommendations will provide useful information and guidance as the state continues its ongoing efforts to provide a rigorous and effective education for its students.

This review is based on a benchmarking analysis, comparing the *Sunshine State Standards* to several other standards frameworks to evaluate the rigor, focus, balance, progression, specificity, clarity, and equity of the Florida standards. Primary among these standards frameworks was the *College Board Standards for College Success*. Developed over the last three years, the *College Board Standards for College Success* articulate a framework of high expectations and rigorous academic study beginning in grade 6 that will prepare students for the expectations they will face either in high school Advanced Placement Program® (AP®) courses or in their college studies. The exit-level benchmarks defined by the *College Board Standards for College Success* are aligned explicitly to the benchmarks defined in the Knowledge and Skills for University Success (KSUS) developed by Standards for Success. The three-year national study that produced the KSUS standards was sponsored by the Association of American Universities (AAU) and the Pew Charitable Trusts and conducted by the Center for Educational Policy Research at the University of Oregon, with assistance from the Stanford Institute for Higher Education Research. This rigorous analysis of what college faculty expect of their first-year students is the most comprehensive, empirically validated definition of college readiness available. By aligning the exit-level expectations of the *College Board Standards for College Success* to the KSUS, the College Board has ensured that its standards set out a rigorous but attainable progression of knowledge and skills that will prepare students for college-level work by the time they graduate high school. Benchmarking the Florida *Sunshine State Standards* to the *College Board Standards for College Success* enables us to evaluate the developmental progression and rigor of the *Sunshine State Standards* and provide specific recommendations for where they may be improved.

In mathematics, the *Sunshine State Standards* were also benchmarked to the mathematics standards for the states of Louisiana and Washington, two states that have recently reviewed and revised their standards frameworks with an eye toward introducing rigor through a carefully articulated developmental progression of increasingly sophisticated mathematics skills.

Major Findings

The most salient conclusion to be drawn from these reviews is that Florida should consider developing grade level expectations for grades 9-12 in order to guide and promote a curriculum that builds toward college readiness by the time students exit high school. The College Board recognizes that the *Sunshine State Standards* and Grade Level Expectations (GLEs) are components of a larger curriculum system that defines expectations for student learning, including the *Florida Curriculum Frameworks*, state course descriptions, textbooks, and the Florida Comprehensive Assessment Test (FCAT). Nevertheless, the lack of grade-level expectations for grades 9–12 is a key contributor to the lack of rigor articulated in the standards, as the state has not worked through a grade-level appropriate sequencing of expectations within the standards framework to determine whether more-rigorous exit-level expectations could be attained.

The benchmarks and GLEs for grade 6 showed good alignment with the College Board standards in terms of rigor and content coverage. These more-rigorous expectations at grade 6 may reflect the state's commitment to its elementary curriculum that has produced a rise in the state's 4^{th} grade NAEP scores in reading and mathematics since 1998. The rigor of this earlier curriculum is not carried forward, however, through the middle years. Evaluations of rigor conducted through this study show that expectations for grade 8 in language arts actually *decrease* from what is expected in grade 6. Lack of specificity in the middle grades also contributes to a lack of rigor. In nearly half of the analyzed benchmarks in language arts, for example, the GLEs provided no additional information for how the expectations at grade 8 were to be differentiated from the expectations at grade 6, stating simply that the skills learned previously should be extended as appropriate for grade 8. In grades 9-12, the depth of knowledge expected by the Florida *Sunshine State Standards* in language arts remained at a level comparable to what the College Board standards expect for grade 8. This lack of progressive development across these grade levels represents the most pressing issue to be addressed as the state reviews its standards frameworks.

Reviewing the state's standards frameworks will offer the opportunity for the state's educational stakeholders to define a consensus view of how students' intellectual and social development can be anticipated and supported so that students achieve their highest potential. With research, effort, and time, the state should be able to articulate grade level expectations that provide more specific guidance to school leaders, teachers, parents, and students for what should be taught and learned in grades 6-8 and 9-12 to be ready for success upon graduating high school.

Methodology

The present review focuses on expectations contained in the Florida state standards, benchmarks, and GLE documents for grades 6–12. In particular, the analysis looks at the Florida standards documents for grades 6-8 and 9-12, as well as the GLE documents for grades 6, 7, and 8. As requested, this review focuses exclusively on the rigor of the Florida state standards and GLEs and their alignment to the preparation that students require for college-level work upon graduating from high school. A fuller review would consider the expectations and guidance provided by other components of the state's educational system, including the alignment of the FCAT to the state's standards frameworks, the alignment of the curriculum frameworks and course descriptions to the standards frameworks, the effectiveness of teacher preparation and professional development programs in enabling teachers to teach the knowledge and skills outlined in the standards frameworks, and the alignment of the enacted curriculum—what teachers are actually teaching in the classroom—to the standards frameworks. It is critical that all these components work together to prepare students for the demands of college or the workplace after graduation. By setting rigorous but attainable expectations and defining clear and teachable benchmarks, the *Sunshine State Standards* can articulate a guiding framework so that all of these components reinforce one another and work toward the same clear goals.

In conducting its review, the College Board used a set of criteria developed by several organizations that conduct research on and provide services for benchmarking and aligning standards and assessments for states, including Achieve; the National Center for Research on Evaluation, Standards, and Testing; the Education Development Center; the Fordham Foundation; the American Federation of Teachers; and the U.S. National Research Center for TIMSS. These criteria guided the questions reviewers asked as they evaluated the Florida standards:

- **Rigor:** Do the standards prepare students intellectually for the next level and, ultimately, for college success?
- **Focus:** Have appropriate choices been made about what is important for students to learn?
- **Balance:** Do the standards reflect an appropriate balance among the areas within the subject area suitable for the given grade levels and future expectations?
- **Progression:** Do knowledge and skills build clearly and sensibly on previous learning and increase in intellectual demand from year to year?
- **Specificity:** Are the standards specific enough to convey the level of performance expected of students?
- **Clarity:** Are the standards written in language that is clear, is free of jargon, and can gain widespread acceptance from teachers, administrators, school boards, and parents?

- **Equity:** Are the performance expectations written in such a way that teachers and administrators may differentiate the curriculum and instruction to enable all students to achieve the rigorous objectives?

These questions, provided in more elaborated form in Appendix B, provide the organizing structure for this review in both subject areas.

To support its conclusions within each of these categories, the College Board conducted a benchmarking analysis of the Florida state standards and GLEs, comparing them with several other standards frameworks recognized for their quality, rigor, and alignment to college readiness. Reviewers mapped performance expectations from the benchmarking frameworks (i.e., the *College Board Standards for College Success,* the standards for Washington, and the standards for Louisiana) to the GLEs in the *Sunshine State Standards*. These detailed mappings are provided in appendices C and D for language arts and mathematics respectively. The mappings enable reviewers to compare the specificity, sequencing, and progression with which each framework articulated its expectations. As a measure of rigor, reviewers also rated the depth of knowledge (DOK) described by each GLE and its corresponding performance expectations. The DOK ratings enable reviewers to compare the relative depth of knowledge expected by each framework at each grade level in each subject area. These ratings also support inferences about how each framework describes a progression in the depth of knowledge that is to be expected of students across grade levels.

Findings for Language Arts

Scope of this review

The Florida *Sunshine State Standards in Language Arts* encompass standards in Reading; Writing; Listening, Viewing, and Speaking; Language; and Literature (these standards correspond to strands in the GLEs). This review addresses the standards in Reading, Writing, Language, and Literature only, as the current edition of the *College Board Standards for College Success* do not address learning expectations in listening, viewing, and speaking. The College Board recognizes that listening, speaking, viewing, and visually representing are important dimensions of literacy that should be developed through the K–12 curriculum; the College Board is currently developing benchmark expectations for these aspects of a language arts curriculum, and it commends the state of Florida for focusing attention on these dimensions of literacy through its standards.

Also, because the current edition of the *College Board Standards for College Success* defines performance expectations for grades 6, 8, 10, and 12, the benchmarking comparison conducted for this review did not include consideration of the Florida GLEs for grade 7.

Organization of the language arts review

The language arts review is divided into a section on the standards for Reading, Language, and Literature and a section on the standard for Writing. Like the state of Florida, the College Board does not view these standards as distinct and separable domains within language arts, but, rather, recognizes that students' knowledge and skills in language arts develop holistically through their experiences in using language, both within and outside of school, including listening, speaking, reading, writing, viewing, and, increasingly, visually representing.

FINDINGS: READING, LANGUAGE, AND LITERATURE

Overall, the Florida standards and GLEs in Reading, Language, and Literature address the knowledge and skills that students need in order to read and learn from texts in grades 6–12. The overlap between the Florida benchmarks and GLEs and the *College Board Standards Standards for College Success* was quite high, indicating that the two frameworks describe in similar ways the component knowledge and skills that students need in reading, language, and literature.[1] Within these categories, however, the Florida standards, benchmarks, and GLEs do not articulate a clear and coherent developmental progression of knowledge and skills beginning in grade 6 that builds toward college readiness by the time students graduate from high school. While the grade 6 expectations match quite well with the College Board standards, the lack of rigor,

[1] This close mapping does not include the standards and GLEs within the standards for Listening, Viewing, and Speaking, which are outside the scope of this review.

specificity, and developmental progression articulated at grades 8 and 12 threatens to leave many students unprepared for the expectations they will encounter in college.

Rigor: *Do the standards prepare students intellectually for the next level and, ultimately, for college success?*

The rigor of a standards framework can be evaluated in several ways. The sequencing of grade-level expectations can be evaluated in terms of how it builds toward some external point of reference, such as a validated definition of college readiness. The standards framework can be benchmarked against other standards frameworks that have been shown to be effective in preparing students for college or workplace readiness. Another method is to compare the cognitive performance described in each GLE to a standardized scale of cognitive processes, such as has been developed by Benjamin Bloom and subsequently modified by others.

In its benchmarking analysis comparing the Florida GLEs to the College Board standards, the College Board rated the cognitive demands expected by each of the Florida GLEs and the College Board Performance Expectations (PEs) mapped to that GLE. These ratings consider whether the GLEs and standards expect students simply to remember and identify content material, or whether they expect students to analyze information and form and justify generalizations based on the content material. The ratings were conducted using Anderson and Krathwohl's (2001) adaptation of Bloom's taxonomy, which is described in the Table 1.

TABLE 1: Levels of Cognitive Demand

Level	Title	Associated Actions
1	Remembering	recognizing, recalling, identifying
2	Understanding	selecting, interpreting, illustrating, classifying, summarizing, inferring, comparing, explaining, describing
3	Applying	using, executing, implementing, computing, translating, ordering, comparing, representing, predicting, drawing, graphing, computing
4	Analyzing	differentiating, organizing, attributing, synthesizing
5	Evaluating	checking, critiquing, justifying
6	Creating	generating, hypothesizing, planning, designing, constructing

The depth of knowledge (DOK) was rated for the Florida GLEs and standards and the College Board Performance Expectations, and ratings were averaged for grades 6, 8, and 12. The results are shown in the Table 2.

TABLE 2: Average Depth of Knowledge Ratings by Grade

Florida GLEs		College Board PEs	
Grade 6 DOK Mean	2.23	Grade 6 DOK Mean	2.19
Grade 8 DOK Mean	2.12	Grade 8 DOK Mean	2.59
Grade 9-12 DOK Mean	2.56	Grade 9-12 DOK Mean	4.33

The averaged DOK ratings summarized in Table 2 indicate that the Florida GLEs in Reading, Language, and Literature and the College Board Performance Expectations in reading that were mapped to the Florida GLEs describe a depth of knowledge expected of students in grade 6 at a point between understanding and applying. Interestingly, the depth of knowledge expected of students by the Florida GLEs for grade 8 drops to a level close to simple understanding; the depth of knowledge expected by the College Board Performance Expectations rises to include greater application. A dramatic difference emerges, however, when comparing the depth of knowledge described by the Florida standards for grades 9–12 and the College Board Performance Expectations mapped to those standards. Where the depth of knowledge expected of exiting students described by the College Board Performance Expectations is at a point between analyzing and evaluating, the depth of knowledge expected by the Florida standards remains at a point only slightly higher than the level expected at grade 6, still between understanding and applying. These data suggest that the Florida language arts curriculum is not sufficiently rigorous after grade 6 to set students on a track to be prepared for college by the time they graduate.

Focus and Balance: *Have choices been made about what is important for students to learn?*

The Florida *Sunshine State Standards* employ an organizational structure that is common among state standards frameworks for describing expectations in reading, language, and literature. They address knowledge and skills related to comprehension, identifying and interpreting text structures and organizational patterns, analyzing how authors craft these elements to produce coherent texts, and reading strategies. The Florida benchmarks and GLEs place significant emphasis on expecting students to develop strategies for improving comprehension, which is critical to students' developing increasing competency in independently learning from texts.

The benchmarking analysis comparing the Florida GLEs and standards to the *College Board Standards for College Success* showed considerable overlap in the knowledge and skills addressed in each of the standards frameworks, suggesting that the overall scope of the Florida standards aligns with the overall scope of the College Board Standards. Explicit links between the Florida GLEs and standards and the NCTE/IRA standards are quite apparent.

Another evaluation of the focus and balance of a language arts framework can be offered by comparing the framework's organization with that of the proposed assessment framework for the 2009 National Assessment of Educational Progress (NAEP) in reading (AIR, 2004). The NAEP 2009 assessment framework proposes genres or text types that students should be familiar with at grades 4, 8, and 12 and organizes the knowledge and skills to be expected for each of those genres within three categories: text structures and features, author's craft, and cognitive targets for comprehension.

- **Text structures** and **text features** define the organization and elements within the text. The organization and elements refer to the ways ideas are arranged and are connected to one another. Features refer to visual and structural elements that support and enhance the reader's ability to understand the text.

- **Author's craft** pertains to the specific techniques that an author chooses in order to relay an intended message.

- **Cognitive targets** for comprehension range from locate/recall to integrate/interpret to critique/evaluate. This scale of cognitive levels corresponds to that used by the *College Board Standards for College Success* discussed in the section on rigor.

The balance and focus of the Florida standards framework can be evaluated by mapping the Florida language arts benchmarks to these categories and considering their distribution. In conducting this analysis, the College Board also included a category for reading strategies, which is important for students' developing literacy skills but not an explicit assessment target for NAEP. For this analysis, the College Board combined text structures and features with author's craft to form one category that addresses students' facility with analyzing how authors craft text elements to create texts. The resulting categories are shown in the Table 3, with the Florida benchmarks mapped to each category.

TABLE 3: Distribution of Florida Benchmarks for Grades 6-8 by Literacy Dimension

Text Structures & Author's Craft	Comprehension	Reading Strategies
LA.E.1.3.1	LA.A.2.3.1	LA.A.1.3.1
LA.E.1.3.2	LA.A.2.3.2	LA.A.1.3.2
LA.E.1.3.3	LA.A.2.3.3	LA.A.1.3.3
LA.E.1.3.4	LA.A.2.3.4	LA.A.1.3.4
LA.E.1.3.5	LA.A.2.3.5	LA.A.1.3.5
LA.E.2.3.1	LA.A.2.3.6	
	LA.A.2.3.7	
	LA.A.2.3.8	
	LA.D.1.3.2	
	LA.D.2.3.2	
	LA.D.2.3.3	
	LA.E.2.3.2	
	LA.E.2.3.3	
	LA.E.2.3.4	
	LA.E.2.3.6	
	LA.E.2.3.7	
	LA.E.2.3.8	
TOTAL: 6	**Total: 17**	**Total: 5**

By comparison, the *College Board Standards for College Success* are distributed evenly across these three dimensions, as shown in Table 4:

TABLE 4: Distribution of College Board Strands by Literacy Dimension

Text Structures & Author's Craft	Comprehension	Reading Strategies
2.1 Interpret how genre norms guide author's crafting of literary texts.	1.1 Interpreting the meaning of words, sentences, and ideas in text.	3.1 Metacognitive Strategies
2.2 Interpret how authors craft literary devices in a variety of literary texts.	1.2 Connecting texts to prior knowledge and personal perspectives.	3.2 Text Processing Strategies
2.3 Interpret how authors craft rhetorical and organizational patterns in a variety of expository texts.	1.3 Connecting texts to author's perspective, purpose, and strategies.	3.3 Post-reading Strategies
2.4 Interpret how authors craft stylistic and rhetorical devices and textual features in a variety of expository texts.	1.4 Connecting texts to their social, cultural, and historical context.	
Total: 4	Total: 4	Total: 3

While these categories derived from the NAEP 2009 assessment framework (AIR, 2004) do not indicate the precise weighting among these categories that will be reflected in the assessment, they do suggest that the focus and balance of Florida's standards and benchmarks could be improved by giving greater attention to developing students' skills in analyzing text structures and how authors use these text structures to craft texts. These skills in turn support readers' comprehension of texts. When combined with the ability to select and use appropriate reading strategies, these skills will enable students to read the complex informational and expository texts that are the primary vehicle for learning in college.

Progression: *Do knowledge and skills build clearly and sensibly on previous learning and increase in intellectual demand from year to year?*

The ability of the Florida benchmarks and standards to describe a clear and coherent progression of knowledge and skills from grade level to grade level is hampered by the lack of grade-level expectations for grades 9–12. The expectations within the standards for grades 9–12 are the equivalent of the benchmarks for grades 6–8. As such, the language arts standards for grades 9–12 provide only a single benchmarked performance expectation for the entire grade band, written at a "grain-size" equivalent to the organizing benchmark in the earlier grades. This prohibits articulating a progressive development of expectations. Certainly the state is aware of this and has relied on other components of its curricular system, such as course descriptions and curriculum frameworks, to provide some guidance to teachers and curriculum developers in sequencing learning objectives and expectations for student performance in language arts across grades 9–12. Nevertheless, the lack of grade-level expectations for grades 9–12 is a key contributor to the lack of rigor articulated in the standards, as the state has not worked through a grade-level appropriate sequencing of expectations within the standards framework to determine whether more-rigorous exit-level expectations could be attained.

While the GLEs for grades 6–8 do provide more specific details on what is intended by the benchmark expectations, they too are weakened by not demonstrating a clear and coherent progression of knowledge and skills. In nearly half the benchmarks within the analyzed strands, the GLEs for grade 8 provided no guidance for how the expected performances at that grade level are to be differentiated from what is expected at grade 6, stating that the skills learned previously should be extended as appropriate for grade 8. While this progression may indeed be reflected in the course descriptions, textbooks, and curriculum frameworks, the state is missing an opportunity afforded by its standards framework to articulate a consensus view among its constituents and stakeholders of what that progression should look like.

For example, Benchmark LA.A.2.3.1 addresses a key comprehension skill: determining the main idea or essential message of a text. The GLEs for this benchmark do not articulate any progression from grade 6 to grade 8. Students' abilities to infer central ideas from texts grow significantly between grades 6 and 8, however, especially if students are taught strategies for inferring and analyzing organizational patterns in expository texts and for making connections among key ideas. These growing expectations should be articulated explicitly to give teachers instructional guidance in building these important reading comprehension skills, which students will need in high school.

Specificity: *Are the standards specific enough to convey the level of performance expected of students?*

One key measure of whether the expectations within a standards framework are sufficiently specific is whether teachers will have a clear understanding of the expectation and be able to plan instruction that will help students achieve the targeted expectation. Many of the comprehension-oriented expectations will be familiar to language arts teachers, who will have available to them familiar lessons, strategies, and instructional resources for helping students achieve the targeted expectations. Graphic organizers, pre-reading guides, strategies for analyzing text structures, and strategies for summarizing what was read are widely available, and shorthand references to these resources and strategies in a standards document can be acceptable. Moreover, references to narrative elements are very familiar to many language arts teachers and do not require much explication within a standards document. In this respect, the Florida GLEs and standards are sufficiently specific in many places to guide teacher instruction.

The specificity of the language arts GLEs and standards could be improved in those benchmarks addressing language and culture (e.g., LA.D.1.3.2) and those addressing common themes in literature (e.g., LA.E.1.3.5). Language used to describe culture and themes in these benchmarks is too vague to guide teachers' understanding or instruction. GLEs should suggest specific themes that may be appropriate for students to understand and interpret at each grade level, not to prescribe instruction but to give teachers some direction on where to focus. The College Board standards mapped to these GLEs provide illustrations of the level of specificity that could be provided.

Clarity: *Are the standards written in language that is clear, free of jargon, and can gain widespread acceptance from teachers, administrators, school boards, and parents?*

The Florida GLEs and standards do not employ jargon and are generally clear and accessible to teachers, leaders, curriculum supervisors, and parents. Where they are not clear is typically a result of their not being sufficiently precise or specific in their expectations.

Equity: *Are the performance expectations written in such a way that teachers and administrators may differentiate the curriculum and instruction to enable all students to achieve the rigorous objectives?*

The Florida GLEs and standards demonstrate a clear commitment to equity, especially in their explicit focus on diversity of language and culture and interpretive perspectives. The state should also recognize, however, that articulating a clear and coherent progression of expectations in its standards document is a powerful means for providing more equitable opportunity to learn among all its students, as clear, well-sequenced GLEs help less experienced teachers to understand what they should be focusing on and to see how their instruction builds progressively toward the goal of preparing all students for college success.

FINDINGS LANGUAGE ARTS: WRITING

To graduate students with the writing skills necessary for college success, Florida schools must provide them with a carefully sequenced language arts curriculum that fosters growth in developmentally appropriate ways. In tandem, it must challenge and prepare students to perform at the highest levels possible if they are to succeed both academically and in their future places of work. To accomplish these goals, Standards and Grade Level Expectations should describe in specific terms what the writing student is expected to know and be able to do. This will then support the classroom teacher in crafting lessons and preparing challenging practice that cultivates the acquisition of the essential literacy skills, concepts, and abilities that Florida students both need and deserve. The following overview is designed to encourage the development of such writing standards, with details following in the Appendices.

Rigor

As presented here, the Florida Standards are generally rigorous at the middle level. However, as noted earlier, Benchmarks have not been designed for grades 9 through 11, and grade 12 expectations provide only summary guidance. The College Board therefore offers additional suggestions for improvements that will ensure increased student success, based on rigorous entry-level college expectations.

Most critically, the Writing standard does not define clear focal points that could help teachers organize their writing instruction around the primary elements of the writing process, including rhetorical analysis and planning, generating and organizing content, researching, drafting, revising, and editing. Instruction and activities should be designed to help students experience how engaging, complex, and rewarding these dimensions of the writing process can be, so that they develop greater engagement with writing and find the motivation to pursue excellence in writing. Too often the GLEs repeat the same expectations for students in grade 6, 8, and 12, thus failing to provide a clear picture of what increasing expertise as a writer may look like. To grow into expert writers, students need vivid examples of what expert writers do. Modeling the practices of expert writers is essential to moving students beyond the rote practice of formulaic writing exercises, to the point where they can engage a writing opportunity critically and creatively, crafting a nuanced message appropriate for their purpose, audience, and context. The writing GLEs need to capture essential elements of this increasing expertise to guide teachers and students alike to a clearer understanding of these processes.

In addition, critical topics of study have been omitted from the document. For example, the GLEs do not define clear expectations for primary and secondary research, the practice of which is critical to linking students' personal life to their classroom writing, increasing engagement. The GLEs also should specify when and how students should be expected to write employing traditional genres. Finally, much more direction should be given to developing students' skills with revision.

In summary, though the middle school Benchmarks are appropriate and generally rigorous, there are no detailed secondary standards to review. Furthermore, the GLEs do not provide the developmental spiral through critical writing processes that is needed to prepare students for the writing demands they will face in college. More specific examples and recommendations are provided in Appendix A.

Progression

Perhaps the most critical, and often most difficult, task for a standards document is to clearly define a consistent and developmentally appropriate sequence of learning for students of the English Language Arts. While the Florida Standards specify GLEs for its middle school students, they do not make recommendations for those high school learners between grades nine and eleven. This is clearly the central weakness of the document, as it leaves teachers unsure of their instructional path prior to the expectations of grade 12 and, for many, the rigors of college beyond.

In other instances, the current document often simply repeats the prior grade's expectations. A careful study of the growing adolescent will show that this is not appropriate, as middle and high school students can readily embrace challenge and change, and should. The state should therefore revise its current document to both complete it across secondary grade levels and to push its expectations higher in all grades.

In summary, strong progression is anchored in appropriate rigor, clear focus, specificity, and clarity, and teachers at both the beginning and end of the learning sequence lack the details that they need to achieve success. More specific examples and recommendations are provided in Appendix A.

Focus

Standards and curriculum frameworks with clear focus organize expectations and instruction around strong, organizing focal points that help students make meaningful connections, develop greater conceptual understanding, and see how their increasing fluency with related skills contributes to their mastery of the subject area. The Florida Writing standard lacks this larger conceptual framework, primarily because the GLEs are written as discrete skills that do not build or show a strong relation to one another.

Specificity

The Writing standard focuses on a narrow band of genres that are regularly tested. Even within these, however, expectations are not sufficiently detailed to guide classroom teachers. GLEs are repeated verbatim across the middle grades and do not appear in the secondary document. This leaves the teacher with little or no direction on what is developmentally appropriate.

Although the standards address research skills, expectations regarding research are not sufficiently specific. Good research skills enable students to locate information, evaluate sources, learn from texts, formulate questions, and guide their own learning. These skills differentiate successful students from less-successful students, because they enable students to direct their own learning in the less-structured context of a college course. Articulating clear and specific expectations for research skills will contribute to closing the gap between lower-performing and higher-performing students and student groups, as such skills enable students to learn even when conditions for learning are less than favorable.

Clarity

Though the document is generally clear, there are occasional instances of vague terminology that hinder the quick understanding of the Benchmark or GLE. For example, there are multiple places where the word *format* means a physical layout of the writing product and then others where it replaces the genre or type of writing. A simple Glossary might prove useful in that situation, though the most obvious choice would be common word usage among curriculum designers, teachers, and students.

Equity

The document allows for equity across learning levels and diverse backgrounds. However, the issues of equity and access will be dramatically improved when the standards present greater specificity and a clearer developmental progression of expectations across grade levels.

Integration of the Language Arts

One final note: To be truly effective, writing and reading skills must sometimes, but not always, be taught in tandem. The Florida standards do not currently articulate when and how to integrate expectations for writing with expectations for reading, listening, speaking, and viewing.

Language Standard

The Florida Language standard should make clear that the skills discussed there are not only *receptive* skills but also *productive* skills. While some expectations do an excellent job of describing the complex qualities and features of language that should be attended to by a listener or reader, few expectations are defined for how an effective writer or speaker must also attend to these same features of language. One suggestion for correcting this problem is to actually embed the language standard into each language art—i.e., into reading, into writing, into listening, into speaking, into viewing, and into representing, rather than maintaining language as a discreet standard. Again, Appendix A provides more specific examples.

Findings for Mathematics

FLORIDA SUNSHINE STANDARDS FOR MATHEMATICS

The 1996 Sunshine State Standards for Mathematics (Florida Department of Education, 1996a, 1996b), developed by the Florida Department of Education, are designed to provide guidance to the public schools of Florida in two ways. The original grade band standards and benchmark documents for grades 6–8 and 9–12 provide broad statements of what students should know and be able to do by the end of the respective grade-level intervals. These standards documents are supplemented with individual grade-level expectation (GLE) documents for grades K–8. These documents provide performance expectations describing explicit examples of student work that would serve as evidence of students meeting the respective benchmarks and standards.

The present review focuses on expectations contained in Florida's standards, benchmarks, and GLE documents for mathematics in grades 6–12. In particular, the analysis uses the two Florida standards documents (Mathematics: Grades 6–8 and Mathematics: Grades 9–12), as well as the GLE documents for grades 6, 7, and 8.

This review was undertaken with goal of determining how well the Florida standards for mathematics describe a preparation in mathematics that gets students ready for college-level work by graduation from high school. This preparation goal was viewed in a broad sense to include various forms of education at the tertiary level, including community colleges, vocational schools, and colleges and universities. In particular, this analysis of the mathematics standards and GLEs focuses on the following factors and related questions:

- **Rigor:** Do the standards prepare students intellectually successively for the next level and, ultimately, for college success?
- **Focus:** Have appropriate choices been made about what is important for students to learn?
- **Balance:** Do the standards reflect an appropriate balance among the areas within mathematics appropriate to the given grade levels and future student needs?
- **Progression:** Do knowledge and skills build clearly and sensibly on previous learning and increase in intellectual demand from year to year?
- **Specificity:** Are the standards specific enough to convey the level of performance expected of students?
- **Clarity:** Are the standards written in language that is clear, free of jargon, and can gain widespread acceptance from teachers, administrators, school boards, and parents?
- **Equity:** Are the performance expectations written in such a way that teachers and administrators may differentiate the curriculum and instruction to enable all students to achieve the rigorous objectives?

These questions, provided in more elaborated form in Appendix B, frame a structure to provide the Florida State Department of Education with an answer to whether or not the standards and GLE statements provide a structure for "teaching and learning across grade levels in … mathematics to prepare students for college-level work by the time they graduate high school" (College Board, 2005).

In addition to examining the issues of what is currently in the state standards and expectations, it is important to examine a number of other sources that speak to what skills are important as one prepares for postsecondary study involving mathematics. This topic has received a great deal of attention over the years by the College Board and other professional organizations interested in mathematics instruction at secondary and collegiate levels. The College Board (1983, 1985) issued reports on what content and process skills students should acquire prior to college to be prepared for mathematics at the college level. In 1996, the College Board developed *Pacesetter Mathematics* as a model of a senior-level college preparatory class in mathematics addressing content needs of college-intending students not taking the traditional college preparatory sequence. From the professional organizations, the National Council of Teachers of Mathematics (NCTM) has provided their *Curriculum and Evaluation Standards for School Mathematics* (1989) and the updated version, *Principles and Standards for School Mathematics* (2000). From the collegiate side, the American Mathematical Association of Two-Year Colleges (1995) developed a set of standards, *Crossroads in Mathematics: Standards for Introductory College Mathematics Before Calculus.* The Mathematical Association of America's Committee on the Undergraduate Program in Mathematics (2004) has produced *Undergraduate Programs and Courses in the Mathematical Sciences: CUPM Curriculum Guide 2004.* The American Statistical Association is currently in the process of releasing a set of standards for school mathematics, *A Curriculum Framework for PreK–12 Statistics Education*. These suggestions are supplemented by the *NAEP Mathematics Framework*, developed by the National Assessment Governing Board (NAGB) (2005) for the National Assessment of Educational Progress (NAEP), which is used to measure student performance in mathematics at the national and state levels for grades 4, 8, and 12. This combined set of recommendations, along with standards and GLEs from the remaining states, provides a rich resource for examining issues in student expectations in mathematics and sequencing of topics as students move toward postsecondary study of mathematics.

THE REVIEW PROCESS

Addressing the central question required a number of activities prior to the writing of this report. The first involved a correlation of the Florida standards with the *College Board Standards for Mathematics*. The Florida standards were also correlated with the standards and GLEs for mathematics recently developed by the states of Louisiana (Louisiana Department of Education, 2004) and Washington (Washington State Office of Superintendent of Public Instruction, 2004). Copies of the GLEs for these two states are found in Appendices F and G. The results of the correlations are contained in the spreadsheet in Appendix D.

Another requisite activity was the qualitative examination of the Florida standard statements with regard to rigor, focus, balance, progression, specificity, clarity, and equity. This examination was done concurrently with the correlations mentioned above. Recorded comments from this analysis are contained in Appendix E.

The final activities contributing to the evaluation of the Florida documents consisted of interpretations of the data from the qualitative and quantitative analyses.

FINDINGS

The review of the *Florida Sunshine State Standards for Mathematics* (Florida Department of Education, 1996a, 1996b) was conducted with the expressed purpose of determining whether or not the standards provide a structure for "teaching and learning across grade levels in … mathematics to prepare students for college-level work by the time they graduate high school" (College Board, 2005). In doing this, the reviewers examined the *Sunshine State Standards* with respect to whether they provided a mathematical basis for students to enter postsecondary study with the conceptual knowledge, cognitive processes, and procedural skills necessary for success in various forms of tertiary education.

Rigor: *Do the standards prepare students intellectually for the next level and, ultimately, for college success?*

The level of curricular rigor can be viewed through a number of lenses. One lens provides a comparison of the content of the standards based on the placement of content relative to levels of schooling. Another lens allows the examination of the depth of mathematical knowledge expected from the students as they work to meet expectations found in the standards and benchmarks. A third lens focuses on the processes found within the expectations themselves. Each of these views provides information regarding the rigor expected of students as they study and learn mathematics.

The first comparison provides an estimate of the degree to which the Florida standards, benchmarks, and performance expectations are consistent with those found in other standard-like documents prepared by the College Board (in progress), the Louisiana Department of Education (1997, 2004) and the Washington State Office of the Superintendent of Instruction (2004). The standards from Louisiana and Washington were selected for a variety of reasons. First, both these sets of standards and GLEs had been through careful development paths and both were current. The geographic proximity of Louisiana to Florida was a consideration in the selection Louisiana's standards. The format of the Washington standards was a consideration in their selection. This format consists of having five general standards—one for content and four for processes.

The particular focus of this view of Florida's standards and GLEs was on whether expectations found in the Florida documents appeared in earlier grade levels, at the same grade level, or in later grade levels as equivalent expectations in the other documents. To investigate this, the performance expectations associated with the GLEs for grades 6–8 and with the benchmarks for grades 9–12 were correlated with the corresponding levels of expectations in the documents from the College Board and the states of Louisiana and Washington. The relevant documents and results of the correlations are found in Appendices A, C, and D.

The data in Table 5 provide the percentage of times Florida expectations were found at the same grade level in other documents, as well as the percentages of time these expectations were found earlier in other documents, or earlier in Florida documents. In this table, the Florida expectations are compared with the College Board curricular expectations, the state of Louisiana expectations, and the state of Washington expectations. The Florida documents being compared are the GLEs in grades 6, 7, and 8, and the benchmarks for grades 9–12. In each case, they were compared with the comparable level expectations in documents from other sources.

TABLE 5: Comparison of Grade Level Appearance of Florida (FL) Expectations, by Percent of Expectations, in Standard Documents from the College Board (CB), Louisiana (LA), and Washington (WA)

Grade	College Board			Louisiana			Washington		
	Same	FL Earlier	CB Earlier	Same	FL Earlier	LA Earlier	Same	FL Earlier	WA Earlier
6	56	19	25	37	35	29	33	28	38
7	32	6	61	25	44	31	39	41	20
8	46	20	33	42	35	22	33	27	39
9-12	32	8	61	53	3	45	39	3	58

The second view of rigor consists of examining the level of cognitive demands a set of expectations places on students. For example, does a set of standards basically only expect students to remember and identify content material, or does it require students to analyze information and form and justify generalizations based on the content material? The demand level is established through examining the nature of the verbs used in stating GLEs for students. The ratings were conducted using Anderson and Krathwohl's (2001) adaptation of Bloom's taxonomy, which is described in the Table 6.

TABLE 6: Levels of Cognitive Demand

Level	Title	Associated Actions
1	Remembering	recognizing, recalling, identifying
2	Understanding	selecting, interpreting, illustrating, classifying, summarizing, inferring, comparing, explaining, describing
3	Applying	using, executing, implementing, computing, translating, ordering, comparing, representing, predicting, drawing, graphing, computing
4	Analyzing	differentiating, organizing, attributing, synthesizing
5	Evaluating	checking, critiquing, justifying
6	Creating	generating, hypothesizing, planning, designing, constructing

Table 7 presents the relative percentage of expectations of differing cognitive demand found in the *Sunshine State Standards*, the *College Board Standards*, and the state documents from Louisiana and Washington. The ratings were done at the level of the benchmarks in the Florida standards for grades 6–12, the enabling objectives in the *College Board Standards*, the benchmarks in the *Louisiana Mathematics Framework*, and the grade/component levels for the Essential Academic Learning Requirement 1 dealing with content in the Washington document.

TABLE 7: Percent of Expectations at Various Cognitive Demand Load Levels

	FL 6–8	LA 5–8	WA 5–8	CB Math I/Alg	FA 9–12	LA 9–12	WA 9–12	CB Geom–PreCal
1. Remembering	1.5	1.5	1.5	0	1.5	5	0	0
2. Understanding	34	32	15	14.5	23.5	23.5	8.5	0
3. Applying	56	54	76.5	74.5	61	57	82.5	64
4. Analyzing	4	6	3.5	7	7	1.5	4.5	27
5. Evaluating	1.5	6	1.5	0	4	8	2	9
6. Creating	2.5	1.5	1.5	3.5	2.5	5	2	0
Average Load	**2.8**	**2.9**	**2.9**	**3.0**	**2.9**	**3.0**	**3.0**	**3.5**

The final row in Table 7 provides a rounded average weighted load assigned to the demand levels; this is computed by multiplying the percentage of occurrences at a demand level by the associated numerical level of that level, summing over the two raters' levels, and rounding to the nearest tenth. This results in an “average” level that rates the expectations in the various documents.

While there is no specific standard for rigor based on cognitive demand, the two levels of analysis suggest that the Florida expectation statements may be less demanding in their cognitive intents that are expectation statements in other standards. An average level of 3.0 would indicate, on average, one expected students to be able to apply their knowledge in solving problems similar to or slightly harder than their classroom exercises. Scores of 3.5 or higher would indicate that the set of standards expected a modicum of reasoning skills that include some ability to make analyses, develop justifications, or create unique solutions.

The third lens for examining rigor is to examine the sets of expectations themselves to see if they specifically highlight processes as separate standards or through pervasive use of process language in the statement of standards or expectations. This analysis found that while each set of documents made use of the processes found in the NCTM’s *Principles and Standards* (2000) document (reasoning, problem solving, representing, connecting, and communicating), only one of the documents had an special structural focus on these processes. This was the state of Washington’s Essential Academic Learning Requirements (EALRs) (Washington State Office of Superintendent of Public Instruction, 2004).

The structure of the Washington standards, or EALRs, is quite different from what is found in other states. This difference is centered on how the Washington State Office of the Superintendent of Public Instruction addresses the issue of cognitive processes students ought to know in developing their standards. They structured the material around five requirements. The first one contains all of the content-related references. The remaining four deal with the following:

- Solving problems
- Reasoning logically
- Communicating understanding
- Making connections

This set of standards provides a good contrast in format for the Florida revision process. Additionally, the Washington standards are more developmentally based than most standards. In coding the content aspects of the Washington standards, only the first requirement was used, in order to permit content comparison with the standards of Florida, the College Board, and Louisiana.

The foregoing analyses provide perspectives from which one can address the question of whether the Florida mathematics standards are intellectually challenging enough to equip students with the knowledge and skills they will need to succeed in mathematics at the postsecondary level.

The Florida standards, benchmarks, and GLEs have done a credible job of detailing an outline for school mathematics across the grade span from grade 6 through the end of high school. The *Sunshine State Standards* have adopted a framework that provides identifiable and understandable clusters of content from the perspective of the layperson and the mathematics curriculum staff and teachers. However, at the same time, these expectations seem to demanding less of students than comparable sets of standards. At the high school level, there are questions regarding whether the scope of the standards and benchmarks, without GLEs, is sufficient to define a program of study that will prepare Florida students to compete successfully in postsecondary studies involving mathematics. Based on the expectations available only in standards and benchmarks, it appears that the program outlines only a minimal program in secondary school mathematics.

While the content covered in the GLEs and outlined in the grade 9–12 benchmarks is developmentally appropriate for student study, several modifications could be made to render the content more focused for both teaching and learning. An examination of the comments from the qualitative analysis of the Florida frameworks in Appendix E makes suggestions at the GLE level. Globally, the Florida Department of Education should work to remove the unnecessary duplication of several GLE statements on the same topic at a given grade level, lessen the breadth of coverage of other benchmark statements, and sharpen the verbs indicating what is expected at the terminal level of cognitive behavior associated with each expectation. In particular, students should be able to use content to analyze problem situations and evaluate the validity of generalizations about statements applying to situations found in various problem contexts. More suggestions about specific content that might be added will be discussed later.

At present the Florida standards, as well as standards in many other states, provide little guidance to teachers or place comparatively low levels of cognitive demand on students relative to reasoning, problem solving, or communicating with the mathematics outlined by the documents. The Washington standards provide an example of how processes can be integrated into a set of state mathematics standards. Efforts and expectations must focus on moving students to be successful in contexts where they must be able to apply their knowledge in contexts beyond those encountered in classroom settings.

FINDING: The Florida standards, benchmarks, and GLEs provide a listing of content expressed in an interpretable format for the public and teachers and others interested in school mathematics in grades 6–12. The language is appropriate and clear. The present version of the standards need additional work to increase the cognitive level of student expectations to ensure that Florida students can successfully enter postsecondary study in programs involving mathematics. The amount of repetition in the program, combined with several missing topics of study in grades 9–12, places Florida students at risk as they move to the study of postsecondary mathematics at the college level.

Focus: *Have appropriate choices been made about what is important for students to learn?*

Each of the various sets of standards, benchmarks, and performance expectations differ in their descriptions of what students should know and be able to do. The following table provides an analysis of the number of statements used in the comparisons contained in Table 7. This provides a sample of the "grain-size" of the various sets of recommendations.

TABLE 8: Distribution of Expectations by Grades Across Documents

	FL 6–8	CB Math I/Alg	LA 5–8	WA 6–8	WA 9–12	FA 9–12	CB Geom – PreCal	LA 9–12
Number of Standards/Grade	5	6	6	5	5	5	4	6
Average Number of Benchmark Areas/Grade	34	14	36	30	30	36	11	35

The Florida standard documents, especially at the performance expectation levels found in the GLEs, contain too many statements of what students should know and be able to do by grade level. This type of guidance leads to the development of checklist approaches to monitoring the flow of curriculum, rather than to focus on the "big ideas" of what students should know and be able to do. Further, as the results of the qualitative analysis of the Florida documents, contained in Appendix E, show, there is a great deal of repetition of expectations within these documents and other expectations are still too broad in scope. Florida needs to decrease the number of benchmarks and focus the expectations under them in clear ways—both on content and cognitive levels appropriate for each grade's role in the envisioned curriculum. The sequencing of the skills and processes within the Florida curriculum are appropriate, but contain too much overlap, or repetition, to define clear expectations for each grade level. Removal of overlap and careful insertion of a few missing topics, combined with a bit more of specificity, will greatly increase the potential impact of the standards.

The sequence of expectations in the Florida documents reflects the original *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989). The added emphasis on processes that came with revised NCTM standards in 2000, *Principles and Standards for School Mathematics*, is not evident in the Florida materials. A comparison of the GLEs in the grade 6–8 materials shows alignment to the *NAEP Mathematics Framework* for 2005 (NAGB, 2005).

FINDING: In general, the Florida standards materials have made appropriate selections of material for grades 6–8, but have not delineated it specifically enough to structure curriculum at the grade levels. In grades 9–12, additional topics need to be added to assure students have the requisite knowledge to compete in mathematics at the postsecondary level. At all levels, attention should be given to adding language related to the processes of reasoning, problem solving, and communication.

Balance: *Do the standards exhibit balance in terms of focus on understanding, fluency, problem solving, and reasoning?*

The data related to the cognitive demands found in Table 3 can be collapsed to reflect the percentages of benchmarks related to remembering and understanding; applying; and analyzing, evaluating, and creating. Linking these three categories to understanding, applying, and reasoning, respectively, yields the average percentages of document focus shown in Table 9. The Washington data has been removed because the original analysis did not include the focus on processes in EALRs 2 through 5. An analysis of the percentages, comparing the Florida distributions with those from the College Board and Louisiana recommendations, indicates that the Florida recommendations tend to focus more on remembering and understanding and less on reasoning.

TABLE 9: Percent of Expectations at Various Cognitive Demand Load Levels

	FL 6-8	CB Math I/Alg	LA 5-8	FA 9-12	CB Geom-PreCal	LA 9-12
Understanding	35.5	14.5	33.5	25	0	28.5
Applying	56	74.5	54	61	64	57
Reasoning	8	10.5	13.5	13.5	36	14.5

As students progress from grade 6 to grade 12, the emphasis on number/operation and measurement decreases and the influence on algebra and probability/statistics increases. While no national standards for this balance exist, the suggested levels of emphasis for the *NAEP Mathematics Framework* (NAGB, 2005) might be taken as indicators of the level of expectations expected in an assessment by area. Using this data and the Florida distribution of benchmark statements yields the comparisons in Table 10.

TABLE 10. Percent of Content Allocation to Standard Areas by Florida and the NAEP Mathematics Framework.

Grade	Number and Operation	Measurement	Geometry	Algebra	Probability and Statistics
4TH NAEP	40	20	15	15	10
6-8 FL	32	26	11	11	18
9-12 FL	33	22	14	11	19
12TH NAEP	10	30		35	25

*At the grade 12 level, the table entry for the *NAEP Mathematics Framework* (NAGB, 2005) combines the geometry and measurement content allocations, as it is hard to separate the areas at that level.

An analysis of the percents in Table 6 suggests that Florida's documents are fairly well aligned, with the possible exception of measurement and probability and statistics, at grades 6-8. However, the grade 9-12 emphases place too much emphasis on number and operation and too little on moving to algebra and probability and statistics.

FINDING: As this analysis shows, and as the careful qualitative analysis in Appendix E indicates, the Florida standards do not increase focus on algebra and data analysis reasoning as students move through the middle and secondary levels of education. Work needs to be done to reshape the emphases, especially in grades 9–12, to reflect the expectations found in both the Principles and Standards for School Mathematics (NCTM, 2000) and the NAEP Mathematics Framework (NAGB, 2005), as well as other documents dealing with preparatory mathematics for postsecondary study.

Progression: *Do knowledge and skills build clearly and sensibly on previous learning and increase in intellectual demand from year to year?*

The data from the comparison of the Florida GLEs with the new GLE documents from Louisiana and Washington indicate that the Florida GLE expectations often have very small grain-size. While the standards and benchmarks are of appropriate levels of detail, the GLEs often appear to be detailing sections of a textbook chapter. The present revision process will need to concentrate on providing a more thorough, organized, and focused set of expectations for teachers. This can be done through the following:

- Listing major focal points for grades (probably numbering six or less per grade)
- Detailing, perhaps in prose form, the link between these foci and the expected prerequisite knowledge from a prior grade

- Eliminating repetition of the prerequisite knowledge from the expectation statements at the subsequent grade.
- Establishing a consistent grain-size for expectations so that there are not more than 25–30 expectations per grade level

The Florida standard statements provide a vision of growth from grades 6–8 to grades 9–12. This is especially evident when one reads further into the benchmarks and GLEs. However, the progression resides, to a great deal, in the inferences made by the reader. Little is explicitly done to reflect carefully the exact content at any grade level. Rather, it is the gradual shifting across grade levels of the descriptions that provides the notion of increasing expectations with changing content. The standards need to have more specificity within the intervals of content currently in the statements at a given grade level. For example, consider the following comparable performance expectations from grades 6, 7, and 8 associated with the same benchmark:

Benchmark MA.A.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.
Grade 6 GLEs
1. knows word names and standard numerals for whole numbers, fractions, decimals (through hundred-thousandths), and percents.
2. reads and writes whole numbers and decimals in expanded form.
Grade 7 GLE
1. compares and orders integers, fractions, decimals, numbers with exponents, and numbers expressed as percents or in scientific notation, including ordering on a number line.
Grade 8 GLEs
1. compares and orders fractions, decimals, integers, and radicals using graphic models, number lines, and symbols.
2. compares and orders numbers expressed in absolute value, scientific notation, integers, percents, numbers with exponents, fractions, decimals, radicals, and ratios.

In comparing the statements, one can see progression in the expectation from grade 6 to grade 7. Again, growth is evident in the movement from grade 7 to grade 8, but there is substantial overlap relative to the nature of expectations for fractions, decimals, and integers—as well as overlap within the grade 8 statements themselves. This needs a thorough reworking across the documents to bring forth the big ideas by grade level relative to expectations and to reduce the overlap both across grades and within grades.

The Florida standards and related expectation materials do not contain any connections to other disciplines, and the amount of connections among areas of mathematics is very minimal and basically the result of reader inference. The one place where this is more visible is in the statistics expectations. Similar statements can emerge about real-life settings in the other mathematics statements.

The Florida materials are arranged so that the standards are elaborated by benchmark statements that provide a statement of what performances would enable one to achieve the standard. At grades 6–8, these benchmark statements are further elaborated by the GLEs at the individual grade levels. No such comparable statements exist for grades 9–12.

FINDING: While the Florida standards documents provide a vision of the progression of content across grades 6–8 and a notion of what is expected by grade 12, they do not provide enough information to provide a backbone for curriculum design, teaching, or assessment. A statement indicating where mastery is expected and what prerequisite knowledge is expected for a given year will help clarify this issue for teachers and curriculum specialists. Such statements might be made in an opening set of paragraphs prior to a listing of content and process expectations. Considerable work focusing on prerequisite knowledge mastered in prior years, foci in given years, and elimination of repeated content will greatly assist in moving to a clearer vision of progression and level of expectation at each grade.

Specificity: *Are the standards specific enough to convey the level of performance expected of students?*

The Florida standards would benefit from a more narrow and focused approach when it comes to identifying expectations. Their present state allows for the broad structuring of curriculum, but this is only possible through the listing of concepts. There is little to guide in what years those concepts will be the specific focus of the curriculum or what cognitive skills students are expected to develop in a given grade with these concepts and processes.

The grain-size of the objectives is inconsistent. For example, consider the materials dealing with the GLEs for the early number work displayed in relation to Benchmark MA.A.1.3.1. Here, it is difficult to ascertain just what is to be done with fractions and decimals in a given year, as they are mentioned for each of the years. At the same time, other expectations are of exceedingly small grain-size and, sometimes, repetitive even at this level of specificity.

Consider, for example, the following expectations for the topic of tessellations:

Benchmark MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).
Grade 6 GLEs
1. constructs tiling patterns to cover a plane.
2. identifies a tessellation.
3. identifies geometric shapes that can be tessellated.
4. tessellates using translation and other desired transformations.
Grade 7 GLEs
1. predicts and verifies whether a given shape or shapes will tessellate.
2. given a simple tessellated pattern, determines the shape(s) and transformation(s).
3. tessellates using reflection, translation, or rotation and any desired combinations.
Grade 8 GLEs
1. continues a tessellation pattern using the needed transformations.
2. creates an original tessellating tile and tessellation pattern using a combination of transformations

Here we have the example of a topic that would not be considered a core geometry topic nationally for each of these grades. It receives as much attention as the earlier expectations for number. However, one can see the growth involved.

Consider, on the other hand, the following expectations for dealing with precision and accuracy in measurement:

Benchmark MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.
Grade 6 GLEs

1. selects an appropriate measurement tool (for example, scales, rulers, thermometers, measuring cups, protractors, gauges).
2. determines the interval of a scale and reads the scales on a variety of measuring instruments.
3. measures accurately with the measurement tools.
Grade 7 GLEs
1. selects the appropriate unit of measure for a given situation.
2. knows the precision of different measuring instruments.
3. determines the appropriate precision unit for a given situation.
4. identifies the number of significant digits as it relates to the least precise unit of measure.
5. determines the greatest possible error of a given measurement and the possible actual measurements of an object.
Grade 8 GLEs
1. determines the level of accuracy and precision, including absolute and relative errors or tolerance, required in real-world measurement situations.
2. selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.

Based on the number of expectations given to it, we see a rather heavy focus on precision and accuracy with measurement, which is not a core objective nationally. Further, there is considerable overlap with respect to the selection of instruments and the determination of precision. Revisions of the document must take into account increasing specificity for core objectives and reducing redundancy for non-core expectations. At the same time, the non-core expectations need to be centralized and dealt with clearly and concisely where placed.

Even with the number of expectations contained in the present form of the document, there is inadequate precision in the statements to guide the development of a test that would be carefully aligned with the document. This is due to the repetition and lack of focus per grade, as well as the lack of some specification of the cognitive levels associated with particular expectations.

An examination of the secondary expectations for grades 9–12 indicates that the content is appropriate, but not detailed enough to know the level or breadth of performance expected of all students. This listing of topics would be improved by the development of an accompanying set of

GLEs for, at least, Algebra I, Geometry, and Algebra II. Such an enhancement should be carefully developed so as not to exclude programs that are using integrated materials.

Within such a detailing of GLEs for grades 9–12, Florida may wish to carefully consider the inclusion of more material on functions as a unifying concept for algebra and the study of geometry (transformations). Expectations might include statements about the behavior of graphs of functions and the interpretation of such graphs. Other content might be about the use of functions as models, including trend lines. The materials on sequences and series mention recursion, but this might be expanded to note the role recursion plays in compound interest and other topics. Here is a good place to bring in expectations about the use of calculators and computers, especially spreadsheets, as an expectation.

The content listings relative to solving equations might mention specifically the quadratic formula and matrices as tools. Again, here is another place where graphical behavior and computational fluency are important, especially using technology to estimate and solve for solutions of equations and systems of equations.

The outcomes in statistics for grades 9–12 are appropriate, but would be greatly improved by the addition of expectations following suggestions to be found in the American Statistical Association's forthcoming standards (in press). Here again, the ability to use technology, both graphing calculators and statistical software/spreadsheets, is of great advantage to students who will continue their education past the secondary school level.

Finally, the present set of expectation does not specify what knowledge or fluency students are expected to have developed relative to technology (graphing calculators, computers, geometry or statistics software, etc.) at various points in the curriculum. Given the pervasive presence of technology in the classroom and the role of visualization and interpretation in the curriculum, the Florida Department of Education should make the addition of such statements a part of the revision. Such information will guide both content selection and teaching.

Clarity: *Are the standards written in language that is clear, free of jargon, and can gain widespread acceptance from teachers, administrators, school boards, and parents?*

Although much of the language in the standards is familiar to teachers, there are many places, especially in the GLEs, in which examples of what is meant would clarify the message. For example, students at grade 6 are to express numbers in expanded notation. It is not clear until reading subsequent grades that this does not involve exponents. This could be made clear by either giving an example or specifying whether or not exponents are used. Examples often help the administrators, school boards, and parents understand the standards.

The wording of the standards, although using the necessary technical terms, is not the main problem. It is the lack of ability to see the big picture or focus for each grade level and understand the parameters of the numbers, geometric shapes, algebraic expressions, and such that are being used.

Equity: Are the performance expectations written in such a way that teachers and administrators may differentiate the curriculum and instruction to enable all students to achieve the rigorous objectives?

The Florida standards, benchmarks, and expectations, when clarified, build in a logical way that will support students' learning of mathematics. Since all strands include some reference to conceptual understandings, skills, and problem solving, they allow for a variety of approaches to help students reach the expectations. However, appropriately, they do not specify the instructional delivery or specific curriculum. They do specify expectations that cannot be met by a curriculum that only stresses skills or by instruction that does not encourage understanding.

SUMMARY: MATHEMATICS

This review of Florida's *Sunshine State Standards for Mathematics* has found that the current version of the state's expectations has developed a good conceptual framework for clustering content and developing the related sequence of standards, benchmarks, and GLEs. However, the content and processes covered within this framework are in need of an update and extension to provide quality guidance to the teachers and curriculum specialists involved in the teaching and learning of mathematics in Florida schools.

The present form for the expectations in Florida's standards does not provide a clear or rigorous foundation for the selection of content or focus on processes that are expected to be the center of teaching and learning activities year-by-year. While the documents are generally aligned with the global nature of the NCTM and NAEP recommendations, the foci of the documents need to be sharpened and better balanced to reflect a contemporary view of middle and secondary school mathematics. Less work needs to be done with number and measurement in 9–12, and greater emphasis needs to be given to algebraic thinking and what to do with data and probability. Further, the lack of emphasis on technology, reasoning, and applications of mathematics beyond those directly encountered in the classroom limits the capabilities of students to make productive use of their mathematics in problem-solving situations.

This judgment is based on a number of factors, the most important of which is the lack of focus and curricular connectedness that results from the lack of clear expectations for what is mastered and what is prerequisite at each grade level. Students and teachers need standards and expectations that are clear and concise. Such standards help teachers plan and deliver quality instruction with expectations for student growth. At the same time, such clarity and the progression that goes with it help students organize their learning and prepare for important assessments in an orderly way.

Any revisions should focus on identifying big ideas that overarch the grades, locating the portion of the topics important to each grade level, determining the grade-specific aspects of these ideas, and expanding them with one or two performance expectations per year. In making such revisions, one must remove repetition across adjacent grades and adjust the cognitive levels of performance expected to include more reasoning.

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PROJECT DIRECTOR

Arthur VanderVeen

Senior Director

Curriculum and Evaluation Standards

The College Board

LANGUAGE ARTS WRITERS AND REVIEWERS

Linda Ferreira-Buckley

Professor

Division of Rhetoric and Composition

Department of English

University of Texas at Austin

David Jolliffe

Professor of English

Department of English

DePaul University

Jeanneine Jones

Professor

Department of Middle, Secondary, and K-12 Education

University of North Carolina at Charlotte

Danielle McNamara

Associate Professor

Department of Psychology

The University of Memphis

Charles Peters

Professor

School of Education

University of Michigan

Rebecca Sipe

Associate Professor

Department of English Language and Literature

Eastern Michigan University

MATHEMATICS WRITERS AND REVIEWERS

John Dossey

Retired Past President

National Council of Teachers of Mathematics

Distinguished University Professor Emeritus of Mathematics

Illinois State University

Mary Lindquist

Retired Past President

National Council of Teachers of Mathematics

Callaway Professor of Mathematics Emeritus

Columbus State University

Leah Casey Quinn

Pre-K–12 Mathematics Supervisor

Montgomery County Public Schools

ASSISTED BY MEMBERS OF THE COLLEGE BOARD'S STANDARDS ADVISORY COMMITTEE IN MATHEMATICS AND STATISTICS:

Katherine Halvorsen

Professor of Mathematics

Smith College

Bernard Madison

Professor of Mathematics

University of Arkansas

Alfred Manaster

Professor of Mathematics

University of California at San Diego

Robin O'Callaghan

Senior Content Specialist, Mathematics

The College Board

Steve Olson

Lecturer at Northeastern University

Mathematics Teacher at Hingham High School

Hingham, MA

Mary Morley

Senior Content Specialist, Mathematics

The College Board

William Speer

Professor, Curriculum and Instruction

University of Nevada

Judith Wells

Mathematics Curriculum Specialist

Shaker Heights City School District

Appendix A: Further Recommendations for Writing

Progression

Following are instances within the Florida Writing standard where the language of the GLEs does not articulate a clear progression of developing skills in writing, with recommendations for how the GLEs could be improved.

Instances of concern in grades 6 to 8

1. Concepts as presented do not lead from the general in grade 6 to appropriate mastery by grade 8. Rather, concepts and GLEs often do not change at all, which would result in flat growth at the grade cluster presented.

Examples:

Benchmark LA.B.1.3.1

Sixth:

Knows possible prewriting strategies for different writing tasks

Uses a prewriting strategy suitable for the task (for example, brainstorming, using a graphic organizer, listing ideas)

Experiments with various prewriting strategies to accommodate individual learning style.

Eighth:

Knows possible prewriting strategies for different writing tasks

Uses a prewriting strategy suitable for the task (for example, brainstorming, using a graphic organizer, listing ideas)

Experiments with various prewriting strategies to accommodate individual learning style.

Benchmark LA.B.2.3.2

Sixth:

The student organizes information using alphabetical, chronological, and numerical systems.

Seventh:

The student organizes information using alphabetical, chronological, and numerical systems.

Eighth:

The student organizes information using alphabetical, chronological, and numerical systems.

Suggestions for addressing this concern in grades 6 to 8

Carefully determine appropriate expectations for Florida eighth graders and design backwards from this targeted outcome goal. In doing so, scaffold both student performance expectations and the teacher's instructional opportunities. This should in turn inform the development of Standards for grades 9 through 11, which do not currently exist. All told, the state should then be able to present a composite picture of the college freshman who is capable and ready for success.

Second, in many instances it is both appropriate and desirable to build upon earlier instruction. However, it is sometimes difficult to know how the Florida standards directly inform this developmental spiral. To address this, the state might consider a coding system that would help teachers understand that certain skills, concepts, and behaviors are to be introduced for specific purposes, like general awareness, as the subject of direct teaching, or reinforced in daily practice. (e.g., I for introduction, E for extending through direct instruction, R for reinforcing).

2. Grade Level Expectations sometimes limit their description of skill, concept, and ability to merely extending the previous grade's expectations, rather than increasing them.

Examples:

Benchmark LA.A.1.3.4

Eighth:

Refines previously learned knowledge and skills of the seventh grade with increasingly complex reading texts and assignments and tasks

Benchmark LA.A.2.3.5

Seventh:

Extends previously learned knowledge and skills of the sixth grade with increasingly complex texts and assignments and tasks

Eighth:

Extends previously learned knowledge and skills of the seventh grade with increasingly complex texts and assignments and tasks

Suggestions for addressing this concern in grades 6 to 8

This lack of specificity may be addressed through more careful description of the key concepts to be targeted at each grade level and by developing a coding system as described above in the suggestion corresponding to Concern 1.

3. Grade Level Expectations are not sufficiently detailed for teachers to fully understand what level of sophistication is expected for the skills, concepts, and abilities to be addressed in their instruction. This is particularly problematic at the sixth grade level, as instruction in grade 6 must lay a sound foundation for grades 7 and 8.

Examples:

Benchmark LA.E.1.3.2

Sixth:

describes or illustrates the setting of a literary text

Benchmark LA.E.1.3.3

Sixth:

Recognizes and understands elements of author's craft (including but now limited to symbolism, figurative language, flashback, foreshadowing)

Benchmark LA.D.1.3.4

Explores origin and historical development of words

Benchmark LA.D.2.3.3

Sixth:

Understands differences between propaganda and logical reasoning strategies

Benchmark LA.E. 2.3.5

Sixth:

Knows different literary approaches that are used in the study of literature

Suggestions for addressing this concern in grades 6 to 8

At an appropriate level of instruction, all of the above skills, concepts, and abilities offer sixth graders the exciting possibility of challenging and meaningful experience. However, these are also quite sophisticated and must be grounded in solid knowledge on which additional foundations can be laid in later years. Therefore, more specificity is needed if teachers are to clearly understand the developmental spiral that their curriculum and instruction will strive to achieve across the grades.

4. Occasionally the GLEs employ circular reasoning and use descriptions that require a teacher to know exactly what grade-appropriate text, notes, outlines, comments, and observations look like.

In other words, in what ways do these practices change from grade to grade, and how is this maturation in knowledge and skill made obvious to the teacher?

Examples

Benchmark LA.B.2.3.1

The student writes text, notes, outlines, comments, and observations that demonstrate comprehension of content and experiences from a variety of media.

Sixth:

Writes notes, outlines, comments, and observations that reflect comprehension of sixth grade level or higher content from a variety of media.

Seventh:

Writes notes, outlines, comments, and observations that reflect comprehension of seventh grade level or higher content from a variety of media.

Eighth:

Writes notes, outlines, comments, and observations that reflect comprehension of eighth grade level or higher content from a variety of media.

Suggestions for addressing this concern in grades 6 to 8

Skills must certainly be reinforced from one grade to the next, which sometimes requires explicit instruction. Without this reinforcement, the student's understanding and use of the skill is superficial; sometimes it is lost altogether. The key question then becomes: How do these skills build upon one another with the necessary repetition and review but without excessive duplication?

Instances of Concern in grades 9 to 12

1. Florida articulates exit standards for grade 12 but does not map the grade level expectations for grades 9, 10, and 11. Therefore, there is no insurance that students will acquire component skills and sub-skills necessary to progress toward the specified goals. The skills expected of high school graduates are themselves the culmination of mastery of many sub-skills, each of which must be taught in a carefully sequenced progression.

Suggestions for addressing this concern in grades 9 to 12

Develop GLEs for each of the grades, 9-12. For each skill, concept, and behavior, provide guidance as to the appropriate level of instructional emphasis. In other words, at grade level, are teachers introducing a concept or is the instruction targeted for mastery? This type of guidance is important for clear instructional planning.

As in the middle grades, concepts presented in grade 12 do not build from the general work presented in lower grades, but in this case, appear to merely summarize them with minimal further expectation for growth, deeper study, and mastery.

Suggestions for addressing this concern in grade 12

Carefully determine the level at which a Florida high school senior should function, and then build an appropriate trajectory toward this outcome goal. In doing so, scaffold both student performance expectations and the teacher's instructional opportunities. This should then inform the development of standards for grades 9 through 11, which do not currently exist.

Expectations define a course of study that is too broad and, consequentially, superficial. Most noted among these is the lack of deep research skills, which are not only needed but also expected of those entering the nation's colleges and universities.

Investigate those things that Florida colleges and universities expect entering freshmen to have mastered in the English language arts field, and develop performance expectations that address these from the lower grades through high school, with mastery obviously targeted at grade 12. A command of research skills and deeply writing across genres should be included in the developmental details.

Rigor

Florida standards are generally appropriate at each level presented, grades 6 through 8, and should ensure that students are reasonably prepared for high school. This does not appear to be true for the high school senior entering college, however. This opens the door to specific concerns that should be addressed. For example, the middle school standards (and obviously the high school) do not present a broad range of cognitive skills that are delineated from grade to grade. Also, the high school standards do not present a wide variety of writing skills that, when mastered, would provide students with the intellectual and experiential equipment necessary for independent success in college.

Instances of Concern in grades 6 to 8

1. The cognitive skills expected, when viewed holistically, do not push students into the full range of developmental potential in a single grade, and do not delineate the developmental progression of skills and knowledge between grades.

Examples:

Benchmark: LA.B.2.3.1 requires that students in all three grade levels display the identical skill of "Writes notes…"

Benchmark LA.B.2.3.2 requires that students at all three levels "Logically sequence…:

Benchmark LA.B.2.3.3 requires that students at all levels display the identical skill of "Select and use…"

Other expectations include such things as "follows, paraphrases, expands and enhances, and formulates," again, with many performance expectations identical from one grade level to the next. Therefore, there is no clear developmental definition between even a sixth grader and an older eighth grader.

Suggestions for addressing this concern in grades 6 to 8

Because the descriptive grade level expectations do not vary, the cognitive action does not either. This could obviously lead to flat growth across grade levels. Florida should carefully delineate the expectations for students in each of the three grades, which would then ensure ongoing growth and appropriate development. Further, these skills should move progressively from lower level thinking and application skills to higher level thinking along a specified trajectory; one example includes: from remembering to understanding to applying to analyzing to evaluating, and finally to creating.

2. Breadth of topic is missing from the standards presented; for example: linkages between personal life and classroom writing situations, fluid and independent work across a variety of traditional genres, and experience with gathering material appropriate to primary and secondary research.

Suggestions for addressing this concern in grades 6 to 8

Florida should carefully embed multiple opportunities for developing writers to work intensely with many topics and situations to ensure full mastery, and thus high school into college success. Chief among these is an emphasis on writing across the genres and a full application of skills appropriate to the developing researcher. Again, as mentioned in the first concern, these emphases should be carefully delineated across grade level and should account for increasingly deeper thinking and production skills.

Instances of Concern in grades 9 to12

1. As noted earlier, Florida presents exit standards for grade 12 but does not actually articulate the grade level expectations (after grade 8) that will move students to these final goals. Therefore, there is no clear way to assess for the potential rigor at high school below grade 12. Expectations for grade 12 do not describe the self-monitoring and self-direction that would be expected of the fluent and experienced writer graduating from high school.

Suggestions for addressing this concern in grades 9 to 12

Develop GLEs for grades 9-12, carefully scaffolding both exit expectations and potential instructional opportunities, while spiraling skills up the grades rather than merely repeating them. At all high school levels, account for a full array of relevant writing opportunities that build to freshman college success; for example, writing fluently across all genres, engaging deeply in the nuances of research, crafting the author's persona to suit the purpose for writing, establishing text credibility, and developing the ability to share that expertise in situations that call for peer conferencing and editing.

Focus

Florida has made some progress toward a specified focus in its writing standards, but there are areas that should be targeted for improvement. For example, there is no clear, tight progression from the beginning GLEs in grade six to the exit standards in grade twelve that would lead to deep mastery of the knowledge and skills needed for college readiness.

Instances of Concern in grades 6 to 8 and in grades 9 to 12

The state's Standards do not supply the spiraling progression of deep knowledge acquisition traditionally found in documents with clear focus. Rather, they introduce content and skills in grade 6 that often repeat verbatim throughout the whole of a child's years in middle school, only to reappear in summary fashion in grade 12. The organizing Benchmarks throughout the document are not robust enough to suggest or support clear focal points for strong curriculum development. The Benchmarks define a course of study that is too broad and, consequentially, superficial. The resulting curriculum will likely be ineffective in helping students develop the self-monitoring and self-direction characteristic of expert writers.

Suggestions for addressing this concern in grades 6 to 8 and in grades 9 to 12

Florida should reconceptualize its writing standard, developing more robust Benchmarks that will organize writing instruction and opportunities to write around the primary elements of rhetorical analysis and the writing process. Initial topics to be considered should include, among others: personal and formal research, a full study of genre, an understanding of and profound value for the revision process, writing across content areas, and literacy as a critical part of the democratic process.

Specificity

The Standards are generally not specific enough to guide teachers and students in their daily teaching and learning. For example, a large Benchmark expectation may lead teachers to understand the broad nature of topics to be taught, but then there is no guidance provided as to how this breaks down by grade level.

Instances of concern in grades 6 to 8

1. Florida does not always specify and fully develop genres for instruction, which makes it likely that students will not be provided adequate immersion in a full range of discursive modes. Instead, substantial amounts of instructional time may be devoted to a narrow band of genres representing those that are familiar and most often tested. As an illustration of this, note the example below. Here the larger Benchmark descriptor does provide general direction, but it fails to specify the details required by teachers at grade levels. For example, the GLE calls for persuasive discourse, but does not specify persuasive essays, letters, or the like. As a result, the types of skills described in the GLEs do, in fact, vary by genre, purpose, and audience, but it is then left to the teacher to decide how all of this merges and to determine what types of genres and strategies students may have been taught in earlier grades.

Examples:

Benchmark LA.B.2.3.3

The student selects and uses appropriate formats for writing, including narrative, persuasive, and expository formats according to the intended audience, purpose, and occasion.

Sixth:

Selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository)

Seventh:

Selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository)

Eighth:

Selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository)

Suggestions for addressing this concern in grades 6 to 8

Creating GLEs that are developed to explicate specified genre more fully will provide a systematized set of sub-skills and strategies to ensure that students leave middle school fully prepared for the increased academic rigor of high school and college.

The Standards do not articulate a sequence of research-based writing experiences, which will not fully prepare students to understand the role of research in school and in everyday life. Skills such as the identification and refinement of research questions and the identification of both primary and secondary source materials are critical to solid research skills and to eventual college success.

Suggestions for addressing this concern in grades 6 to 8

Clearly describe through Benchmarks and GLEs the types of primary and secondary research skills students should master. In GLEs for each grade level provide guidance regarding the types of products that should emerge from research (e.g., collaborative investigation into the opinion of peers on an important issue at the school leading to a panel presentation or letter to the school newspaper presenting the findings).

Because grade level expectations rarely change, they are not challenging to older students. Often, however, it is only a lack of detail that makes this so, or as in the examples below, an emphasis on format rather than a full understanding of the nuances dictated by a particular genre. This offers multiple opportunities to embed additional detail and study into the Standards. Topics to consider for additional study should include, for example: building toward an internalized process for various writing tasks, such as prewriting and editing; deeper work across genres (as seen below); research writing based on both primary and secondary sources; and the exploration of audience as a participating member in the writing process.

Examples:

Benchmark LA.B.2.3.3: The student selects and uses appropriate formats for writing, including narrative, persuasive, and expository formats, according to the intended audience, purpose, and occasion.

Sixth:

Selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository)

Seventh:

Selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository)

Eighth:

Selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository)

Suggestions for addressing this concern in grades 6 to 8

Detail topics and performance expectations already expected at grade 8 after they are introduced at grade 6. After that, embed additional topics into those currently presented by the state, including research that relies on the use of both primary and secondary sources.

Instances of concern in grades 9 to 12

1. A lack of development within the Benchmarks and grade Level Expectations results in a general lack of specificity within the high school standards. For instance, the absence of specifics relating to genre presents concerns on multiple levels within the grades 9-12 Standards, and particularly when they are assessed in terms of preparation for college. As illustration, the Standards do not reference genre at all, but rather hint at it, as seen in the example below. This creates a two-fold problem: First, burying the concept obscures the critical role that genre plays in writing tasks. Second, common research shows that the very concept of genre must itself be taught, so that students can differentiate among genres, while purposely and appropriately employing the conventions of each. When targeted across grade levels, this results in the high school graduate who can write well in many genres, including argumentative and persuasive academic essays, rhetorical analyses, literary analyses, and narratives.

Example:

Standard 2: LA.B.2.4

Writes fluently for a variety of occasions, audiences, and purposes, making appropriate choices regarding style, tone, level of detail, and organization

Suggestions for addressing this concern in grades 9 to12

Genre and its conventions should be carefully delineated across Benchmarks and GLEs, and should permeate much of what writers think and produce at the high school level.

2. As in grades 6-8, the Standards do not articulate a sequence of research-based writing experiences, which will not prepare students to understand the role of research in school and in everyday life. Deep development of these skills is absolutely critical to college success.

Suggestions for addressing this concern in grades 9 to12

Clearly describe through Benchmarks and GLEs the types of primary and secondary research skills students should master. In GLEs for each grade level provide guidance regarding the types of products that should emerge from research (e.g., collaborative investigation into the opinion of peers on an important issue at the school leading to a panel presentation or letter to the school newspaper presenting the findings; a senior project that includes primary and secondary research).

3. Literary criticism is largely overlooked in the high school standards. The examples below target the only GLEs that approach this very significant skill of examining texts from perspectives other than our own. Implicit in these two Benchmarks is the use of transactional (reader response) and historical criticism. By the time students exit high school, it is highly recommended that they also think about various genres of literature through the lens of Feminist, Cultural, and Marxist criticism. Doing so will more adequately prepare students to enter and understand the highly complex, multicultural world in which they live.

Examples

LA.E.2.4.7 Examines a literary selection from several critical perspectives

LA.E.2.4.8 Knows that people respond differently to texts based on their background knowledge, purposes, and point of view

Suggestions for addressing this concern in grades 9 to12

Develop Benchmarks that clearly articulate the range of experiences with literary criticism that high school students should master if they are to anticipate college and workplace readiness.

Clarity

The Florida State Standards for grades 6-8 are not always clear. This lack of clarity often results simply from the document's imprecise use of terminology. In other words, the standards shift their definitions of words and concepts from Benchmark to Benchmark, and often within the grade levels themselves.

Instances of concern in grades 6 to 8

1. The use of the terms "format" and "formatting" is unclear. For example, note the dual use of this word's meaning in the benchmarks that follow. In some cases, the word formatting indicates physical layout, while in others, the genre or type of writing. This shifting word usage results in multiple problems for the classroom teacher, and eventually for the learner.

Examples:

Benchmark LA.B.1.3.3.

The student produces final documents that have been edited for

- Correct spelling
- Correct punctuation, including commas, colons, and semicolons
- Correct capitalization
- Effective sentence structure
- Correct common usage, including subject/verb agreement, common noun/pronoun agreement, common possessive forms, and with a variety of sentence structure, including parallel structure; and
- Correct formatting.

Sixth: (selected)

6. Uses creative writing strategies appropriate to the format (for example, using appropriate voice; using descriptive language to clarify ideas and creative vivid images; using elements of style, such as appropriate tone).

Seventh: (selected)

6. Uses a variety of formatting (including but not limited to the use of electronic technology)

7. Uses creative writing strategies appropriate to the format (for example, using appropriate voice, using descriptive language to clarify ideas and create vivid images; using elements of style, such as appropriate tone)

Suggestions for addressing this concern in grades 6 to 8

To avoid confusion and misinterpretation, include a glossary that specifies precisely how multiple-meaning terms and concepts are used in these standards. The glossary should include words like prewriting, creative writing strategies, format, media, and strategy. Also, because format does not precisely mean genre or type (rather stylistic elements appropriate to a genre), its use here is confusing. Move this skill to another, more appropriate Benchmark.

Other

The descriptions of the Standard, Benchmark, and GLEs do not adequately capture the dynamic and interactive nature of writing. The standards document needs prefatory or meta-comments that convey the interactivity of the benchmarks and GLEs. For example, the draft of the College Board Standards provides a Preface that lays the foundation for this understanding. The following is shared in the spirit of suggestion and represents only a portion of the Preface:

Preface from the CB Standards draft.

While teachers often use the stages of the writing process to scaffold writing instruction, writers do not usually follow a linear progression through these stages as they compose a text. Rather, research shows that writing is a complex problem-solving activity in which writers define their goals for writing in relation to the form of writing selected and the intended audience; identify audience interests, values, assumptions, and knowledge; brainstorm ideas and generate content related to the topic, the audience, and their writing goals; select strategies appropriate for the form of writing assigned and develop a writing plan for achieving their goals; search out connections to support the writing plan; compose; evaluate—paragraph by paragraph, line by line, minute by minute—whether the emerging text is following their plan and achieving their goals; and generate additional content and revise writing plans and goals as needed. Writers monitor and orchestrate these cognitive processes throughout the writing activity, not in a linear progression of stages but flexibly and constantly, reconsidering and revising their goals, their knowledge, their writing plans, and their emerging text while they write.

Appendix B: Standards Review Criteria

Rigor: Do the standards prepare students intellectually for the next level and, ultimately, for college success?

Are the performance expectations for each level intellectually challenging enough to equip students with the knowledge and skills they will need to succeed at the next level?

Are the expectations at each grade level developmentally appropriate?

Do the standards specify a range of cognitive skills to be expected, including some range of the following?

Remembering

- recognizing, recalling

Understanding

- selecting, interpreting, illustrating, classifying, summarizing, inferring, comparing, explaining

Applying

- using, executing, implementing, computing, translating

Analyzing

- differentiating, organizing, attributing, synthesizing

Evaluating

- checking, critiquing, justifying

Creating

- generating, hypothesizing, planning, designing, constructing

Do the standards specify a range of strategies students should be able to draw on, including strategies for reasoning and problem-solving?

Focus: Have choices been made about what is important for students to learn?

Do the standards focus on the core concepts and skills that students must master as they progress toward advanced study in the discipline?

Do the standards align with national or professional standards?

Do the standards describe an appropriate number of topics to be covered in a year to encourage deeper conceptual understanding? Are there too many topics packed into a single year?

Balance

Do the standards exhibit balance in terms of focus on understanding, fluency, problem-solving, and reasoning?

Do the standards describe an appropriate balance of instructional time across areas of mathematics (number, measurement, algebra, geometry, and data) based on the targeted areas of instruction for different grade levels?

Progression: Do knowledge and skills build clearly and sensibly on previous learning and increase in intellectual demand from year to year?

Are standards presented grade-by-grade, or in bands of no more than two grade levels?

Do the standards describe a clear and coherent progression of knowledge and skills from grade level to grade level, without unnecessary redundancies?

Is there too much duplication with preceding or following years?

Within each grade, do the standards describe connections among different areas of mathematics or to other disciplines?

Where necessary, do the standards provide benchmarks for what is grade-level appropriate, either through descriptions, examples, or rubrics?

Do the standards include some stage setting at each grade to highlight the range of activities in which students will be involved and how they relate to past and future activities?

Specificity: Are the standards specific enough to convey the level of performance expected of students?

Are the standards specific enough to guide both teachers' and students' day-to-day work without being overly prescriptive?

Do the standards make clear the level of conceptual understanding that is expected?

Are the descriptions explicit enough to communicate the progression of knowledge and skills from grade to grade?

Are the standards mathematically correct?

Is the grain size of the objectives consistent?

Are the objectives specific enough to communicate to test developers the central content and performance expectation that should be measured by test items?

Do the standards include expectations for students to use calculators, spreadsheets, dynamical geometry software, and statistical software?

Clarity

Are the standards written in language that is clear, free of jargon, and can gain widespread acceptance from teachers, administrators, school boards, and parents?

Are the objectives organized into strands or big ideas that help teachers, students, administrators, school boards, and parents see how specific objectives build within courses and across grade levels to support students' overall development within the subject area?

Equity

Are the performance expectations written in such a way that teachers and administrators may differentiate the curriculum and instruction to enable all students to achieve the rigorous objectives?

Do the standards for literary texts define expectations for students to become familiar with specific literary periods, specific texts and authors of recognized importance, major themes, primary genres, and common character types in American, British, and world literature?

Language arts

Do the standards clearly address listening and speaking skills and explain connections between these skills and skills in reading and writing?

Do the standards clearly address skills in critical viewing and visually representing information and explain connections between these skills and skills in reading and writing?

Do the standards explicitly address the reading, interpretation, and critical evaluation of literature using tools of literary analysis and a variety of interpretive lenses?

Do the standards clearly address research processes, including developing questions and locating, understanding, evaluating, synthesizing, and using various sources of information for reading, writing, and speaking assignments?

Appendix C: Language Arts Benchmarking Analysis

In the pages that follow are the results of the benchmarking analysis for language arts, including depth-of-knowledge ratings recorded by two independent raters.

Inter-rater reliability is a measure of the degree to which the same group of raters provides the same ratings to the same set of items. In this rating, two raters both examined sets of GLEs from the Florida standards and performance expectations from the College Board standards. The following analyses indicate the percent of time the raters rated the DOK of a GLE or performance expectation exactly the same and the percent of time they rated the same or with a DOK value within 1 of the level given by the other rater.

Florida Language Arts Grade 6

Exact Agreement on levels	0.53
Agreement ± 1 DOK level	0.94

College Board Language Arts Grade 6

Exact Agreement on levels	0.35
Agreement ± 1 DOK level	0.87

Florida Language Arts Grade 8

Exact Agreement on levels	0.55
Agreement ± 1 DOK level	0.92

College Board Language Arts Grade 8

Exact Agreement on levels	0.42
Agreement ± 1 DOK level	0.63

Florida Language Arts Grades 9-12

Exact Agreement on levels	0.67
Agreement ± 1 DOK level	0.88

College Board Language Arts Grades 9-12

Exact Agreement on levels	0.70
Agreement ± 1 DOK level	0.97

Florida Sunshine State Standards and GLEs: Language Arts					College Board Standards			Comment
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
Grades 6-8								
Strand A: Reading Standard 1: The student uses the reading process effectively.								
	Benchmark LA.A.1.3.1: The student uses background knowledge of the subject and text structure knowledge to make complex predictions of content, purpose, and organization of the reading selection.							
		Grade 6						
		1. predicts ideas or events that may take place in the text, gives rationale for predictions, and confirms and discusses predictions as the story progresses.	3	2	R3.8.7.6. The reader make predictions about the story while reading narrative texts. R3.8.2.3 The reader monitors the accuracy of previous predictions and elaborations while reading.	3	2	
		2. uses prereading strategies before reading (for example, a KWL or skimming text headings, bold type, and other text features).	3	2	R3.6.4.1. The reader previews sections of expository texts, such as the title, introduction, headings, key words, figures, tables, and conclusions.	3	2	
		3. makes predictions about purpose and organization using background knowledge and text structure knowledge.	3	2	R3.8.7.1. The reader uses the structure of an expository text to guide the reading process. R3.8.7.5. The reader elaborates the text by making associations with personal experience, general knowledge, and domain-specific knowledge. R3.8.7.6. The reader make predictions about the story while reading narrative texts.	3	2.33	
		4. reads and predicts from graphic representations (for example, illustrations, diagrams, graphs, maps).	3	2	R3.6.4.1. The reader previews sections of expository texts, such as the title, introduction, headings, key words, figures, tables, and conclusions. R3.8.4.1. The reader uses information gained from previewing sections of expository texts to regulate the reading process and the types of reading strategies used while and after reading. R3.8.7.6. The reader make predictions about the story while reading narrative texts.	3	2.33	
		Grade 7						
		1. extends and applies previously learned prereading knowledge and skills of the sixth grade with increasingly complex reading selections and assignments and tasks.						
		Grade 8						
		1. refines and applies previously learned prereading knowledge and skills of the seventh grade with increasingly complex reading texts and assignments and tasks.			R3.8.4.1. The reader uses information gained from previewing sections of expository texts to regulate the reading process and the types of reading strategies used while and after reading.	3	3	Progression: Shows no progression from Grade 6.
	Benchmark LA.A.1.3.2: The student uses a variety of strategies to analyze words and text, draw conclusions, use context and word structure clues, and recognize organizational patterns.							Focus: LA.A.1.3.2 and LA.A.1.3.3 essentially cover the same material, especially since LA.A.1.3.2 does not provide GLEs for organizational patterns and GLE for drawing inferences is too vague.

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		Grade 6						
		1. uses context and word structure clues to interpret words and ideas in text.	2	2	R1.6.1.1 Draw on knowledge of root word, prefixes, and suffixes to understand words. R1.6.1.2 Use context to infer meanings of words and sentences. R3.6.9.1. The reader uses strategies to chunk difficult words and sentences in the text (e.g., break words or sentences into parts by numbering or drawing boxes).	2	3	
		2. makes inferences and generalizations about what is read.	2	2	R1.6.1.8 Infer key ideas. Make connections between key ideas in text to determine the theme or main idea. R1.6.1.9 Recognize and identify conclusions and generalizations from text. R3.6.7.5. The reader makes bridging inferences between consecutive sentences by referring back to previous sentences while reading.	2.33	2.33	Specificity: Benchmark is too general.
		3. uses strategies such as graphic organizers and note-making to clarify meaning and to illustrate organizational pattern of texts.	3	3	R3.6.6.3. The reader identifies key concepts and issues in the text (e.g., make notes in margins, write notes while reading or after reading). R3.6.9.2. The reader uses simple graphic organizers or diagrams (e.g., flow charts, story maps, concept maps, tables, or pictures about contents) to understand the global meaning of a text.	3	2	
		Grade 7						
		1. uses context and word structure clues to interpret words and ideas in text.						Repeats benchmark at Grade 6.
		2. makes inferences and generalizations about what is read.						
		3. uses strategies such as graphic organizers and note-making to clarify meaning and to illustrate organizational patterns.						
		4. compares and contrasts similar information contained in different text selections.						
		Grade 8						

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		1. extends previously learned knowledge and skills of the seventh grade with increasingly complex reading selections and assignments and tasks (for example, using context and word structure, making inferences and generalizations, using graphic organizers and note-making, comparing and contrasting).			R1.8.1.1 Draw on knowledge of root word, prefixes, suffixes, and word origins to understand words. Draw on knowledge of words in different languages. R1.8.1.2 Use context in text to infer meanings of ambiguous and uncommon words. R3.8.9.1. The reader uses strategies to chunk paragraphs and entire texts to better understand the global meaning of the text (e.g., break paragraphs and text into parts by numbering or drawing boxes). R1.8.1.8 Explain the progression and development of arguments in texts. R1.8.1.9 Outline and explain the conceptual framework that organizes the ideas in a text, including themes, motifs, and symbols. R3.8.7.5. The reader elaborates the text by making associations with personal experience, general knowledge, and domain-specific knowledge. R3.8.6.3. The reader refines strategies to identify key concepts and issues in the text (e.g., make notes in margins, write notes while reading or after reading). R3.8.9.2. The reader uses complex graphic organizers or diagrams (e.g., schematic diagrams, flow charts, story maps, concept maps, tables, or pic	2.43	3.29	Progression: Does not benchmark expectations. Focus (omission): Though organizational patterns are mentioned in Benchmark LA.A.1.3.2, the GLEs do not describe expected performances with organizational patterns. Progression: This combines strategies in CB that are more specific and benchmarked by grade level.
	Benchmark LA.A.1.3.3: The student demonstrates consistent and effective use of interpersonal and academic vocabularies in reading, writing, listening, and speaking.							No reference to knowledge of parts of speech or sentence structure to determine word meaning. Progression: Shows no benchmarked progression in vocabulary skills.
		Grade 6						
		1. identifies word parts such as prefixes, suffixes, and root words.	2	1	R1.6.1.1 Draw on knowledge of root word, prefixes, and suffixes to understand words.	2	2	
		2. uses word origins as a strategy in understanding historical influences on word meanings.	2	2	R1.8.1.1 Draw on knowledge of root word, prefixes, suffixes, and word origins to understand words. Draw on knowledge of words in different languages.	2	2	
		3. selects appropriate meaning for a word according to context.	2	2	R1.6.1.2 Use context to infer meanings of words and sentences.	2	3	
		4. analyzes word relationships such as analogies.	4		Not addressed in current edition.			This is a good strategy for determining word meanings.
		5. distinguishes denotative and connotative meanings of words.	4	2	R1.6.1.4 Understand that words and phrases have different meanings depending on context. R1.8.1.6 Distinguish denotative and connotative meanings of words.	3	2	
		6. learns new words in a consistent manner (for example, through reading and writing activities).	2		Not addressed in current edition.			
		Grade 7						
		1. extends the vocabulary-building expectations of the sixth grade using seventh grade or higher level vocabulary.						
		Grade 8						

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		1. extends the vocabulary-building expectations of the seventh grade using eighth grade or higher level vocabulary.			R1.8.1.1 Draw on knowledge of root word, prefixes, suffixes, and word origins to understand words. Draw on knowledge of words in different languages. R1.8.1.2 Use context in text to infer meanings of ambiguous and uncommon words. R1.8.1.3 Analyze syntax to infer meanings of words and sentences. R1.8.1.4 Understand primary and secondary meanings of ambiguous words. R1.8.1.6 Distinguish denotative and connotative meanings of words.	2.8	2.6	Progression and Specificity: Shows no benchmarked progression in vocabulary skills.
	Benchmark LA.A.1.3.4: The student uses strategies to clarify meaning, such as rereading, note taking, summarizing, outlining, and writing a grade level-appropriate report.							
		Grade 6						
		1. monitors own comprehension and makes modifications when understanding breaks down by rereading a portion aloud or silently.	5	2	R3.6.6.1. The reader re-reads sentences when comprehension problems are encountered. R3.8.6.5. The reader uses think aloud to better understand difficult concepts in the text.	4	2	
		2. restates text by note making or summarizing.	3	1	R3.6.6.3. The reader identifies key concepts and issues in the text (e.g., make notes in margins, write notes while reading or after reading). R3.6.9.5. The reader summarizes narrative text to better understand the theme of the text.	2	2.5	
		3. examines other sources to clarify meaning (for example, encyclopedia, web site, or expert).	3	3	R3.3.8 Use outside sources. The reader obtains and uses information from outside sources (e.g., look up unfamiliar words in dictionaries, computer, or other books).	3	3	
		4. uses a graphic organizer to clarify meaning of text.	4	3	R3.6.9.2. The reader uses simple graphic organizers or diagrams (e.g., flow charts, story maps, concept maps, tables, or pictures about contents) to understand the global meaning of a text.	3	4	
		Grade 7						
		1. monitors own comprehension and makes modifications when understanding breaks down by rereading a portion aloud or silently.						
		2. restates or paraphrases text by summarizing.						
		3. uses the text's structure or progression of ideas) to locate and recall information (for example, cause and effect. chronology).						
		4. analyzes information from one textual source to create a report.						
		Grade 8						

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		1. refines previously learned knowledge and skills of the Seventh grade with increasingly complex reading texts and assignments and tasks (for example, monitoring comprehension, modifying understanding, summarizing, using text structure for recall, analyzing information to create a report).			R3.8.6.1. The reader re-reads sentences and paragraphs when comprehension problems are encountered. R3.8.6.5. The reader uses think aloud to better understand difficult concepts in the text. R3.8.6.3. The reader refines strategies to identify key concepts and issues in the text (e.g., make notes in margins, write notes while reading or after reading). R3.8.9.5. The reader summarizes expository text to better understand the relationship between ideas in the text. R3.3.8 Use outside sources. The reader obtains and uses information from outside sources (e.g., look up unfamiliar words in dictionaries, computer, or other books). R3.8.9.2. The reader uses complex graphic organizers or diagrams (e.g., schematic diagrams, flow charts, story maps, concept maps, tables, or pictures about contents) to understand relationships between ideas in the text and the global meaning of a text.	3.43	3	
Standard 2: The student constructs meaning from a wide range of texts.								
	Benchmark LA.A.2.3.1: The student determines the main idea or essential message in a text and identifies relevant details and facts and patterns of organization.							
		Grade 6						
		1. determines a text's major ideas and how those ideas are supported with details.	2	1	R1.6.1.8 Infer key ideas. Make connections between key ideas in text to determine the theme or main idea.	4	4	Rigor: Good for expecting students to identify supporting details. Should be connecting ideas to higher-level meaning of text, such as theme.
		2. draws inferences and supports them with text evidence and experience (for example, conclusions or generalizations).	2	4	R1.6.1.9 Recognize and identify conclusions and generalizations from text.	2	1	Rigor: Good for expecting students to identify supporting details.
		3. paraphrases and summarizes text to recall, inform, or organize ideas.	2	4	R1.6.1.7 Summarize the progression and development of arguments in texts. R3.6.6.4. The reader paraphrases sentences (puts concepts in own words) to better understand the sentences, particularly when comprehension problems are encountered.	2	3	
		4. analyzes ways writers organize and present ideas (for example, through chronology, comparison contrast, cause-effect).	4	4	R2.6.3.2 Interpret texts organized by simple descriptive patterns, including presenting a topic with attributes, specifics, or setting information that describes the topic. Interpret texts organized by simple problem-solution patterns. Interpret texts organized by simple sequential patterns, including grouping ideas by order or enumerated steps.	4	2	
		Grade 7						

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		1. extends the expectations of the sixth grade with increasingly complex reading texts and assignments and tasks (for example, main ideas, supporting details, inferences, summarizing, analysis of organization and presentation of ideas).						
		Grade 8						
		1. refines previously learned knowledge and skills of the seventh grade with increasingly complex reading texts and assignments and tasks (for example, main ideas, supporting details, inferences, summarizing, analysis of organization and presentation of ideas).			R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts. R1.8.1.8 Explain the progression and development of arguments in texts. R1.8.1.9 Outline and explain the conceptual framework that organizes the ideas in a text, including themes, motifs, and symbols. R1.8.1.10 Draw conclusions and generalizations from text and support those conclusions with details from the text.	2	3.25	Progression Rigor
	Benchmark LA.A.2.3.2: The student identifies the author's purpose and/or point of view in a variety of texts and uses the information to construct meaning.							
		Grade 6						
		1. discusses the meaning and role of point of view in a variety of texts.	2	2	R1.6.3.1 Identify the author's values and perspectives stated explicitly in the text.	1	1	
		2. states the author's purpose and relates it to specific details from the text.	2	3	R1.6.3.2 Identify ways in which the author's purpose and intended audience are suggested through the text.	2	1	
		Grade 7						
		1. understands ways the author's perspective or point of view affects a text.						
		2. states the author's purpose and relates it to specific details from the text.						
		Grade 8						
		3. understands ways the author's perspective or point of view affects a text.	2	2	R1.8.3.1 Identify the author's values and perspectives implied in the text.	2	1	
		1. states the author's purpose and relates it to specific statements from text.	2	3	R1.8.3.2 Identify the author's purpose and intended audience.	2	1	
	Benchmark LA.A.2.3.3: The student recognizes logical, ethical, and emotional appeals in texts.							
		Grade 6						
		1. recognizes persuasive techniques in text.	1	1	R2.6.3.2 Interpret texts organized by simple descriptive patterns, including presenting a topic with attributes, specifics, or setting information that describes the topic. Interpret texts organized by simple problem-solution patterns. Interpret texts organized by simple sequential patterns, including grouping ideas by order or enumerated steps.	4	2	Specificity: Focus on argumentation patterns here (problem/solution, sequence, and description) that can be integrated into a larger persuasive organization by Grade 8.
		Grade 7						
		1. identifies persuasive and propaganda techniques in text.						
		2. delineates the strengths and weaknesses of an argument in persuasive text.						

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		3. recognizes ethical and unethical statements in text.						
		Grade 8						
		1. knows persuasive and propaganda techniques in text.	1	1	R2.8.3.2 Interpret text organized according to simple persuasive and argumentative structure, including a claim, supporting reasons and evidence, acknowledgement and refutation of counter-arguments, and a call to action.	4	2	
		2. delineates the strengths and weaknesses of an argument in persuasive text.	5	2	R1.8.1.8 Explain the progression and development of arguments in texts. [R1.10.1.7 Analyze and evaluate the progression and development of ideas or an argument. Identify inconsistencies in the logical progression of ideas.]	2	4.5	This evaluation of an argument's strengths and weakness appears to be sequenced too early without adequate preparation. CB introduces this as shown at Grade 10.
		3. knows the difference between logical and illogical, and ethical and unethical statements in a piece of text.	2	1	[R1.10.1.7 Analyze and evaluate the progression and development of ideas or an argument. Identify inconsistencies in the logical progression of ideas.]		5	Have used a low cognitive category (know) with a sophisticated skill (differentiating logical and illogical and ethical and unethical statements).
	Benchmark LA.A.2.3.4: The student uses a variety of reading materials to develop personal preferences in reading.							
		Grade 6						
		1. develops personal reading preferences through exploring a variety of prose, poetry and nonfiction.						Not addressed in current edition.
		Grade 7						
		1. develops and expands personal reading preferences through exploring a variety of prose, poetry and nonfiction.						Not addressed in current edition.
		Grade 8						
		1. develops and expands personal reading preferences through exploring a variety of prose, poetry and nonfiction.						Not addressed in current edition.
	Benchmark LA.A.2.3.5: The student locates, organizes, and interprets written information for a variety of purposes, including classroom research, collaborative decision making, and performing a school or real-world task.							
		Grade 6						
		1. forms and revises questions for investigations (including but not limited to questions arising from readings).			W2.6.1.4 Student formulates a research question and/or thesis claim and recognizes that questions may change in the process of research.			Appropriate for grade level.
		2. uses print and electronic sources to locate books, documents, and articles.			W2.6.2.4 Student draws upon a variety of primary sources for identifying information (e.g., interviews, visits with experts) and appropriate secondary sources (e.g., magazines, journals, Internet sites, encyclopedias, almanacs), and takes careful notes.			Appropriate for grade level.

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		3. organizes and interprets information from a variety of sources for a school or real-world task.			W2.6.2.5 Student uses a variety of strategies to guide the generation of content (e.g., brainstorming; idea mapping; free writing; journaling; journalist's questions--who, what, when, where, why, and how; setting up comparisons; making predictions).			Appropriate for grade level.
		Grade 7						
		1. extends previously learned knowledge and skills of the sixth grade with increasingly complex texts and assignments and tasks (for example, forming questions for readings, using print and electronic sources to locate information, organizing information from a variety of sources for real-world tasks).						
		Grade 8						
		1. refines previously learned knowledge and skills of the seventh grade with increasingly complex texts and assignments and tasks (for example, forming questions for readings, using print and electronic sources to locate information, organizing information from a variety of sources for real-world tasks).			W2.8.2.1 Student recognizes in limited ways the role of introspective and external research as a part of everyday life. W2.8.2.2 Student uses a variety of strategies to guide the generation of internal and external knowledge (e.g., brainstorming; idea mapping; free writing; journaling; journalist's questions--who, what, when, where, why, and how; setting up comparisons; making predictions). W2.8.2.4 Student refines and focuses questions or thesis claim (e.g., activate prior knowledge; predict how they might answer, support, or question or the claim; evaluate whether question or claim can be answered or supported within limits of assignment and available resources), recognizing that questions may change in the process of the research. W2.8.2.5 Student draws upon a variety of primary and secondary sources for gathering information (interviews with authorities in a field, appropriate Internet sources, books, journals, newspapers), and systematically takes notes.			Progression: Shows no progression. Differentiation from Grade 7 would support teacher decision-making about level of teacher support/instruction.
	Benchmark LA.A.2.3.6: The student uses a variety of reference materials, including indexes, magazines, newspapers, and journals, and tools, including card catalogs and computer catalogs, to gather information for research topics.							
		Grade 6						
		1. chooses reference materials appropriate to research purpose.			W2.6.1.2 Student begins to recognize the role of introspective and external research as a part of everyday life. W2.6.2.4 Student draws upon a variety of primary sources for identifying information (e.g., interviews, visits with experts) and appropriate secondary sources (e.g., magazines, journals, Internet sites, encyclopedias, almanacs), and takes careful notes.			Appropriate for grade level.

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		2. uses multiple sources to locate information relevant to research questions (including electronic texts, experts, print resources).			W2.6.2.4 Student draws upon a variety of primary sources for identifying information (e.g., interviews, visits with experts) and appropriate secondary sources (e.g., magazines, journals, Internet sites, encyclopedias, almanacs), and takes careful notes.			Appropriate for grade level.
		Grade 7						
		1. gathers information from a variety of sources, including primary sources (for example, magazines and newspapers).						
		2. evaluates and uses information from a variety of sources (including primary sources) when researching content area topics.						
		Grade 8						
		1. gathers information from a variety of sources, including primary sources.			W2.8.1.5 Student identifies a variety of primary and secondary sources for information (interviews with authorities in a field, appropriate Internet sources, books, journals, newspapers) and begins to develop a system for recording sources.			Use of primary sources is to be commended.
		2. evaluates and uses information from a variety of sources when researching content area topics (including but not limited to primary sources).			W2.8.2.5 Student draws upon a variety of primary and secondary sources for gathering information (interviews with authorities in a field, appropriate Internet sources, books, journals, newspapers), and systematically takes notes.			Appropriate for grade level. Use of primary sources is to be commended.
	Benchmark LA.A.2.3.7: The student synthesizes and separates collected information into useful components using a variety of techniques, such as source cards, note cards, spreadsheets, and outlines.							
		Grade 6						
		1. separates collected information into useful components using a variety of techniques.			W2.6.3.2 Student uses a variety of strategies for limited exploration of various types of persuasive arguments (e.g., persuasive letters, speeches, debates, reports) to make connections among ideas. W2.6.3.3 Student uses, in limited ways, specific methods to synthesize and organize information (e.g., graphic organizers, informational semantic maps, notes that summarize or paraphrase, quote cards to make it clear what a source actually said), carefully crediting sources.			Appropriate for grade level.

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		2. synthesizes collected information using a matrix or other graphic organizer.			W2.6.3.2 Student uses a variety of strategies for limited exploration of various types of persuasive arguments (e.g., persuasive letters, speeches, debates, reports) to make connections among ideas. W2.6.3.3 Student uses, in limited ways, specific methods to synthesize and organize information (e.g., graphic organizers, informational semantic maps, notes that summarize or paraphrase, quote cards to make it clear what a source actually said), carefully crediting sources.			Appropriate for grade level.
		Grade 7						
		1. classifies and records information (for example, using note cards, data files).						
		2. compiles information using graphic organizers (for example, timelines, circle diagrams).						
		3. organizes and summarizes information using a format (for example, note cards).						
		Grade 8						
		1. classifies and records information (for example, using note cards, data files).			W2.8.3.2 Student uses a variety of strategies to explore various types of persuasive arguments (e.g., persuasive letters, speeches, debates, reports) to sift, select, and make connections among ideas and perspectives. W2.8.3.3 Student uses specific methods to synthesize and organize findings in limited ways (e.g., records of significant ideas, concepts, and quotations; summaries of information; timelines; charts and graphs) to convey a point of view, carefully crediting sources.			Appropriate for grade level.
		2. compiles information using an organizer (for example, a spreadsheet).			W2.8.3.2 Student uses a variety of strategies to explore various types of persuasive arguments (e.g., persuasive letters, speeches, debates, reports) to sift, select, and make connections among ideas and perspectives. W2.8.3.3 Student uses specific methods to synthesize and organize findings in limited ways (e.g., records of significant ideas, concepts, and quotations; summaries of information; timelines; charts and graphs) to convey a point of view, carefully crediting sources.			Appropriate for grade level. Is a spreadsheet the best example for Grade 8?

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		3. compares and contrasts elements within or across texts.	2	2	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts. W2.8.3.2 Student uses a variety of strategies to explore various types of persuasive arguments (e.g., persuasive letters, speeches, debates, reports) to sift, select, and make connections among ideas and perspectives. W2.8.3.3 Student uses specific methods to synthesize and organize findings in limited ways (e.g., records of significant ideas, concepts, and quotations; summaries of information; timelines; charts and graphs) to convey a point of view, carefully crediting sources.	2	2	Sophisticated skills. Appropriate at an introductory level.
		4. records bibliographic information using a format such as source cards.			W2.8.1.5 Student identifies a variety of primary and secondary sources for information (interviews with authorities in a field, appropriate Internet sources, books, journals, newspapers) and begins to develop a system for recording sources.			
	Benchmark LA.A.2.3.8: The student checks the validity and accuracy of information obtained from research, in such ways as differentiating fact and opinion, identifying strong vs. weak arguments, recognizing that personal values influence the conclusions an author draws.							
		Grade 6						
		1. distinguishes between fact and opinion.	2	2	R1.6.1.10 Distinguish between fact and opinion. W3.6.1.4 Student reads the developing draft with some understanding of thesis claim, supporting ideas that are elaborated, fact/opinion, external bias, and possible conclusions to identify areas of strength/concern, and to ensure continued progress through the piece.	2	2	Progression: This benchmark is appropriate at an introductory level.
		2. examines texts for identification of strong versus weak arguments.	5	4	R1.6.1.7 Summarize the progression and development of arguments in texts. W3.6.1.4 Student reads the developing draft with some understanding of thesis claim, supporting ideas that are elaborated, fact/opinion, external bias, and possible conclusions to identify areas of strength/concern, and to ensure continued progress through the piece.	2	4	Progression: This evaluation of an argument's strengths and weakness and logical development appears to be sequenced too early without adequate preparation.
		3. uses resources, such as expert opinion, to check the validity of information obtained from research.			W5.6.3.1 Student begins to use a specified format for citing source materials.			Progression: This benchmark is appropriate at an introductory level.
		4. identifies and examines the influence of personal values on the conclusions an author draws.	4	4	R1.6.3.1 Identify the author's values and perspectives stated explicitly in the text. W3.6.1.4 Student reads the developing draft with some understanding of thesis claim, supporting ideas that are elaborated, fact/opinion, external bias, and possible conclusions to identify areas of strength/concern, and to ensure continued progress through the piece.	2	2	Progression: This benchmark is appropriate at an introductory level.

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		Grade 7						
		1. cites, examines, and discusses the use of and differences between fact and opinion within a text.						Progression: This benchmark is appropriate at an introductory level.
		2. knows differences between strong versus weak arguments and relevant and irrelevant information in reading selections.						
		3. understands the use of comparison and contrast in a text.						
		4. understands the influence of personal values on the conclusions an author draws.						
		Grade 8						
		1. extends previously learned knowledge and skills of the seventh grade with increasingly complex texts and assignments and tasks (for example, differences between fact and opinion, strong versus weak arguments, relevant and irrelevant information, comparison and contrast, influence of personal values).			R1.8.1.8 Explain the progression and development of arguments in texts. R1.8.1.9 Outline and explain the conceptual framework that organizes the ideas in a text, including themes, motifs, and symbols. R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts. R1.8.1.11 Explain the differences between fact and opinion cited in texts. W3.8.1.4 Student reads the developing draft for thesis claim, supporting ideas that are elaborated, possible counterarguments, fact/opinion, external bias, and possible conclusions to identify areas of strength/ concern to ensure continued progress through the piece. W5.8.3.1 Student uses a specified format for citing source materials.	2.5	3.5	
Strand B: Writing Standard 1:The student uses writing processes effectively.								
	Benchmark LA.B.1.3.1: The student organizes information before writing according to the type and purpose of writing.							
		Grade 6						
		1. knows possible prewriting strategies for different writing tasks.			W2.6.2.1 Student begins to recognize the role of introspective and external research as a part of everyday life. W2.6.2.5 Student uses a variety of strategies to guide the generation of content (e.g., brainstorming; idea mapping; free writing; journaling; journalist's questions--who, what, when, where, why, and how; setting up comparisons; making predictions).			Progression: Shows no progression. Differentiation from Grade 6-8 would support teacher decision-making about level of teacher support/instruction.

Florida Sunshine State Standards and GLEs: Language Arts					College Board Standards			Comment
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		2. uses a prewriting strategy suitable for the task (for example, brainstorming, using a graphic organizer, listing ideas).			W1.6.1.1 Student reads and thinks about a school assignment in order to understand what is expected for the task, reviews suggested final products, and makes some plans for completing the task. W2.6.2.1 Student begins to recognize the role of introspective and external research as a part of everyday life. W2.6.2.5 Student uses a variety of strategies to guide the generation of content (e.g., brainstorming; idea mapping; free writing; journaling; journalist's questions--who, what, when, where, why, and how; setting up comparisons; making predictions).			Progression: Shows no progression. Differentiation from Grade 6-8 would support teacher decision-making about level of teacher support/instruction.
		3. experiments with various prewriting strategies to accommodate individual learning style.			W2.6.2.1 Student begins to recognize the role of introspective and external research as a part of everyday life. W2.6.2.5 Student uses a variety of strategies to guide the generation of content (e.g., brainstorming; idea mapping; free writing; journaling; journalist's questions--who, what, when, where, why, and how; setting up comparisons; making predictions).			Progression: Shows no progression. Differentiation from Grade 6-8 would support teacher decision-making about level of teacher support/instruction.
		Grade 7						
		1. knows possible prewriting strategies for different writing tasks.						
		2. uses a prewriting strategy suitable for the task (for example, brainstorming, using a graphic organizer, listing ideas).						
		3. experiments with various prewriting strategies to accommodate individual learning style.						
		Grade 8						
		1. knows possible prewriting strategies for different writing tasks.			W1.8.1.1 Student reads and thinks about a school assignment in order to understand what is expected for the task, thinks about what final products might look like, and makes plans for completing the task. W2.8.2.1 Student recognizes in limited ways the role of introspective and external research as a part of everyday life. W2.8.2.2 Student uses a variety of strategies to guide the generation of internal and external knowledge (e.g., brainstorming; idea mapping; free writing; journaling; journalist's questions--who, what, when, where, why, and how; setting up comparisons; making predictions).			Progression: Appropriate for grade level. Where are various prewriting skills taught? In relation to which genres? Shows no progression. Differentiation from Grade 6-8 would support teacher decision-making about level of teacher support/instruction.

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		2. uses a prewriting strategy suitable for the task (for example, brainstorming, using a graphic organizer, listing ideas).			W1.8.1.1 Student reads and thinks about a school assignment in order to understand what is expected for the task, thinks about what final products might look like, and makes plans for completing the task. W2.8.2.2 Student uses a variety of strategies to guide the generation of internal and external knowledge (e.g., brainstorming; idea mapping; free writing; journaling; journalist's questions--who, what, when, where, why, and how; setting up comparisons; making predictions). W2.8.2.3 Student identifies and evaluates sources and gathers information about topic and audience.			Progression: Appropriate for grade level. However, shows no progression. Differentiation from Grade 6-8 would support teacher decision-making about level of teacher support/instruction.
		3. experiments with various prewriting strategies to accommodate individual learning style.			W2.8.2.2 Student uses a variety of strategies to guide the generation of internal and external knowledge (e.g., brainstorming; idea mapping; free writing; journaling; journalist's questions--who, what, when, where, why, and how; setting up comparisons; making predictions). W2.8.2.3 Student identifies and evaluates sources and gathers information about topic and audience.			Progression: Appropriate for grade level. However, shows no progression. Differentiation from Grade 6-8 would support teacher decision-making about level of teacher support/instruction.
	Benchmark LA.B.1.3.2: The student drafts and revises writing that • is focused, purposeful, and reflects insight into the writing situation; • conveys a sense of completeness and wholeness with adherence to the main idea; • has an organizational pattern that provide for a logical progression of ideas; • has support that is substantial, specific, relevant, concrete, and/or illustrative; • demonstrates a commitment to and an involvement with the subject; • has clarity in presentation of ideas; • uses creative writing strategies appropriate to the purpose of the paper; • demonstrates a command of language (word choice) with freshness of expression; • has varied sentence structure and sentences that are complete except when fragments are used purposefully; and • has few, if any, convention errors in mechanics, usage, punctuation.							Conflates organization with rhetorical analyses. Puts limited emphasis on rhetorical analysis. Focuses primarily on textual organization.
		Grade 6						
		1. focuses on a central idea or topic (for example, excluding loosely related, extraneous, or repetitious information).			W3.6.1.4 Student reads the developing draft with some understanding of thesis claim, supporting ideas that are elaborated, fact/opinion, external bias, and possible conclusions to identify areas of strength/concern, and to ensure continued progress through the piece.			Progression: Appropriate for grade level.

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		2. uses an appropriate organizational pattern having a beginning, middle, end and transitional devices.			W2.6.3.3 Student uses, in limited ways, specific methods to synthesize and organize information (e.g., graphic organizers, informational semantic maps, notes that summarize or paraphrase, quote cards to make it clear what a source actually said), carefully crediting sources. W3.6.1.3 Student begins to use very limited rhetorical appeals (e.g., reason, emotion), strategies (e.g., using organizational patterns), and devices (e.g., limited figurative language) to persuade the intended audience. The student begins to understand that introducing source materials increases the credibility of the text.			Progression: Appropriate for grade level.
		3. demonstrates a commitment to and an involvement with the subject that engages the reader.			W2.6.1.1 Student recognizes the role of introspective and external research in everyday life. W2.6.1.2 Student identifies whom she or he is writing to and thinks about the characteristics of the audience.			Progression: Appropriate for grade level.
		4. demonstrates a command of the language including precise word choice and use of appropriate figurative language.			W3.6.1.1 Student drafts words, phrases, sentences, and paragraphs that are generally clear and complete.			Progression: Appropriate for grade level.
		5. uses an effective organizational pattern and substantial support to achieve a sense of completeness or wholeness (for example, considering audience, sequencing events, choosing effective words; using specific details to clarify meaning).			W2.6.3.3 Student uses, in limited ways, specific methods to synthesize and organize information (e.g., graphic organizers, informational semantic maps, notes that summarize or paraphrase, quote cards to make it clear what a source actually said), carefully crediting sources. W3.6.1.3 Student begins to use very limited rhetorical appeals (e.g., reason, emotion), strategies (e.g., using organizational patterns), and devices (e.g., limited figurative language) to persuade the intended audience. The student begins to understand that introducing source materials increases the credibility of the text.			Progression: Appropriate for grade level.
		6. proofreads writing to correct convention errors in mechanics, usage, and punctuation, using dictionaries, handbooks, and other resources, including teacher or peers, as appropriate.			W5.6.1.1 Student corrects for appropriate grammatical and mechanical conventions in limited ways (e.g., complete sentences, subject/verb agreement, tense, phrases), knows, and often demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation. W5.6.3.1 Student begins to use a specified format for citing source materials.			Progression: Appropriate for grade level.

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		7. revises draft to further develop a piece of writing by adding, deleting, and rearranging ideas and details.			W4.6.1.1 Student evaluates, in limited ways, whether the central idea, context and background are logical, realistic, and clear, and revises as needed. W4.6.1.2 Student evaluates, in limited ways, whether the details are relevant, clear, and elaborated, and revises as needed. W4.6.1.3 Student evaluates whether the conclusion is effective and revises as needed. W4.6.2.1 Student evaluates the organization for logical sequencing, and revises as needed. W4.6.2.2 Student, in limited ways, reviews text for transition words that signal the organizing structure to the reader, and revises as needed.			Rigor: Appropriate for grade level. Specifity: Where are various revision skills taught? In relation to which genres?
		Grade 7						
		1. focuses on a central idea or topic (for example, excluding loosely related, extraneous, or repetitious information).						
		2. uses devices to develop relationships among ideas (for example, transitional devices; paragraphs that show a change in time, idea, or place; cause-and-effect relationships).						
		3. uses supporting ideas, details, and facts from a variety of sources to develop and elaborate topic.						
		4. demonstrates a commitment to and an involvement with the subject that engages the reader.						
		5. demonstrates a command of the language (including but not limited to precise word choice, appropriate figurative language).						
		6. uses an effective organizational pattern and substantial support to achieve a sense of completeness or wholeness (for example, considering audience, sequencing events, choosing effective words; using specific details to clarify meaning).						
		7. proofreads writing to correct convention errors in mechanics, usage, and punctuation, using dictionaries, handbooks, and other resources, including teacher or peers, as appropriate.						
		8. analyzes and revises draft to further develop a piece of writing by adding or deleting details and explanations; clarifying difficult passages; and rearranging words, sentences, and paragraphs to improve meaning.						
		Grade 8						

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		1. focuses on a central ideas or topic (for example, excluding loosely related, extraneous, or repetitious information).			W2.8.2.4 Student refines and focuses questions or thesis claim (e.g., activate prior knowledge; predict how they might answer, support, or question or the claim; evaluate whether question or claim can be answered or supported within limits of assignment and available resources), recognizing that questions may change in the process of the research. W3.8.1.4 Student reads the developing draft for thesis claim, supporting ideas that are elaborated, possible counterarguments, fact/opinion, external bias, and possible conclusions to identify areas of strength/ concern to ensure continued progress through the piece.			Progression: Duplicates Grade 6.
		2. uses devices to develop relationships among ideas (for example, transitional devices; paragraphs that show a change in time, idea, or place; cause-and-effect relationships).			W4.8.2.2 Student reviews text for transition words that signal the organizing structure to the reader, and revises as needed.			Appropriate for grade level.
		3. uses supporting ideas, details, and facts from a variety of sources to develop and elaborate topic.			W4.8.1.2 Student evaluates whether the details are clear and sufficiently elaborated, and revises as needed.			Appropriate for grade level.
		4. demonstrates a commitment to and an involvement with the subject that engages the reader.			W2.8.1.2 Student thinks about the attitudes and interests of the intended audience.			Appropriate for grade level. Duplicates Grade 6.
		5. demonstrates a command of the language (including but not limited to precise word choice, appropriate figurative language).			W4.8.3.1 Student evaluates whether word choice, sentence structure, imagery, and figurative language are varied and effective for the topic and audience, and revises as needed. W5.8.1.1 Student corrects for grammatical and mechanical conventions with general accuracy (e.g., complete sentences, subject/verb agreement, tense, phrases, clauses), understands, and demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Appropriate for grade level. Duplicates Grade 6.
		6. uses an effective organizational pattern and substantial support to achieve a sense of completeness or wholeness (for example, considering audience, sequencing events, choosing effective words; using specific details to clarify meaning).			W4.8.2.1 Student evaluates the organization for logical and effective sequencing, and revises as needed.			

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		7. proofreads writing to correct convention errors in mechanics, usage, and punctuation, using dictionaries, handbooks, and other resources, including teacher or peers, as appropriate.			W5.8.1.1 Student corrects for grammatical and mechanical conventions with general accuracy (e.g., complete sentences, subject/verb agreement, tense, phrases, clauses), understands, and demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation. W5.8.2.1 Student recognizes that electronic spell and grammar checks are not always adequate, and employs specified proofreading strategies to ready the final text, including the verification of information obtained through primary sources.			
		8. analyzes and revises draft to further develop a piece of writing by adding or deleting details and explanations; clarifying difficult passages; and rearranging words, sentences, and paragraphs to improve meaning.			W4.8.1.2 Student evaluates whether the details are clear and sufficiently elaborated, and revises as needed. W4.8.2.1 Student evaluates the organization for logical and effective sequencing, and revises as needed. W4.8.2.2 Student reviews text for transition words that signal the organizing structure to the reader, and revises as needed.			
	Benchmark LA.B.1.3.3: The student produces final documents that have been edited for • correct spelling; • correct punctuation, including commas, colons, and semicolons; • correct capitalization; • effective sentence structure • correct common usage, including subject/verb agreement, common noun/pronoun agreement, common possessive forms, and with a variety of sentence structure, including parallel structure; and • correct formatting.							
		Grade 6						
		1. uses resources such as dictionary and thesaurus to confirm spelling.			W5.6.1.1 Student corrects for appropriate grammatical and mechanical conventions in limited ways (e.g., complete sentences, subject/verb agreement, tense, phrases), knows, and often demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Appropriate for grade level.

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		2. uses conventions of punctuation (including but not limited to commas, colons, semicolon, quotation marks, apostrophes).			W5.6.1.1 Student corrects for appropriate grammatical and mechanical conventions in limited ways (e.g., complete sentences, subject/verb agreement, tense, phrases), knows, and often demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Rigor: Use of colon and semicolon may be a sophisticated text skill at Grade 6.
		3. uses conventions of capitalization (including but not limited to the names of organizations, nationalities, races, languages, religions).			W5.6.1.1 Student corrects for appropriate grammatical and mechanical conventions in limited ways (e.g., complete sentences, subject/verb agreement, tense, phrases), knows, and often demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Appropriate for grade level.
		4. uses various parts of speech correctly in written work (including but not limited to subject and verb agreement, common noun and pronoun agreement, possessive forms, the comparative and superlative of adjectives and adverbs).			W5.6.1.1 Student corrects for appropriate grammatical and mechanical conventions in limited ways (e.g., complete sentences, subject/verb agreement, tense, phrases), knows, and often demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Appropriate for grade level.
		5. uses a variety of sentence structures (including but not limited to parallel structure).			W3.6.2.1 Student drafts, in limited ways, words, phrases, and sentences (e.g., precise vocabulary, figurative language, and variation in sentence length) that employ a formal or informal tone to establish credible voice and to appeal to the audience.			Progression and Rigor: Parallel structure is a more sophisticated skill than compound sentences, which is the focus at Grade 8.
		6. uses creative writing strategies appropriate to the format (for example, using appropriate voice; using descriptive language to clarify ideas and create vivid images; using elements of style, such as appropriate tone).			W4.6.3.1 Student evaluates whether word choice, sentence structure, and figurative language are adequate for the topic and audience, and revises as needed.			
		Grade 7						
		1. uses resources such as dictionary and thesaurus to confirm spelling.						
		2. uses conventions of punctuation (including but not limited to commas, colons, semicolon, quotation marks, apostrophes).						
		3. uses conventions of capitalization (including but not limited to the names of organizations, nationalities, races, languages, religions).						
		4. uses various parts of speech correctly in written work (including but not limited to subject and verb agreement, common noun and pronoun agreement, possessive forms, the comparative and superlative of adjectives and adverbs).						

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		5. uses a variety of sentence structures (including but not limited to parallel structure, compound and complex sentences).						
		6. uses a variety of formatting (including but not limited to the use of electronic technology).						
		7. uses creative writing strategies appropriate to the format (for example, using appropriate voice; using descriptive language to clarify ideas and create vivid images; using elements of style, such as appropriate tone).						
		Grade 8						
		1. uses resources such as dictionary and thesaurus to confirm spelling.			W5.8.1.1 Student corrects for grammatical and mechanical conventions with general accuracy (e.g., complete sentences, subject/verb agreement, tense, phrases, clauses), understands, and demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Appropriate for grade level.
		2. uses conventions of punctuation (including but not limited to commas, colons, semicolon, quotation marks, apostrophes).			W5.8.1.1 Student corrects for grammatical and mechanical conventions with general accuracy (e.g., complete sentences, subject/verb agreement, tense, phrases, clauses), understands, and demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Appropriate for grade level. Rigor: Introduce sentence-level use of colon and semicolon.
		3. uses conventions of capitalization (including but not limited to the names of organizations, nationalities, races, languages, religions).			W5.8.1.1 Student corrects for grammatical and mechanical conventions with general accuracy (e.g., complete sentences, subject/verb agreement, tense, phrases, clauses), understands, and demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Appropriate for grade level.
		4. uses various parts of speech correctly in written work (including but not limited to subject and verb agreement, common noun and pronoun agreement, possessive forms, the comparative and superlative of adjectives and adverbs).			W5.8.1.1 Student corrects for grammatical and mechanical conventions with general accuracy (e.g., complete sentences, subject/verb agreement, tense, phrases, clauses), understands, and demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Appropriate for grade level.
		5. uses a variety of sentence structures including parallel structure, compound and complex sentences.			W3.8.2.1 Student drafts words, phrases, and sentences (e.g., precise vocabulary, figurative language, and variation in sentence length) that employ a formal or informal tone to establish credible voice and to appeal to the audience.			Appropriate for grade level. Use of complex sentences at an introductory level.

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		6. uses a variety of formatting (including but not limited to the use of electronic technology).						Clarity/specificity. What does this mean?
		7. uses creative writing strategies appropriate to the format (for example, using appropriate voice; using descriptive language to clarify ideas and create vivid images; using elements of style, such as appropriate tone).			W4.8.3.1 Student evaluates whether word choice, sentence structure, imagery, and figurative language are varied and effective for the topic and audience, and revises as needed.			Appropriate for grade level.
Standard 2: The student writes to communicate ideas and information effectively.								
	Benchmark LA.B.2.3.1: The student writes text, notes, outlines, comments, and observations that demonstrate comprehension of content and experiences from a variety of media.							
		Grade 6						
		1. writes notes, outlines, comments, and observations that reflect comprehension of sixth grade level or higher content from a variety of media.			W2.6.1.5 Student identifies a variety of primary sources for information (e.g., interviews, visits with experts) and appropriate secondary sources (e.g., magazines, journals, Internet sites, encyclopedias, almanacs) and understands the need to maintain careful track of them. W2.6.2.2 Student identifies and evaluates sources in limited ways and gathers information about topic and audience. W2.6.2.4 Student draws upon a variety of primary sources for identifying information (e.g., interviews, visits with experts) and appropriate secondary sources (e.g., magazines, journals, Internet sites, encyclopedias, almanacs), and takes careful notes. W2.6.3.3 Student uses, in limited ways, specific methods to synthesize and organize information (e.g., graphic organizers, informational semantic maps, notes that summarize or paraphrase, quote cards to make it clear what a source actually said), carefully crediting sources.			Appropriate for grade level.
		Grade 7						
		1. writes notes, outlines, comments, and observations that reflect comprehension of seventh grade level or higher content from a variety of media.						
		Grade 8						

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		1. writes notes, outlines, comments, and observations that reflect comprehension of eighth grade level or higher content from a variety of media.			W2.8.1.5 Student identifies a variety of primary and secondary sources for information (interviews with authorities in a field, appropriate Internet sources, books, journals, newspapers) and begins to develop a system for recording sources. W2.8.2.3 Student identifies and evaluates sources and gathers information about topic and audience. W2.8.2.5 Student draws upon a variety of primary and secondary sources for gathering information (interviews with authorities in a field, appropriate Internet sources, books, journals, newspapers), and systematically takes notes. W2.8.3.3 Student uses specific methods to synthesize and organize findings in limited ways (e.g., records of significant ideas, concepts, and quotations; summaries of information; timelines; charts and graphs) to convey a point of view, carefully crediting sources.			Appropriate for grade level.
	Benchmark LA.B.2.3.2: The student organizes information using alphabetical, chronological, and numerical systems.							
		Grade 6						
		1. logically sequences information using alphabetical, chronological, and numerical systems.			W2.6.1.3 Student identifies and organizes what she or he knows about the topic. W4.6.4.1 Student listens to or silently reads texts written by others to point out structures that are effective and to raise questions about areas that are unclear.			Progression: Does not differentiate between grade-level skills.
		Grade 7						
		1. logically sequences information using alphabetical, chronological, and numerical systems.						
		Grade 8						
		1. logically sequences information using alphabetical, chronological, and numerical systems.			W2.8.1.3 Student thinks about and organizes what he or she knows and needs to know about the topic. W4.8.2.1 Student evaluates the organization for logical and effective sequencing, and revises as needed.			See Grade 6.
	Benchmark LA.B.2.3.3: The student selects and uses appropriate formats for writing, including narrative, persuasive, and expository formats, according to the intended audience, purpose, and occasion.							
		Grade 6						

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		1. selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository).			W1.6.3.1 Student begins to recognize that different genres have different purposes and selects a genre to support the purpose for writing. W1.6.3.2 Student begins to think about what the audience needs to know for the writing to be effective. W1.6.3.3 Student crafts a guiding question to shape the writing. W1.6.3.4 Student recognizes the importance voice in writing.			Progression: Does not differentiate between grade levels.
		Grade 7						
		1. selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository)						
		Grade 8						
		1. selects and uses a format for writing which addresses the audience, purpose, and occasion (including but not limited to narrative, persuasive, expository).			W1.8.3.1 Student considers possible genres and selects one for a particular purpose. W1.8.3.2 Student thinks about what the audience needs to know for the writing to be effective. W1.8.3.3 Student crafts guiding questions to shape the thesis claim of the writing and to offer support and elaboration. W1.8.3.4 Student experiments with ways to present his or her voice as the writer of the piece.			Progression: Does not differentiate between grade levels. Rigor: High level of sophistication expected.
	Benchmark LA.B.2.3.4: The student uses electronic technology including databases and software to gather information and communicate new knowledge.							
		Grade 6						
		1. uses electronic technology appropriate to writing tasks (including but not limited to the Internet, databases and software) to create, revise, retrieve, and verify information.			W2.6.2.4 Student draws upon a variety of primary sources for identifying information (e.g., interviews, visits with experts) and appropriate secondary sources (e.g., magazines, journals, Internet sites, encyclopedias, almanacs), and takes careful notes.			Progression: Does not differentiate between grade level skills. Rigor: High level of sophistication expected.
		Grade 7						
		1. uses electronic technology appropriate to writing tasks (including but not limited to the Internet, databases and software) to create, revise, retrieve, and verify information.						
		Grade 8						
		1. uses electronic technology appropriate to writing tasks (including but not limited to the Internet, databases and software) to create, revise, retrieve, and verify information.			W2.8.2.5 Student draws upon a variety of primary and secondary sources for gathering information (interviews with authorities in a field, appropriate Internet sources, books, journals, newspapers), and systematically takes notes.			See Grade 6.

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Strand C: Listening, Viewing, and Speaking Standard 1: The student uses listening strategies effectively.								
	Benchmark LA.C.1.3.1: The student listens and uses information gained for a variety of purposes, such as gaining information from interviews, following directions, and pursuing a personal interest.							
		Grade 6						
		1. follows verbal directions.						
		2. paraphrases information.						
		3. expands and enhances personal interest through listening.						
		Grade 7						
		1. follows verbal directions.						
		2. formulates questions and conducts an interview.						
		3. paraphrases information.						
		4. expands and enhances personal interest through listening.						
		Grade 8						
		1. follows verbal directions.						
		2. formulates questions and conducts an interview.						
		3. paraphrases information.						
		4. expands and enhances personal interest through listening.						
	Benchmark LA.C.1.3.2: The student selects and listens to readings of fiction, drama, nonfiction, and informational presentations according to personal preferences.							
		Grade 6						
		1. listens to fiction, drama, nonfiction, and informational presentations based on personal preferences.						
		Grade 7						
		1. listens to fiction, drama, nonfiction, and informational presentations based on personal preferences.						
		Grade 8						
		1. listens to fiction, drama, nonfiction, and informational presentations based on personal preferences.						
	Benchmark LA.C.1.3.3: The student acknowledges the feelings and messages sent in a conversation.							
		Grade 6						
		1. recognizes verbal and nonverbal cues and responds appropriately.						

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		Grade 7						
		2. recognizes verbal and nonverbal cues and responds appropriately.						
		Grade 8						
		2. recognizes verbal and nonverbal cues and responds appropriately.						
	Benchmark LA.C.1.3.4: The student uses responsive listening skills, including paraphrasing, summarizing, and asking questions for elaboration and clarification.							
		Grade 6						
		1. stays alert while listening.						
		2. makes eye contact while listening.						
		3. demonstrates appropriate body language while listening.						
		4. asks pertinent questions during activities such as interviews and discussions.						
		5. summarizes main points and supporting details orally and in writing.						
		Grade 7						
		1. demonstrates effective listening behaviors for a variety of purposes (for example, using eye contact, note-making, appropriate posture).						
		2. asks appropriate, challenging questions for elaboration or clarification during activities such as interviews and discussion.						
		3. summarizes main points and supporting details orally or in writing.						
		4. uses information gained for a variety of purposes.						
		Grade 8						
		1. demonstrates effective listening behaviors for a variety of purposes (for example, eye contact, note-making, appropriate posture).						
		2. asks appropriate, challenging questions for elaboration or clarification during activities such as interviews and discussions.						
		3. summarizes main points and supporting details orally or in writing.						
		4. uses information gained for a variety of purposes.						
Standard 2: The student uses viewing strategies effectively.								
	Benchmark LA.C.2.3.1: The student determines main concept, supporting details, stereotypes, bias, and persuasion techniques in a nonprint message.							
		Grade 6						
		1. summarizes main concept and lists supporting details in a nonprint message.						
		2. identifies biases, stereotypes, and persuasive techniques in a nonprint message.						
		Grade 7						

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		1. summarizes main concept and lists supporting details in a nonprint message.						
		2. identifies biases and stereotypes in a nonprint message.						
		3. responds to persuasive techniques and nonverbal cues in a nonprint message (for example, body language, silence).						
		Grade 8						
		1. summarizes the main concept and lists supporting details in a nonprint message.						
		2. identifies biases and stereotypes in a nonprint message.						
		3. responds to persuasive techniques and nonverbal cues in a nonprint message (for example, body language, silence, juxtaposition).						
	Benchmark LA.C.2.3.2: The student uses movement, placement, juxtaposition, gestures, silent periods, facial expressions, and other nonverbal cues to convey meaning to an audience.							
		Grade 6						
		1. demonstrates nonverbal cues to convey a message to an audience (for example, movement, gestures, facial expressions).						
		Grade 7						
		1. participates in classroom discussions using effective speaking strategies (for example, asking questions, making observations.						
		2. alternates between roles of contributor and leader in a group discussion.						
		Grade 8						
		1. demonstrates nonverbal cues to convey a message to an audience (for example, movement, gestures, facial expressions).						
Standard 3: The student uses speaking strategies effectively.								
	Benchmark LA.C.3.3.1: The student understands how volume, stress, pacing, and pronunciation can positively or negatively affect an oral presentation.							
		Grade 6						
		1. evaluates classroom presentations according to volume, stress, pacing, and pronunciation.						
		2. organizes and effectively delivers a speech using a basic beginning, middle, and end.						
		Grade 7						
		1. evaluates classroom presentations according to volume, stress, pacing, and pronunciation.						
		2. uses a rating sheet to compare and contrast effective and ineffective presentations according to volume, stress, pacing, and pronunciation.						
		3. organizes and effectively delivers a speech using a beginning, middle, and end.						

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		Grade 8						
		1. evaluates classroom presentations according to volume, stress, pacing, and pronunciation.						
		2. uses a rating sheet to compare and contrast effective and ineffective presentations according to volume, stress, pacing, and pronunciation.						
		3. organizes and effectively delivers a speech using a beginning, middle, and end.						
	Benchmark LA.C.3.3.2: The student asks questions and makes comments and observations that reflect understanding and application of content, processes, and experiences.							
		Grade 6						
		1. participates in classroom discussions using effective speaking strategies (for example, asking questions, making observations.						
		2. participates as a contributor and occasionally acts as a leader in a group discussion.						
		Grade 7						
		1. participates in classroom discussions using effective speaking strategies (for example, asking questions, making observations.						
		2. alternates between roles of contributor and leader in a group discussion.						
		Grade 8						
		1. participates in classroom discussions using effective speaking strategies (for example, asking questions, making observations.						
		2. alternates between roles of contributor and leader in a group discussion.						
	Benchmark LA.C.3.3.3: The student speaks for various occasions, audiences, and purposes, including conversations, discussions, projects, and informational, persuasive, or technical presentations.							
		Grade 6						
		1. identifies the occasion, audience, and purpose for speaking.						
		2. uses appropriate grammar, word choice, and pacing.						
		3. uses language which is clear, audible, and suitable.						
		4. delivers a speech which appropriately addresses the audience.						
		Grade 7						
		1. identifies the occasion, audience, and purpose for speaking.						
		2. uses appropriate grammar, word choice, and pacing.						
		3. uses language which is clear, audible and suitable.						

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		4. delivers an effective informational, persuasive, or technical speech.						
		Grade 8						
		1. identifies the occasion, audience, and purpose for speaking.						
		2. uses appropriate grammar, word choice, and pacing.						
		3. uses language that is clear, audible, and suitable.						
		4. delivers an effective informational, persuasive, or technical speech.						
Strand D: Language Standard 1:The student understands the nature of language.								
	Benchmark LA.D.1.3.1: The student understands that there are patterns and rules in semantic structure, symbols, sounds, and meanings conveyed through the English language.							
		Grade 6						
		1. knows patterns and rules found in the English language (for example, grammar usage, word pronunciation).			W5.6.1.1 Student corrects for appropriate grammatical and mechanical conventions in limited ways (e.g., complete sentences, subject/verb agreement, tense, phrases), knows, and often demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Rigor and Focus: For Grades 6-8, consider shifting benchmark to focus on use of grammar, usage, and word pronunciation rather than simply identify.
		Grade 7						
		1. identifies patterns and rules found in the English language (for example, grammar usage, word pronunciation).						
		Grade 8						
		1. identifies and uses the patterns and rules of the English language (for example, grammar usage, word pronunciation).			W5.8.1.1 Student corrects for grammatical and mechanical conventions with general accuracy (e.g., complete sentences, subject/verb agreement, tense, phrases, clauses), understands, and demonstrates the proper relations among parts of speech (e.g., use of conjunction for subordination/coordination) appropriate for the genre. Student consults specified resources to guide correct use of grammar, spelling, mechanics, and punctuation.			Progression: Differentiate to support clearer expectations by grade level.
	Benchmark LA.D.1.3.2: The student demonstrates an awareness that language and literature are primary means by which culture is transmitted.							
		Grade 6						

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		1. understands ways culture and time period influence a literary work.	2	2	R1.6.2.2 Recognize that readers from different social, cultural, and historical contexts read and interpret texts differently. R1.6.4.1 Identify social, cultural, and historical perspectives in texts. R1.6.4.3 Identify how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., survival, determination, cultural diversity, loyalty, considerateness).	2	1	Specificity: Can be much more specific here.
		Grade 7						
		1. understands ways culture and time period influence a literary work.						
		2. compares and contrasts literature from different time periods and cultures to understand concepts and themes.						
		Grade 8						
		1. understands ways culture and time period influence a literary work.	2	2	R1.8.4.3 Explain how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., the conflict between good and evil, fairness, justice, honesty, commitment, loyalty, perseverance, freedom, empathy).	4	4	Should benchmark specific expectations regarding cultural themes.
		2. compares and contrasts literature from different time periods and cultures to understand concepts and themes.	2	2	R1.8.2.2 Understand how readers across different social, cultural, and historical contexts will interpret a given text differently. R1.8.4.1 Demonstrate familiarity with the concept that all social, cultural, and historical perspectives, including one's own, are not universal or absolute, but relative to one's context. R1.10.4.1 Compare and contrast texts from multiple historical, social, and cultural contexts to examine similar and contrasting themes, archetypes, beliefs, values, and perspectives.	2.33	2.33	
	Benchmark LA.D.1.3.3: The student demonstrates an awareness of the difference between the use of English in formal and informal settings.							
		Grade 6						
		1. knows when to use formal and informal English based on audience and purpose.			W1.6.2.1 Student reviews the situation and makes an initial identification of the audience.			Progression: Differentiation by levels in Grade 6-8 would support teacher decision-making about level of teacher support/instruction.
		Grade 7						
		1. knows when to use formal and informal English based on audience and purpose.						
		2. transfers information gathered and recorded informally into a formal presentation.						
		Grade 8						
		1. knows when to use informal and formal English based on audience and purpose.			W1.8.2.1 Student examines the situation and determines the intended audience.			Progression: See above.
		2. transfers information gathered and recorded informally into a formal presentation.						
	Benchmark LA.D.1.3.4: The student understands that languages change over time.							

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		Grade 6						
		1. explores origin and historical development of words.	1	2	R1.8.1.1 Draw on knowledge of root word, prefixes, suffixes, and word origins to understand words. Draw on knowledge of words in different languages.	2	2	Explore is a vague cognitive expectation.
		2. explores changes in sentence patterns over the years.	1		Not addressed in current edition.			
		3. identifies slang, both past and present.	1		Not addressed in current edition.			
		Grade 7						
		1. explores the origin and historical development of words.						
		2. identifies slang, both past and present.						
		3. analyzes words and sentence patterns that have changed in meaning over the years.						
		Grade 8						
		1. explores the origin and historical development of words and usage patterns.	1	2	R1.8.1.1 Draw on knowledge of root word, prefixes, suffixes, and word origins to understand words. Draw on knowledge of words in different languages.	2	2	
		2. identifies slang, both past and present.	1		Not addressed in current edition.			
		3. analyzes words and sentence patterns that have changed in meaning over the years.	4		Not addressed in current edition.			
Standard 2: The student understands the power of language.								
	Benchmark LA.D.2.3.1: The student selects language that shapes reactions, perceptions, and beliefs.							
		Grade 6						
		1. uses words and images that best express intended messages.			W3.6.1.1 Student drafts words, phrases, sentences, and paragraphs that are generally clear and complete.			Progression: Differentiation by level in Grade 6-8 would support teacher decision-making about level of teacher support/instruction.
		Grade 7						
		1. uses words and images that best express intended messages.						
		2. uses language appropriate to purpose and audience.						
		Grade 8						
		1. uses words and images that best express intended messages.			W3.8.1.1 Student drafts words, phrases, sentences, and paragraphs, continuously reading for coherence and cohesion.			Progression: See above.
		2. uses language appropriate to purpose and audience.						
	Benchmark LA.D.2.3.2: The student uses literary devices and techniques in the comprehension and creation of written, oral, and visual communications.							
		Grade 6						

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Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Performance Expectations	Rater 1 DOK: CB	Rater 2 DOK: CB	
		1. uses figurative language techniques to create and comprehend meaning (for example, similes, metaphors, analogies, anecdotes, sensory language).	2	3	R2.6.2.1 Recognize and identify how authors use symbolism, foreshadowing, and developed dialogue. W3.6.1.3 Student begins to use very limited rhetorical appeals (e.g., reason, emotion), strategies (e.g., using organizational patterns), and devices (e.g., limited figurative language) to persuade the intended audience. The student begins to understand that introducing source materials increases the credibility of the text. W3.6.2.1 Student drafts in limited ways words, phrases, and sentences (e.g., precise vocabulary, figurative language, and variation in sentence length) that employ a formal or informal tone to establish credible voice and to appeal to the audience.	2	1	Rigor: Expectation appropriate for grade level.
		Grade 7						
		1. uses figurative language techniques to create and comprehend meaning (for example, similes, metaphors, analogies, anecdotes, sensory language).						
		Grade 8						
		1. uses figurative language techniques to create and comprehend meaning (for example, similes, metaphors, analogies, anecdotes, sensory language).	2	3	R2.8.2.1 Interpret and explain how authors use anthropomorphism, emotional appeal, exaggeration. W3.8.1.3 Student begins to use rhetorical appeals (e.g., appeals to reason, character, and emotion), strategies (e.g., using organizational patterns, anticipating and refuting counterarguments), and devices (e.g., metaphors, similes) to persuade the intended audience. Student understands that introducing source materials increases the credibility of the text. W3.8.2.1 Student drafts words, phrases, and sentences (e.g., precise vocabulary, figurative language, and variation in sentence length) that employ a formal or informal tone to establish credible voice and to appeal to the audience.	2	4	Progression: No progression in GLEs. Rigor: Expectation appropriate for grade level.
	Benchmark LA.D.2.3.3: The student distinguishes between emotional and logical argument.							
		Grade 6						
		1. recognizes emotional and logical arguments in written, oral, and visual communication.	2	1	R1.6.1.11 Identify appeals to logic and appeals to emotion in arguments or persuasive texts.	2	1	
		2. understands differences between propaganda and logical reasoning strategies.	2	2	R1.6.1.11 Identify appeals to logic and appeals to emotion in arguments or persuasive texts.	2	1	
		Grade 7						
		1. distinguishes between emotional and logical arguments in written, oral and visual communication.						
		2. understands difference between propaganda and logical reasoning strategies.						
		Grade 8						

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		1. distinguishes between emotional and logical arguments in written, oral and visual communication.	2	1	R1.8.1.12 Explain how appeals to emotion work in persuasive texts or propaganda.	2	4	
		2. understands differences between propaganda and logical reasoning strategies.	2	2	R1.8.1.12 Explain how appeals to emotion work in persuasive texts or propaganda.	2	4	
	Benchmark LA.D.2.3.4: The student understands how the multiple media tools of graphics, pictures, color, motion, and music can enhance communication in television, film, radio, and advertising.							
		Grade 6						
		1. understands ways the tools of graphics, pictures, color, motion, music, and computer technology affect communication across the media.			Not addressed in current edition.			
		Grade 7						
		1. selects communication tools that will enhance understanding.						
		2. knows ways the tools of graphics, pictures, color, motion, music, and computer technology affect communication across the media.						
		Grade 8						
		1. selects communication tools that will enhance understanding.			Not addressed in current edition.			
		2. understands ways the tools of graphics, pictures, color, motion, music, and computer technology affect communication across the media.			Not addressed in current edition.			
		3. evaluates strengths and weaknesses of multimedia tools in presentations.			Not addressed in current edition.			
	Benchmark LA.D.2.3.5: The student incorporates audiovisual aids in presentations.							
		Grade 6						
		1. uses multimedia tools to enhance presentations.						
		Grade 7						
		1. uses multimedia tools to enhance presentations.						
		Grade 8						
		1. uses multimedia tools to enhance presentations.						
	Benchmark LA.D.2.3.6: The student understands specific ways that mass media can potentially enhance or manipulate information.							
		Grade 6						
		1. understands ways mass media may enhance or manipulate information.						
		Grade 7						
		1. understands ways mass media may enhance or manipulate information.						
		Grade 8						

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		1. understands ways mass media may enhance or manipulate information.						
	Benchmark LA.D.2.3.7: The student understands that laws exist that govern what can and cannot be done with mass media.							
		Grade 6						
		1. understands ways laws govern use of mass media (for example, plagiarism, copyright, libel, slander).						
		Grade 7						
		1. understands ways laws govern use of mass media (for example, plagiarism, copyright, libel, slander).						
		Grade 8						
		1. understands ways laws govern use of mass media (for example, plagiarism, copyright, libel, slander).						
		2. identifies examples of libel and slander in the media.						
Strand E: Literature Standard 1:The student understands the common features of a variety of literary forms.								
	Benchmark LA.E.1.3.1: The student identifies the defining characteristics of classic literature, such as timelessness, deals with universal themes and experiences, and communicates across cultures.							
		Grade 6						
		1. identifies universal themes in various types of literature.	1	1	R1.6.4.3 Identify how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., survival, determination, cultural diversity, loyalty, considerateness). R2.6.1.1 Recognize and identify how authors connect themes and main events.	3	1	Specificity: Much more specificity would help teachers understand how to address these very abstract topics. Rigor: Generally found at Grade 9 or above.
		Grade 7						
		1. identifies universal themes in various types of literature.						
		2. compares and contrasts themes in classic and contemporary literature.						
		Grade 8						
		1. identifies universal themes in various types of literature.	1	1	R1.8.4.3 Explain how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., the conflict between good and evil, fairness, justice, honesty, commitment, loyalty, perseverance, freedom, empathy). R2.8.1.1 Interpret and explain how authors connect themes and character development.	3	4	Specificity: Much more specificity would help teachers understand how to address these very abstract topics. Rigor: Introductory level only.
		2. compares and contrasts themes in classic and contemporary literature.	2	2	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts.	2	2	Rigor: Generally found at Grade 9 or above.

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	Benchmark LA.E.1.3.2: The student recognizes complex elements of plot, including setting, character development, conflicts, and resolutions.							
		Grade 6						
		1. describes or illustrates the setting in a literary text.	2	2	R1.6.1.6 Identify events, ideas, themes, characters, settings, and plots in texts. Compare and contrast simple treatment of these elements across texts.	2	2	Rigor: We expect greater understanding of how setting functions within a narrative.
		2. explains character development in a literary text.	2	4	R2.6.1.3 Recognize and identify how authors use major and minor characters as well as dialogue to enhance the plot.	2	1	Rigor: We expect greater understanding of how character functions within a narrative.
		3. creates a graphic organizer that represents the complex elements of a plot in a literary text.	3	4	R3.6.9.2. The reader uses simple graphic organizers or diagrams (e.g., flow charts, story maps, concept maps, tables, or pictures about contents) to understand the global meaning of a text.	3	4	Appropriate for grade level.
		4. explains the conflicts and resolutions in self-selected and assigned texts.	2	4	R2.6.1.4 Recognize and identify how authors use character choice to impact other characters and character actions and thoughts to develop well-rounded characters.	2	1	Rigor: This should be addressed earlier. We expect greater understanding of how character functions within a narrative at grade 6.
		Grade 7						
		1. compares and contrasts characters from various texts.						
		2. compares and contrasts settings from various texts.						
		3. compares and contrasts plot elements from various texts.						
		4. knows the primary conflicts and explains their resolutions in a variety of text types.						
		Grade 8						
		1. compares and contrasts characters from various texts.	2	2	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts.	2	2	
		2. compares and contrasts settings from various texts.	2	2	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts.	2	2	Appropriate for grade level.
		3. compares and contrasts plot elements from various texts.	2	2	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts.	2	2	Appropriate for grade level.
		4. differentiates between major and minor conflicts and their resolutions in a variety of texts.	4	2	R2.8.1.3 Interpret and explain how authors use internal and external conflicts to enhance the plot. R2.8.1.5 Interpret and explain how authors use characters to perform different roles and functions, e.g., hero, heroine, antagonist, protagonist, foil, tragic hero, anti-hero, anti-heroine.	2	4	Specificity: More specificity here would provide greater instructional value.

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	Benchmark LA.E.1.3.3: The student understands various elements of authors' craft appropriate at this grade level, including word choice, symbolism, figurative language, mood, irony, foreshadowing, flashback, persuasion techniques, and point of view in both fiction and nonfiction.							
		Grade 6						
		1. recognizes and understands elements of author's craft (including but not limited to symbolism, figurative language, flashback, foreshadowing).	2	2	R2.6.2.1 Recognize and identify how authors use symbolism, foreshadowing, and developed dialogue.	2	1	At an introductory level only. Some elements, such as symbolism, can be introduced but not taken to the level of literary analysis.
		2. understands the role of point of view in a literary or informational text.	2	2	R2.7.1.5 Explain and identify how narrative point of view affects how a story is told. Understand the difference between third-person-omniscient and third-person-limited narration. R2.6.1.3 Recognize and identify how authors use major and minor characters as well as dialogue to enhance the plot.	2	2.5	Specificity: Unclear whether this refers to narrative point of view or point of view conveyed through different characters. Should be clarified.
		Grade 7						
		1. knows ways the author's word choice contributes to the meaning of a text.						
		2. identifies symbolism and figurative language used effectively in fiction and nonfiction.						
		3. knows the role of point of view or persona in a literary or informational text.						
		4. identifies literary devices (for example, foreshadowing, flashbacks, irony).						
		5. understands the mood in a literary work.						
		6. identifies persuasion techniques in literary works.						
		Grade 8						
		1. knows ways the author's word choice contributes to the meaning of a text.	1	1	R2.8.2.3 Interpret and explain how authors use specific words, sentence structures, figurative and descriptive language, images, tone, and topics to achieve specific effects.	2	4	Rigor: Appropriate for grade level.
		2. analyzes and describes the use of symbolism and figurative language in fiction or nonfiction.	4	4	R1.8.1.9 Outline and explain the conceptual framework that organizes the ideas in a text, including themes, motifs, and symbols. R2.7.2.1 Explain and identify how authors use metaphors, similes, and caricatures. R1.6.1.5 Understand the difference between literal and nonliteral meanings of words and expressions (e.g., metaphor, simile, hyperbole).	2	3.33	Rigor: Appropriate for grade level.
		3. knows the role of point of view or persona in a literary or informational text.	1		R2.8.1.6 Interpret and explain how authors use narrator voice to provide insights in characters. R2.8.4.1 Interpret how authors craft authorial persona through word choice, point of view, opinions, and evidence provided to establish credibility and authority. R1.8.3.1 Identify the author's values and perspectives implied in the text. R1.8.3.3 Evaluate how well an author understands a topic.	2.75		Specificity: Unclear what this refers to.

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		4. knows how foreshadowing and flashbacks contribute to plot development of the text.	1	1	R2.8.1.4 Interpret how authors use flashbacks and foreshadowing to develop plot.	2	2	Rigor: Appropriate for grade level.
		5. recognizes the types of irony used in texts.	1	1	R2.9.2.1 Interpret and compare how authors use personification, imagery, mood, tone, irony, and alliteration.	2	2	Rigor: Advanced for grade level.
		6. infers the mood in a literary work.	2	2	R2.9.2.1 Interpret and compare how authors use personification, imagery, mood, tone, irony, and alliteration.	2	2	Rigor: Advanced for grade level.
		7. analyzes and explains persuasion techniques in literary works.	4	4	R2.8.3.2 Interpret text organized according to simple persuasive and argumentative structure, including a claim, supporting reasons and evidence, acknowledgement and refutation of counter-arguments, and a call to action.	2	2	Rigor: Advanced for grade level.
	Benchmark LA.E.1.3.4: The student knows how mood or meaning is conveyed in poetry, such as, word choice, dialect, invented words, concrete or abstract terms, sensory or figurative language; use of sentence structure, line length, punctuation, and rhythm.							
		Grade 6						
		1. identifies effective word choice, uses of dialect, and sensory or figurative language in poetry.	1	1	R2.6.2.2 Recognize and identify how authors select words to achieve specific effects.	1	1	
		2. understands the impact on the reader of specific word choices (for example, multiple meanings, invented words, concrete or abstract terms, figurative language).	2	2	R2.6.2.2 Recognize and identify how authors select words to achieve specific effects.	1	1	
		3. describes how line length, punctuation, and rhythm contribute to the overall effect of a poem.	2		Not addressed in current edition.			
		Grade 7						
		1. knows ways effective word choice, uses of dialect and sensory or figurative language contribute to the mood or meaning of a poem.						
		2. understands the impact on the reader of specific word choices (for example,, multiple meanings, invented words, concrete or abstract terms, figurative language).						
		3. understands ways line length, punctuation, and rhythm contribute to the overall effect of a poem.						
		Grade 8						
		1. recognizes and summarizes possible themes in a variety of literary works, including classic literature.	2	4	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts. R2.7.1.1 Explain and identify how authors use abstract themes.	2	3	Focus: NAEP differentiates comprehension of literary elements from analyzing authors' craft to develop literary elements. Both should be addressed and distinguished.
		2. identifies and explains themes which appear across cultures.	2	4	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts. R1.8.4.4 Demonstrate familiarity with classical and contemporary works of literature from various world cultures.	2	2.5	

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		3. discusses recurring and timeless themes in literary works.	2	2	R1.8.4.3 Explain how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., the conflict between good and evil, fairness, justice, honesty, commitment, loyalty, perseverance, freedom, empathy).	2	4	
	Benchmark LA.E.1.3.5: The student identifies common themes in literature.							Focus: This whole benchmark repeats same expectations listed in LA.E.1.3.1 on literature.
		Grade 6						
		1. knows common recurring themes in literature.	1	1	R1.6.4.3 Identify how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., survival, determination, cultural diversity, loyalty, considerateness).	4	1	Repetitious.
		2. compares and contrasts themes across texts.	2	2	R1.6.1.6 Identify events, ideas, themes, characters, settings, and plots in texts. Compare and contrast simple treatment of these elements across texts. R2.7.1.1 Explain and identify how authors use abstract themes.	2	3	
		Grade 7						
		1. knows possible themes in a variety of literary texts.						
		2. knows and explains themes that appear across cultures.						
		3. knows recurring and timeless themes in literary works.						
		Grade 8						
		1. recognizes and summarizes possible themes in a variety of literary works, including classic literature.	2	4	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts.	2	2	
		2. identifies and explains themes which appear across cultures.	2	4	R1.8.1.7 Identify events, central ideas, themes, settings, and plots in complex texts. Compare and contrast these elements across texts. R1.8.4.4 Demonstrate familiarity with classical and contemporary works of literature from various world cultures.	2	2.5	
		3. discusses recurring and timeless themes in literary works.	2	2	R1.8.4.3 Explain how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., the conflict between good and evil, fairness, justice, honesty, commitment, loyalty, perseverance, freedom, empathy).	4	4	
Standard 2: The student responds critically to fiction, nonfiction, poetry, and drama.								
	Benchmark LA.E.2.3.1: The student understands how character and plot development, point of view, and tone are used in various selections to support a central conflict or story line.							
		Grade 6						
		1. knows the motives for a character's actions.	1	1	R2.6.1.4 Recognize and identify how authors use character choice to impact other characters and character actions and thoughts to develop well-rounded characters.	2	1	Progression: Students should already be able to infer characters' motives. Expectation related to character motive should be made more specific.

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		2. knows the events in the plot related to the central conflict.	1	1	R2.6.1.3 Recognize and identify how authors use major and minor characters as well as dialogue to enhance the plot.	2	1	
		3. knows the point of view of a literary work and how it affects the story line.	2	1	R2.7.1.5 Explain and identify how narrative point of view affects how a story is told. Understand the difference between third-person-omniscient and third-person-limited narration.	2	4	
		4. knows how cause-and-effect relationships affect the development of a plot.	2	1	R2.6.1.3 Recognize and identify how authors use major and minor characters as well as dialogue to enhance the plot.	2	1	Progression: We assume that students have learned to trace simple cause-and-effect relationships in plot development at an earlier stage.
		Grade 7						
		1. knows the reasons for a character's actions.						
		2. knows the events in the plot related to the central conflict.						
		3. knows ways cause-and-effect relationships affect the development of a plot.						
		4. knows ways the tone of a literary work is used to support its story line.						
		Grade 8						
		1. knows the reasons for a character's actions.	1	1	R2.6.1.4 Recognize and identify how authors use character choice to impact other characters and character actions and thoughts to develop well-rounded characters.	2	1	
		2. knows the events in the plot related to the central conflict and identifies the rising action and climax/resolution where applicable.	2	1	R2.7.1.3 Identify and explain how authors use anti-climax, raising action, and catharsis to enhance the plot.	2	4	
		3. knows ways the tone of a literary work is used to support its story line.	2	1	R2.8.2.3 Interpret and explain how authors use specific words, sentence structures, figurative and descriptive language, images, tone, and topics to achieve specific effects.	2	4	
		4. knows from various characters' points of view a situation related to the central conflict in a literary work.	2	1	R2.8.1.5 Interpret and explain how authors use characters to perform different roles and functions, e.g., hero, heroine, antagonist, protagonist, foil, tragic hero, anti-hero, anti-heroine.	2	4	
	Benchmark LA.E.2.3.2: The student responds to a work of literature by interpreting selected phrases, sentences, or passages and applying the information to personal life.							
		Grade 6						
		1. selects a key passage that reflects personal convictions.	2		Not addressed in current edition.			
		2. explains or demonstrates how phrases, sentences, or passages relate to personal life.	2	4	R1.8.2.3 Interpret and explain personal reactions to word choice, use of figurative and descriptive language, imagery, and topic while reading.	2	4	
		Grade 7						
		1. selects a key passage that reflects personal convictions.						
		2. explains or demonstrates how phrases, sentences, or passages relate to personal life.						
		Grade 8						
		1. selects a key passage that reflects his/her personal convictions.	2		Not addressed in current edition.			

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		2. explains or demonstrates how phrases, sentences, or passages relate to personal life.	2	4	R1.8.2.3 Interpret and explain personal reactions to word choice, use of figurative and descriptive language, imagery, and topic while reading.	2	4	
	Benchmark LA.E.2.3.3: The student knows that a literary text may elicit a wide variety of valid responses.							
		Grade 6						
		1. recognizes that a literary text may elicit a variety of valid responses.	1	1	R1.6.2.2 Recognize that readers from different social, cultural, and historical contexts read and interpret texts differently. R1.6.2.4 Recognize personal reactions to word choice, use of figurative and descriptive language, imagery, and topic while reading.	1.5	1	
		Grade 7						
		1. recognizes that a literary text elicit a variety of valid responses.						
		Grade 8						
		1. knows that a text may elicit a variety of valid responses.	1	1	R1.8.2.1 Understand that a reader's prior knowledge of a topic or subject area, attitudes, and belief shapes, distorts, or embellishes the reader's interpretation of a text. R1.8.2.2 Understand how readers across different social, cultural, and historical contexts will interpret a given text differently. R1.8.2.3 Interpret and explain personal reactions to word choice, use of figurative and descriptive language, imagery, and topic while reading.	2	2	Specificity: Greater specificity here would be instructionally valuable.
	Benchmark LA.E.2.3.4: The student knows ways in which literature reflects the diverse voices of people from various backgrounds.							
		Grade 6						
		1. reads literature by authors from various cultural and historical backgrounds.	3	2	R1.6.4.4 Read and understand classical and contemporary works of literature from various world cultures.	3	2	
		Grade 7						
		1. reads literature by authors from various cultural and historical backgrounds.						
		Grade 8						
		1. reads literature by authors from various cultural and historical backgrounds.	3	2	R1.8.4.4 Demonstrate familiarity with classical and contemporary works of literature from various world cultures.	3	3	
	Benchmark LA.E.2.3.5: The student recognizes different approaches that can be applied to the study of literature, including thematic approaches such as change, personal approaches such as what an individual brings to his or her study of literature, historical approaches such as how a piece of literature reflects the time period in which it was written.							
		Grade 6						

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		1. knows different literary approaches that are used in the study of literature.	1					Progression: Formally adopting a specific critical perspective is a very sophisticated approach to reading that should not be introduced until 12th grade. Have used a low cognitive category (know) with a sophisticated skill (managing the use of different critical lenses).
		Grade 7						
		1. knows different literary approaches that are used in the study of literature.						
		Grade 8						
		1. knows different literary approaches that are used in the study of literature.	1					
		2. supports a particular literary approach or interpretation of a text with information from other texts (for example, historical or personal).	2	4	[R1.12.2.3 Adopt a specific critical perspective to analyze a text (e.g., close reading, reader response, historical, psychological, feminist).]		4	Formally adopting a specific critical perspective is a very sophisticated approach to reading that should not be introduced until 12th grade (see example).
	Benchmark LA.E.2.3.6: The student identifies specific questions of personal importance and seeks to answer them through literature.							
		Grade 6						
		1. gains a better understanding of self through the reading of literature.	2	2	R1.6.2.4 Recognize personal reactions to word choice, use of figurative and descriptive language, imagery, and topic while reading. R1.6.2.1 Make connections between the events, ideas, themes, settings, and plots in texts to prior knowledge and experience to interpret the text.	1.5	2.5	
		Grade 7						
		1. gains a better understanding of self through the reading of literature.						
		2. explains the influence of a particular text on personal growth and development.						
		Grade 8						
		1. gains a better understanding of self through the reading of literature.	2	2	R1.8.2.1 Understand that a reader's prior knowledge of a topic or subject area, attitudes, and belief shapes, distorts, or embellishes the reader's interpretation of a text.	2	2	
		2. explains the influence of a particular text on personal growth and development.	2	4	R1.8.2.3 Interpret and explain personal reactions to word choice, use of figurative and descriptive language, imagery, and topic while reading.	2	4	
	Benchmark LA.E.2.3.7: The student identifies specific interests and the literature that will satisfy those interests.							
		Grade 6						
		1. reads literature for personal pleasure.			Not addressed in current edition.			
		Grade 7						
		1. reads literature for personal pleasure.			Not addressed in current edition.			
		Grade 8						
		1. reads literature for personal pleasure.			Not addressed in current edition.			

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	Benchmark LA.E.2.3.8: The student knows how a literary selection can expand or enrich personal viewpoints or experiences.							
		Grade 6						
		1. reads and discusses literature with differing viewpoints to enhance perspective.	2	2	R1.6.2.2 Recognize that readers from different social, cultural, and historical contexts read and interpret texts differently. R1.6.2.3 Use both general and subject-specific knowledge to understand, extend, elaborate, and generalize the ideas in text. R1.6.4.1 Identify social, cultural, and historical perspectives in texts.	1.67	1.67	
		Grade 7						
		1. reads and discusses literature with differing viewpoints to enhance perspective.						
		Grade 8						
		1. reads and discusses literature with differing viewpoints to enhance perspective.	2	2	R1.8.2.1 Understand that a reader's prior knowledge of a topic or subject area, attitudes, and belief shapes, distorts, or embellishes the reader's interpretation of a text. R1.8.2.2 Understand how readers across different social, cultural, and historical contexts will interpret a given text differently. R1.8.4.1 Demonstrate familiarity with the concept that all social, cultural, and historical perspectives, including one's own, are not universal or absolute, but relative to one's context.	2.33	2.33	
Grades 9–12								
Strand A: Reading Standard 1: The student uses the reading process effectively.								
		LA.A.1.4.1: selects and uses prereading strategies that are appropriate to the text, such as discussion, making predictions, brainstorming, generating questions, and previewing, to anticipate content, purpose, and organization of a reading selection.	3	3	R3 Strand 4. Prepare to read. The reader uses strategies to prepare for the reading process by previewing certain sections of the text or by quickly scanning or skimming the text. R3 Strand 5. Generate questions. The reader generates questions about specific content, such as word meanings, or parts of text that are not understood. R3 Strand 9. Organize text content. The reader uses strategies to organize the content of the text.	4	4.33	

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		LA.A.1.4.2: selects and uses strategies to understand words and text, and to make and confirm inferences from what is read, including interpreting diagrams, graphs, and statistical illustrations.	3	3	R3 Strand 3. Monitor reading strategies. The reader monitors the use of reading strategies and regulates their use to meet comprehension goals while reading. The reader uses strategies based on the comprehension monitoring process both while and after reading. The reader uses strategies based on the comprehension difficulty of individual sentences, successive sentences, paragraphs, or the entire text. R3 Strand 6. Close/attentive reading. The reader uses strategies that improve careful attention to the nature and meaning of the words, sentences, and the entire text. R3 Strand 9. Organize text content. The reader uses strategies to organize the content of the text.	4	3.33	
		LA.A.1.4.3: refines vocabulary for interpersonal, academic, and workplace situations, including figurative, idiomatic, and technical meanings.		2	W4.8.3.1 Student evaluates whether word choice, sentence structure, imagery, and figurative language are varied and effective for the topic and audience, and revises as needed.		5	Rigor: Unclear expectation. Appears low.
		LA.A.1.4.4: applies a variety of response strategies, including rereading, note taking, summarizing, outlining, writing a formal report, and relating what is read to his or her own experiences and feelings.	3	3	R3 Strand 6. Close/attentive reading. The reader uses strategies that improve careful attention to the nature and meaning of the words, sentences, and the entire text. R3 Strand 7. Using prior knowledge. The reader uses strategies that require going beyond the information contained in the sentence by identifying how the sentence relate to previous sentences, personal experience, general knowledge, or topic knowledge. R3 Strand 9. Organize text content. The reader uses strategies to organize the content of the text.	3.67	3.33	
Standard 2: The student constructs meaning from a wide range of texts.								
		LA.A.2.4.1: determines the main idea and identifies relevant details, methods of development, and their effectiveness in a variety of types of written material.	2	1	R1.12.1.8 Analyze and evaluate the progression and development of ideas or an argument. Identify faulty assumptions underlying illogical conclusions. Explain how opinions do not follow from cited facts or reasoning. R1.12.1.9 Develop conceptual frameworks to relate ideas and arguments summarized from multiple texts.	5.5	5.5	
		LA.A.2.4.2: determines the author's purpose and point of view and their effects on the text.	2	1	R1.12.3.3 Infer the author's purpose and intended audience to guide interpretation of a text.	3	2	
		LA.A.2.4.3: describes and evaluates personal preferences regarding fiction and nonfiction.			Not addressed in current edition.			
		LA.A.2.4.4: locates, gathers, analyzes, and evaluates written information for a variety of purposes, including research projects, real-world tasks, and self-improvement.			W2.10.2.1 Student occasionally uses introspective and external research in everyday life. W2.12.2.1 Student uses introspective and external research in everyday life.			

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		LA.A.2.4.5: identifies devices of persuasion and methods of appeal and their effectiveness.	3	1	R2.12.3.1 Analyze and critique appeals to emotion and the audience's values and beliefs and appeals to authority, including establishing his or her own credibility. W1.10.3.2 Student recognizes that audience "pressure points" (i.e., attitudes, interests, values, and background knowledge) must be appealed to in order to achieve desired outcomes. W1.12.3.2 Student considers how to accommodate and appeal to audience "pressure points" (i.e., attitudes, interests, values, and background knowledge) to achieve desired outcomes.	5	5	Rigor: As described, this is a Grade 8 expectation. Focus: Promote use instead of identifying.
		LA.A.2.4.6: selects and uses appropriate study and research skills and tools according to the type of information being gathered or organized, including almanacs, government publications, microfiche, news sources, and information services.			W2.10.2.5 and W2.12.25 Focus on primary and secondary research sources and knowledge that questions may change as a result of researching. The student takes notes that reflect the ways in which the information will be used (e.g., direct quotation of words, phrases, and sentences; paraphrasing).			Rigor: At Grade 9-12, CB standards call for development of skills in using primary and secondary research sources.
		LA.A.2.4.7: analyzes the validity and reliability of primary source information and uses the information appropriately.	5	4	R1.12.3.4 Evaluate the author's credibility and authority on a topic to guide interpretation of a text.	5	5	
		LA.A.2.4.8: synthesizes information from multiple sources to draw conclusions.	4	4	R1.12.1.9 Develop conceptual frameworks to relate ideas and arguments summarized from multiple texts. R1.12.1.10 Infer implied consequences, draw conclusions, and draw generalizations from multiple texts, explaining how such inferences, conclusions, and generalizations follow logically from the given information. R3 Strand 10. Synthesize text content. The reader uses strategies to synthesize the text contents with context or goal of reading (discuss the content with peers, analyze the author's intent and style, compare and contrast the text content to evaluate the quality of the text in terms of the application, problem, project, etc.). W2.10.3.2 and W2.12.3.2 Student uses conventional structures of persuasive/argumentative writing to sift, select, and make connections among ideas and perspectives generated and begins to arrange them into a preliminary organizational structure (e.g., synthesize information from a variety of sources; paraphrase ideas and connect them to other sources and related topics; identify disagreements	4	4	Grade-level appropriate.
Strand B: Writing Standard 1:The student uses writing processes effectively.								
		LA.B.1.4.1: selects and uses appropriate prewriting strategies, such as brainstorming, graphic organizers, and outlines.			W1.12.1.1, W1.12.1.2, W2.12.1.3, W2.12.1.4, W1.10.1.1, W10.1.2, W2.10.1.3, W2.10.1.4.			Progression: Standards do not show development of skills across grade levels. Must articulate an instructional sequence.

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		LA.B.1.4.2: drafts and revises writing that: is focused, purposeful, and reflects insight into the writing situation; has an organizational pattern that provides for a logical progression of ideas; has effective use of transitional devices that contribute to a sense of completeness; has support that is substantial, specific, relevant, and concrete; demonstrates a commitment to and involvement with the subject; uses creative writing strategies as appropriate to the purposes of the paper; demonstrates a mature command of language with freshness of expression; has varied sentence structure; has few, if any, convention errors in mechanics, usage, punctuation, and spelling.			W3.10.1.3, W3.10.1.4, W3.12.1.1, W3.12.1.2, W3.12.1.3, W3.12.1.4.			Progression: Standards do not show development of skills across grade levels. Must articulate an instructional sequence.
		LA.B.1.4.3: produces final documents that have been edited for: correct spelling; correct punctuation, including commas, colons, and common use of semicolons; correct capitalization; correct sentence formation; correct instances of possessives, subject/verb agreement, instances of noun/pronoun agreement, and the intentional use of fragments for effect; and correct formatting that appeals to readers, including appropriate use of a variety of graphics, tables, charts, and illustrations in both standard and innovative forms.			W5.12.1.1, W5.10.1.1, W5.12.3.1, W5.10.3.1.			Progression: Standards do not show development of skills across grade levels. Must articulate an instructional sequence.
Standard 2: The student writes to communicate ideas and information effectively.								
		LA.B.2.4.1: writes text, notes, outlines, comments, and observations that demonstrate comprehension and synthesis of content, processes, and experiences from a variety of media.						
		LA.B.2.4.2: organizes information using appropriate systems.						
		LA.B.2.4.3: writes fluently for a variety of occasions, audiences, and purposes, making appropriate choices regarding style, tone, level of detail, and organization.						
		LA.B.2.4.4: selects and uses a variety of electronic media, such as the Internet, information services, and desktop publishing software programs, to create, revise, retrieve, and verify information.						
Strand C: Listening, Viewing, and Speaking Standard 1: The student uses listening strategies effectively.								

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		LA.C.1.4.1: selects and uses appropriate listening strategies according to the intended purpose, such as solving problems, interpreting and evaluating the techniques and intent of a presentation, and taking action in career-related situations.						
		LA.C.1.4.2: describes, evaluates, and expands personal preferences in listening to fiction, drama, literary nonfiction, and informational presentations.						
		LA.C.1.4.3: uses effective strategies for informal and formal discussions, including listening actively and reflectively, connecting to and building on the ideas of a previous speaker, and respecting the viewpoints of others.						
		LA.C.1.4.4: identifies bias, prejudice, or propaganda in oral messages.						
Standard 2: The student uses viewing strategies effectively.								
		LA.C.2.4.1: determines main concept and supporting details in order to analyze and evaluate nonprint media messages.						
		LA.C.2.4.2: understands factors that influence the effectiveness of nonverbal cues used in nonprint media, such as the viewer's past experiences and preferences, and the context in which the cues are presented.						
Standard 3: The student uses spreaking strategies effectively.								
		LA.C.3.4.1: uses volume, stress, pacing, enunciation, eye contact, and gestures that meet the needs of the audience and topic.						
		LA.C.3.4.2: selects and uses a variety of speaking strategies to clarify meaning and to reflect understanding, interpretation, application, and evaluation of content, processes, or experiences, including asking relevant questions when necessary, making appropriate and meaningful comments, and making insightful observations.						
		LA.C.3.4.3: uses details, illustrations, analogies, and visual aids to make oral presentations that inform, persuade, or entertain.						
		LA.C.3.4.4: applies oral communication skills to interviews, group presentations, formal presentations, and impromptu situations.						
		LA.C.3.4.5: develops and sustains a line of argument and provides appropriate support.						
Strand D: Language Standard 1:The student understands the nature of language.								

Florida Sunshine State Standards and GLEs: Language Arts					College Board Standards			Comment
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	Rater 1 DOK: FL	Rater 2 DOK: FL	**Performance Expectations**	Rater 1 DOK: CB	Rater 2 DOK: CB	
		LA.D.1.4.1: applies an understanding that language and literature are primary means by which culture is transmitted.	3	3	R1.12.4.1 Analyze and evaluate texts from multiple historical, social, and cultural contexts to examine similar and contrasting themes, archetypes, beliefs, values, and perspectives. R1.12.4.2 Analyze and evaluate how references to major historical events, persons, and social or political groups encountered in texts contribute to the theme or main idea of a text. R1.12.4.3 Explain how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., the conflict between good and evil, the conflict between public and private life, the conflict between love and duty, the conflict between humans and nature, the conflict between humans and the divine, class conflicts, gender differences and conflicts, absolute versus relative truth).	4.67	4.67	Specificity: Very vague; provides no instructional direction or expectation of student performance.
		LA.D.1.4.2: makes appropriate adjustments in language use for social, academic, and life situations, demonstrating sensitivity to gender and cultural bias.						
		LA.D.1.4.3: understands that there are differences among various dialects of English.						
Standard 2: The student understands the power of language.								
		LA.D.2.4.1: understands specific ways in which language has shaped the reactions, perceptions, and beliefs of the local, national, and global communities.	2	2	R1.12.3.1 Compare and contrast multiple authors' ideas, values, and perspectives across different social, cultural, and historical contexts. R1.12.3.2 Analyze how an author's ideas, values, and perspectives are shaped by his or her social, cultural, and historical context to guide interpretation of a text.	3	3	
		LA.D.2.4.2: understands the subtleties of literary devices and techniques in the comprehension and creation of communication.	2	2	R2.12.2.1 Evaluate and critique how authors use controlling images, hyperbole, allegory, and comic relief. R2.12.2.1 Evaluate and critique how authors use allegory and parody to suggest non-literal meaning and use complex symbolism and complex imagery to create coherence. R2.12.2.3 Evaluate and critique how authors use specific words, sentence structures, figurative and descriptive language, images, tone, and topics to achieve specific effects.	5	5	
		LA.D.2.4.3: recognizes production elements that contribute to the effectiveness of a specific medium.						Specificity: Very vague; provides no instructional direction or expectation of student performance.
		LA.D.2.4.4: effectively integrates multimedia and technology into presentations.						
		LA.D.2.4.5: critically analyzes specific elements of mass media with regard to the extent to which they enhance or manipulate information.						
		LA.D.2.4.6: understands that laws control the delivery and use of media to protect the rights of authors and the rights of media owners.						

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Strand E: Literature Standard 1:The student understands the common features of a variety of literary forms.								
		LA.E.1.4.1: identifies the characteristics that distinguish literary forms.	1	1	R1.12.1.7 Analyze genre and stylistic elements of complex texts to infer their themes and central ideas. Compare and contrast themes across texts.	4	4	Rigor: Identification of characteristics of literary forms should be in service of comprehension or critique. This is not a rigorous expectation.
		LA.E.1.4.2: understands why certain literary works are considered classics.			Not addressed in current edition.			Specificity: There are many reasons why literary works become "classics." This expectation provides inadequate direction to teachers.
		LA.E.1.4.3: identifies universal themes prevalent in the literature of all cultures.	2	1	R1.12.4.1 Analyze and evaluate texts from multiple historical, social, and cultural contexts to examine similar and contrasting themes, archetypes, beliefs, values, and perspectives. R1.12.4.3 Explain how narrative elements, ideas, and literary devices in texts relate to abstract cultural themes (e.g., the conflict between good and evil, the conflict between public and private life, the conflict between love and duty, the conflict between humans and nature, the conflict between humans and the divine, class conflicts, gender differences and conflicts, absolute versus relative truth).	4.5	4.5	Rigor: Low expectation for this topic.
		LA.E.1.4.4: understands the characteristics of major types of drama.	2	2	R1.12.1.7 Analyze genre and stylistic elements of complex texts to infer their themes and central ideas. Compare and contrast themes across texts.	5	4	Specificity: Identification of characteristics of literary forms should be in service of comprehension or critique. This is not a rigorous expectation.
		LA.E.1.4.5: understands the different stylistic, thematic, and technical qualities present in the literature of different cultures and historical periods.	2	2	R1.12.4.1 Analyze and evaluate texts from multiple historical, social, and cultural contexts to examine similar and contrasting themes, archetypes, beliefs, values, and perspectives.	5	5	
Standard 2: The student responds critically to fiction, nonfiction, poetry, and drama.								
		LA.E.2.4.1: analyzes the effectiveness of complex elements of plot, such as setting, major events, problems, conflicts, and resolutions.	4	4	R2.12.1.3 Evaluate and critique how authors construct plots by creating external conflicts that are derived from social, cultural, and historical differences. Explain how plot developments support and convey the theme and main ideas of the narrative. Evaluate the credibility of plot developments.	5	5	

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		LA.E.2.4.2: understands the relationships between and among elements of literature, including characters, plot, setting, tone, point of view, and theme.	2	2	R2.12.1.1. Evaluate how authors use social, cultural, and historic contexts to develop themes. R2.12.1.2 Evaluate and critique how authors use time to create settings that are multi-dimensional (streams of consciousness). Explain how setting and mood support and convey the theme and main ideas of the narrative. Cite specific details to support your claim. R2.12.1.3 Evaluate and critique how authors construct plots by creating external conflicts that are derived from social, cultural, and historical differences. Explain how plot developments support and convey the theme and main ideas of the narrative. Evaluate the credibility of plot developments. R2.12.1.4 Evaluate and critique how authors use subtle details of a character to reveal insights into personal beliefs, values, and gender roles. Explain how character actions, dialogue, thoughts, and the relationships among characters support and convey the theme and main ideas of the narrative. Cite specific details to support your claim. Evaluate the credibility of character motives, character dialogue, and character actions. R2.12.1.5 Evaluate and critique how authors use un	5	5	Rigor, Focus, Specificity: Should make curricular decisions on what to teach when regarding how these narrative elements relate. Simply understanding these relationships is a low level of rigor.
		LA.E.2.4.3: analyzes poetry for the ways in which poets inspire the reader to share emotions, such as the use of imagery, personification, and figures of speech, including simile and metaphor; and the use of sound, such as rhyme, rhythm, repetition, and alliteration.	4	4	R2.12.2.3 Evaluate and critique how authors use specific words, sentence structures, figurative and descriptive language, images, tone, and topics to achieve specific effects.	5	5	
		LA.E.2.4.4: understands the use of images and sounds to elicit the reader's emotions in both fiction and nonfiction.	2	2	R2.12.2.3 Evaluate and critique how authors use specific words, sentence structures, figurative and descriptive language, images, tone, and topics to achieve specific effects.	5	5	Rigor: This is a low level of rigor expected.
		LA.E.2.4.5: analyzes the relationships among author's style, literary form, and intended impact on the reader.	4	4	R2.12.2.3 Evaluate and critique how authors use specific words, sentence structures, figurative and descriptive language, images, tone, and topics to achieve specific effects.	5	5	
		LA.E.2.4.6: recognizes and explains those elements in texts that prompt a personal response, such as connections between one's own life and the characters, events, motives, and causes of conflict in texts.	2	4	R1.8.2.3 Interpret and explain personal reactions to word choice, use of figurative and descriptive language, imagery, and topic while reading.	2	4	Rigor: This is a low level of rigor expected.
		LA.E.2.4.7: examines a literary selection from several critical perspectives.	4	4	R1.12.2.2 Adopt a specific critical perspective to analyze a text (e.g., close reading, reader response, historical, psychological, feminist, Marxist).	4	5	Rigor: Rigorous expectation appropriate for Grade 12.

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		LA.E.2.4.8: knows that people respond differently to texts based on their background knowledge, purpose, and point of view.	1	2	R1.12.2.1 Analyze an issue presented in a text or in multiple texts to identify and explain multiple possible points of view on the issue. Evaluate and compare the merits of those points of view based on a variety of criteria (e.g., their appeal, coherence, consistency, consequences, persuasiveness, practicality, moral and ethical implications). R1.8.4.1 Demonstrate familiarity with the concept that all social, cultural, and historical perspectives, including one's own, are not universal or absolute, but relative to one's context. R1.8.2.1 Understand that a reader's prior knowledge of a topic or subject area, attitudes, and belief shapes, distorts, or embellishes the reader's interpretation of a text. R1.8.2.2 Understand how readers across different social, cultural, and historical contexts will interpret a given text differently.	2.75	2.75	Rigor: This is a low level of rigor expected.
		Grade 6 DOK Mean: FL SSS	2.26	2.2	Grade 6 DOK Mean: CB	2.35	2.03	
		Grade 8 DOK Mean: FL SSS	2.05	2.18	Grade 8 DOK Mean: CB	2.3	2.87	
		Grade 9-12 DOK Mean: FL SSS	2.67	2.5	Grade 9-12 DOK Mean: CB	4.31	4.35	

Appendix D: Mathematics Benchmarking Analysis

In the pages that follow are the results of the benchmarking analysis for mathematics, including depth-of-knowledge ratings recorded by two independent raters.

Inter-rater reliability is a measure of the degree to which the same group of raters provides the same ratings to the same set of items. In this rating, two raters both examined sets of benchmarks for the Florida Standards and enabling objectives from the College Board Standards. The following analyses indicate the percent of time the raters rated DOK of an item exactly the same and the percent of time they rated the same or having a DOK value within 1 value of the level of the level given by the other rater.

Florida Mathematics 6-8

Exact Agreement on levels	0.72
Agreement ± 1 DOK level	0.92

Florida Mathematics 9-12

Exact Agreement on levels	0.55
Agreement ± 1 DOK level	0.92

College Board Math 1-Algebra

Exact Agreement on levels	0.74
Agreement ± 1 DOK level	0.92

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
Grade 6									
Strand A: Number Sense, Concepts, and Operations Standard 1: The student understands the different ways numbers are represented and used in the real world.									
	Benchmark MA.A.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.		1	2					
		1. knows word names and standard numerals for whole numbers, fractions, decimals (through hundred-thousandths), and percents.			Prior to Math I	=	=	5-5 NR	5-1.1.1
		2. reads and writes whole numbers and decimals in expanded form.			Prior to Math I	=	=	5-5 NR	5-1.1.1
	Benchmark MA.A.1.3.2: The student understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.		2	2					
		1. compares and orders fractions and decimals using graphic models, number lines, and symbols.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations.	5-4 NR	5-1.1.2
		2. compares and orders fractions, decimals, and common percents.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations.	5-4 NR	5-1.1.2
	Benchmark MA.A.1.3.3: The student understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.		2	2					
		1. knows examples of positive rational numbers in real-world situations.			Prior to Math I	=	=	5-11 NR	5-1.1.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		2. describes the meanings of positive rational numbers using part/whole relationships and relative size comparisons in real-world situations.			Prior to Math I	=	=	6-5 NR	5-1.1.1
		3. constructs models to represent positive rational numbers.			Prior to Math I	=	=	4-6 NR	5-1.1.1
	Benchmark MA.A.1.3.4: The student understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.		2	2					
		1. knows the relationships among fractions, decimals, and percents.			Math I	Ratios, Rates, and Proportion	Analyzing problem situations and identifying appropriate strategies for solving problems involving multiplicative change and proportional relationships. & Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	7-2 NR	6-1.1.4
		2. expresses a given quantity in a variety of ways, such as fractions, decimals, or numbers expressed as percents.			Math I	Ratios, Rates, and Proportion	Analyzing problem situations and identifying appropriate strategies for solving problems involving multiplicative change and proportional relationships. & Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	7-1 NR	6-1.1.4
		3. knows whether numbers expressed in different forms are equal.			Math I	Ratios, Rates, and Proportion	Analyzing problem situations and identifying appropriate strategies for solving problems involving multiplicative change and proportional relationships. & Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	6-3 NR	6-1.1.4

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		4. converts a number expressed in one form to its equivalent in another form.			Math I	Ratios, Rates, and Proportion	Analyzing problem situations and identifying appropriate strategies for solving problems involving multiplicative change and proportional relationships. & Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	6-3 NR	6-1.1.4
Standard 2: The student understands number systems.									
	Benchmark MA.A.2.3.1: The student understands and uses exponential and scientific notation.		2	3					
		1. knows the meaning and use of exponential notation (for example 23=2X2X2=8).			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	7-2 NR	8-1.1.1
		2. expresses whole numbers in exponential notation or in factored form.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	8-2 NR	8-1.1.1
		3. evaluates numerical expressions that contain exponential notation.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	8-2 NR	8-1.1.1
	Benchmark MA.A.2.3.2: The student understands the structure of number systems other than the decimal number system.		2	2					
		1. compares the decimal number system to systems that do not use place value (for example, Roman numeral, ancient Egyptian).			Not Covered in CB Standards	=	=	D.N.A.	D.N.A.
Standard 3: The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.A.3.3.1: The student understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.		2	2					
		1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, and decimals.			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	5-5 NR	5-1.1.5
		2. uses models or pictures to show the effects of addition, subtraction, multiplication, and division, on whole numbers, decimals, fractions, and mixed numbers.			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	6-5 NR	6-1.1.5
		3. knows and applies the commutative, associative, and distributive properties in the addition and multiplication of rational numbers.			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	7-4 NR	6-1.1.5
		4. uses concrete models and real-world examples to explore the inverse relationship of positive and negative numbers.			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	6-8 NR	7-1.1.5
	Benchmark MA.A.3.3.2: The student selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.		2	2					
		1. knows the appropriate operations to solve real-world problems involving whole numbers, decimals, and fractions.			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	6-13 NR	5-1.1.5
		2. solves real-world problems involving whole numbers, fractions, decimals, and common percents using one or two-step problems.			Math I	Ratios, Rates, and Proportion	Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions.	7-7 NR	6-1.1.4
		3. applies order of operations when solving problems (parentheses,			Math I	Integers and Nonnegative Rational	Establishing fluency in representing and computing with nonnegative rational	7-3 NR	6-1.1.3

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		4. knows proportional relationships and describes such relationships in words, tables, or graphs.			Math I	Ratios, Rates, and Proportion	Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions.	8-7 NR	7-1.1.4
	Benchmark MA.A.3.3.3: The student adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.		3	3					
		1. solves one- or two-step real-world problems involving whole numbers and decimals using appropriate methods of computation (for example, mental computation, paper and pencil, and calculator).			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	7-7 NR	7-1.1.3
		2. justifies the choice of method for calculations, such as mental computation, concrete materials, algorithms, or calculators.			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	7-6 NR	6-1.1.5
Standard 4: The student uses estimation in problem solving and computation.									
	Benchmark MA.A.4.3.1: The student uses estimation strategies to predict results and to check the reasonableness of results.		3	3					
		1. knows an appropriate estimation technique for a given situation using whole numbers (for example, clustering, compatible number, front-end).			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	6-10 NR	4-1.1.8
		2. estimates to predict results and to check reasonableness of results.			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	6-10 NR	4-1.1.8
		3. determines whether an exact answer is needed or an estimate would be sufficient.			Math I	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	5-10 NR	5-1.1.8
Standard 5: The student understands and applies theories related to numbers.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
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	Benchmark MA.A.5.3.1: The student uses concepts about numbers, including primes, factors, and multiples, to build number sequences.		3	3					
		1. knows if numbers (less than or equal to 100) are prime or composite.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	5-1 NR	7-1.1.1
		2. finds the greatest common factor and least common multiple of two or more numbers.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	6-2 NR	6-1.1.6
		3. determines the prime factorization of a number less than or equal to 100.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	5-1 NR	8-1.1.1
		4. uses divisibility rules.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	D.N.A.	6-1.1.1
Strand B: Measurement Standard 1: The student measures quantities in the real world and uses the measures to solve problems.									
	Benchmark MA.B.1.3.1: The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.		3	3					
		1. uses concrete and graphic models to create formulas for finding the perimeter and area of plane figures and the volume of rectangular solids.			Math I Rectangular Solid in Math II	Two-dimensional Geometry	Measuring and applying related formulas to find the perimeter/ circumference and area of triangles, quadrilaterals, circles and compound figures composed of these shapes	6-19 M	6-1.2.1
		2. uses concrete and graphic models to discover an approximation for π and creates a formula for finding circumference.			Math I	Two-dimensional Geometry	Measuring and applying related formulas to find the perimeter/ circumference and area of triangles, quadrilaterals, circles and compound figures composed of these shapes	7-26 G	7-1.2.1
	Benchmark MA.B.1.3.2: The student uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.		3	3					

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. identifies a protractor as a tool for measuring angles and measures angles using a protractor.			Math I	Two-dimensional Geometry	Measuring and classifying angles visually and through measurement with a protractor	5-21 G	5-1.2.1
		2. identifies and names angles according to their measure (including acute, right, obtuse, straight).			Math I	Two-dimensional Geometry	Measuring and classifying angles visually and through measurement with a protractor	5-26 G	5-1.2.1
		3. classifies triangles according to the measurement of their angles and according to the length of their sides.			Math I	Two-dimensional Geometry	Measuring and classifying angles visually and through measurement with a protractor	5-26 G	5-1.2.1
		4. determines the measure of a missing angle using angle relationships.			Math I	Two-dimensional Geometry	Measuring and classifying angles visually and through measurement with a protractor	7-30 G	6-1.3.2
	Benchmark MA.B.1.3.3: The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.		2	2					
		1. given a two-dimensional figure, creates a new figure by increasing or decreasing the original dimensions.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-26 G	7-1.2.1
		2. knows the relationship between the area or perimeter of an original figure and that of a newly created figure.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-26 G	7-1.2.1
		3. solves real-world or mathematical problems involving perimeter or area and how these are affected by changes in the dimensions of the figure.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-26 G	7-1.2.1
	Benchmark MA.B.1.3.4: The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.		3	3					
		1. knows proportional relationships in scale drawings.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-30 G	8-1.2.5

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Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		2. uses scale drawings to solve real-world problems including distance (as in map reading).			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-30 G	8-1.2.5
Standard 2: The student compares, contrasts, and converts within systems of measurement (both standard/non-standard and metric/customary).									
	Benchmark MA.B.2.3.1: The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.		3	3					
		1. compares objects according to their length, weight or mass, and capacity using customary or metric units.			Assumed Prerequisite to Math I	-	-	5-19 M	5-1.2.6
		2. measures length, weight or mass, and capacity using appropriate measuring instruments.			Assumed Prerequisite to Math I	-	-	5-19 M	5-1.2.6
	Benchmark MA.B.2.3.2: The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.		3	3					
		1. changes one customary or metric unit of measurement to another within the same system.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	5-23 M	9-1.2.3
		2. uses concrete manipulatives or constructs models of square units (such as square inch and square meter) for measuring area and cubic units (such as cubic centimeter or cubic yard) for measuring volume.			Assumed Prerequisite to Math I	-	-	4-21 M	4-1,2,1
Standard 3: The student estimates measurements in real-world problem situations.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.B.3.3.1: The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight/mass, temperature, money, perimeter, area, and volume, in either customary or metric units.		3	3					
		1. estimates the measure (length, weight or mass, and capacity) of an object or figure and then compares the estimate with the actual measurement of the object or figure.			Assumed Prerequisite to Math I	-	-	5-18 M	5-1.2.1
		2. knows whether an exact answer is needed or an estimate is sufficient.			Assumed Prerequisite to Math I	-	-	5-18 M	5-1.2.6
		3. estimates solutions to real-world problems by estimating the length, volume or capacity, weight or mass, perimeter, or area of objects or shapes in either customary or metric units.			Math I	Two-dimensional Geometry	Measuring and applying related formulas to find the perimeter/ circumference and area of triangles, quadrilaterals, circles and compound figures composed of these shapes & Representing and analyzing figures (including some three-dimensional figures) involving geometric relationships and measurements by sketches, figures on grids, or models	8-21 M	5-1.2.6
		4. estimates solutions to real-world problems involving measurement, including estimates of time, temperature and money.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	8-21 M	5-1.2.6
Standard 4: The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.									
	Benchmark MA.B.4.3.1: The student selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement).		3	3					
		1. selects the appropriate unit of measure for a given real-world situation.			Assumed Prerequisite to Math I	=	=	6-23 M	7-1.2.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		2. knows the approximate nature of measurement and measures to the specified degree of accuracy (for example, nearest centimeter or sixteenth of an inch).			Assumed Prerequisite to Math I	=	=	8-19 M	7-1.2.3
	Benchmark MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.		2	3					
		1. selects an appropriate measurement tool (for example, scales, rulers, thermometers, measuring cups, protractors, gauges).			Assumed Prerequisite to Math I	=	=	5-20 M	7-1.2.3
		2. determines the interval of a scale and reads the scales on a variety of measuring instruments.			Assumed Prerequisite to Math I	=	=	5-20 M	7-1.2.3
		3. measures accurately with the measurement tools.			Assumed Prerequisite to Math I	=	=	5-20 M	7-1.2.3
Strand C: Geometry and Spatial Sense Standard 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.									
	Benchmark MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two- and three-dimensions.		2	2					
		1. identifies, draws, and uses symbolic notation to denote the attributes of two-dimensional geometric figures (including points, parallel and perpendicular lines, planes, rays, and parts of a circle).			Math I	Two-dimensional Geometry	Measuring and applying related formulas to find the perimeter/ circumference and area of triangles, quadrilaterals, circles and compound figures composed of these shapes	6-26 G	5-1.3.1
		2. knows and draws angles (including acute, obtuse, right, and straight).			Math I	Two-dimensional Geometry	Measuring and applying related formulas to find the perimeter/ circumference and area of triangles, quadrilaterals, circles and compound figures composed of these shapes	5-24 G	5-1.3.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		3. analyzes relationships among two-dimensional geometric figures (for example, the diagonal of a rectangle divides the rectangle into two congruent triangles each having one half the area of the rectangle).			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres)	5-24 G	8-1.3.1
		4. uses appropriate measuring devices (including ruler and protractor) as needed in analysis of figures.			Assumed Prerequisite to Math I	=	=	5-21 G	5-1.2.1
		5. knows the attributes of and draws three-dimensional figures (including rectangular solids and cylinders).			Math I	Two-dimensional Geometry	Representing and analyzing figures (including some three-dimensional figures) involving geometric relationships and measurements by sketches, figures on grids, or models	6-24 G	8-1.3.1
		6. knows the properties of two- and three-dimensional figures.			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres)	6-24 G	8-1.3.1
Standard 2: The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed.									
	Benchmark MA.C.2.3.1: The student understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.		2	2					
		1. uses manipulatives and drawings to solve problems requiring spatial visualization.			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres)	6-25 G	7-1.3.2
		2. describes and applies the property of symmetry in figures.			Math I	Two-dimensional Geometry	Representing and analyzing figures (including some three-dimensional figures) involving geometric relationships and measurements by sketches, figures on grids, or models	5-26 G	6-1.3.1
		3. recognizes and draws congruent and similar figures.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-24 G	7-1.3.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		4. identifies and performs the various transformations (reflection, translation, rotation) of a given figure on a coordinate plane.			Math II	Three-dimensional Geometry and Measurement	Relating and applying knowledge of translations, reflections, and rotations of plane figures in discussing and applying motions of figures on coordinate systems and real-world settings	8-25 G	6-1.3.4
	Benchmark MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).		2	3					
		1. constructs tiling patterns to cover a plane.			Not Covered in CB Standards	=	=	6-27 G	D.N.A.
		2. identifies a tessellation.			Not Covered in CB Standards	=	=	6-27 G	D.N.A.
		3. identifies geometric shapes that can be tessellated.			Not Covered in CB Standards	=	=	6-27 G	D.N.A.
		4. tessellates using translation and other desired transformations.			Not Covered in CB Standards	=	=	6-27 G	D.N.A.
Standard 3: The student uses coordinate geometry to locate objects in both two- and three-dimensions and to describe objects algebraically.									
	Benchmark MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.		3	3					
		1. observes, explains, and makes conjectures regarding geometric properties and relationships (among angles, triangles, squares, rectangles, parallelograms).			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships & Relating and applying knowledge of translations, reflections, and rotations of plane figures in discussing and applying motions of figures on coordinate systems and real-world settings	6-26 G	5-1.3.2

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		2. applies known geometric properties (for example, symmetry, congruence) to solve real-world and mathematical problems.			Math II	**Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps**	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	8-29 G	5-1.3.2
	Benchmark MA.C.3.3.2: The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.		3	3					
		1. identifies the x and y axes in a coordinate plane and identifies the coordinates of a given point in the first quadrant.			Assumed Prerequisite to Math I	=	=	4-33 G	7-1.4.5
		2. plots specific points in the first quadrant of the Cartesian coordinate system.			Assumed Prerequisite to Math I	=	=	4-33 G	7-1.4.5
Strand D: Algebraic Thinking Standard 1: The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions.									
	Benchmark MA.D.1.3.1: The student describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.		2	2					
		1. describes, predicts, and creates numerical and geometric patterns through models (for example, manipulatives, tables, graphs).			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-38 PRF	5-1.5.2
		2. states in words a rule for a pattern.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-15 A	6-1.5.2

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		3. predicts outcomes based on patterns.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-37 PRF	5-1.5.2
		4. finds patterns in real-world situations.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-37 PRF	6-1.5.2
		5. describes relationships and patterns using words, tables, symbols, variables, expressions, or equations.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-37 PRF	7-1.5.2
		6. given initial terms in a pattern, supplies a specific missing term in the pattern (for example, given first four terms, supplies sixth term).			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-37 PRF	6-1.5.5
	Benchmark MA.D.1.3.2: The student creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.		6	3					
		1. interprets and creates function tables and graphs (first quadrant).			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-37 PRF	6-1.5.1
		2. substitutes values for variables in expressions and describes the results or patterns observed.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-16 A	6-1.5.5
		3. graphs (first quadrant) functions from function tables to explain cause-and-effect relationships.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	7-17 A	7-1.5.4
Standard 2: The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.									
	Benchmark MA.D.2.3.1: The student represents and solves real-world problems graphically, with algebraic expressions, equations, and inequalities.		3	3					
		1. uses variables to represent numbers and relationships.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	4-15 A	4-1.5.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		2. translates verbal expressions into algebraic expressions.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-15 A	6-1.5.2
		3. translates simple algebraic expressions, equations or formulas representing real-world relationships into verbal expressions or sentences.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	7-40 PRF	7-1.5.2
		4. uses pictures, models, manipulatives or other strategies to solve simple one-step linear equations with rational solutions.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	7-16 A	6-1.5.6
	Benchmark MA.D.2.3.2: The student uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.		3	3					
		1. knows how to solve simple equations representing real-world situations, using pictures, models, manipulatives (such as algebra tiles), or other strategies.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and solving simple linear equations	7-16 A	7-1.5.6
		2. uses concrete materials to solve equations and inequalities and explains reasoning orally or in writing.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and solving simple linear equations	7-16 A	8-1.5.6
Strand E: Data Analysis and Probability Standard 1: The student understands and uses the tools of data analysis for managing information.									
	Benchmark MA.E.1.3.1: The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.		4	3					
		1. reads and analyzes data displayed in a variety of forms (charts, pictographs, stem-and-leaf plots).			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-29 D	5-1.4.5

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		2. generates and collects data for analysis.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-29 D	6-1.4.3
		3. chooses appropriate titles, scales, labels, keys, and intervals for displaying data in graphs.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	5-29 D	5-1.4.5
		4. constructs, interprets, and explains displays of data, such as tables and graphs (single- and multiple-bar graphs and single- and multiple- line graphs).			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-29 D	6-1.4.5
	Benchmark MA.E.1.3.2: The student understands and applies the concepts of range and central tendency (mean, median, and mode).		3	3					
		1. organizes items in a set of data.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-29 D	5-1.4.5
		2. finds the range, mean, median, and mode of a set of data.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-32 D	6-1.4.4
		3. describes real-world data by applying and explaining appropriate procedures for finding measures of central tendency.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-32 D	6-1.4.4
	Benchmark MA.E.1.3.3: The student analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.		4	4					

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. describes a set of data by using the measures of central tendency.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-32 D	6-1.4.4
		2. uses technology, such as graphing calculators and computer spreadsheets, to create graphs.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	D.N.A.	D.N.A.
Standard 2: The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.									
	Benchmark MA.E.2.3.1: The student compares experimental results with mathematical expectations of probabilities.		3	3					
		1. determines all possible outcomes of an event using a tree diagram or organized list.			Math I	Concepts of Probability: Measuring and Estimating Likelihood	Calculating probabilities associated with simple events and discussing the likelihood of a given outcome	6-34 D	6-1.4.2
		2. calculates simple mathematical probabilities.			Math I	Concepts of Probability: Measuring and Estimating Likelihood	Calculating probabilities associated with simple events and discussing the likelihood of a given outcome	5-32 D	6-1.4.1
		3. uses manipulatives to obtain experimental results, compares results to mathematical expectations, and discusses the validity of the experiment.			Math I	Concepts of Probability: Measuring and Estimating Likelihood	Calculating probabilities associated with simple events and discussing the likelihood of a given outcome	7-38 D	6-1.4.2
	Benchmark MA.E.2.3.2: The student determines odds for and odds against a given situation.		3	3					
		1. examines and describes situations that include finding the odds for and against a specified outcome.			Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	9-33 D	D.N.A.
Standard 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.E.3.3.1: The student formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.		6	4					
		1. with classmates, formulates hypotheses based on research and prior data, designs an appropriate experiment, collects and analyses data using appropriate statistics, and displays and interprets results in appropriate tables or graphs.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-35 D	6-1.4.3
	Benchmark MA.E.3.3.2: The student identifies the common uses and misuses of probability or statistical analysis in the everyday world.		5	2					
		1. explores uses and misuses of statistics in real-world situations such as advertisements and polls.			Algebra I	Data Analysis: Populations and Samples	Analyzing and explaining census or sample data to understand relationships or solve problems.	8-41 D	6-1.4.3
Grade 7									
Strand A: Number Sense, Concepts, and Operations Standard 1: The student understands the different ways numbers are represented and used in the real world.									
	Benchmark MA.A.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. knows word names and standard numerals for integers, fractions, decimals, ratios, numbers expressed as percents, numbers with exponents, numbers expressed in scientific notation, and numbers expressed using the square root radical.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	6-6 NR	7-1.1.5
		2. reads and writes whole numbers and decimals in expanded form, including exponential notation.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	6-8 NR	5-1.1.1
	Benchmark MA.A.1.3.2: The student understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.								
		1. compares and orders integers, fractions, decimals, numbers with exponents, and numbers expressed as percents or in scientific notation, including ordering on a number line.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	6-6 NR	6-1.1.2
	Benchmark MA.A.1.3.3: The student understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.								
		1. knows examples of rational and irrational numbers in real-world situations, including the irrational numbers π and 2.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-1 NR	7-1.1.1
		2. describes the meanings of positive rational numbers using part/whole relationships and relative size comparisons in real-world situations.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations. & Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding or estimating when necessary	9-1 NR	7-1.1.1
		3. constructs models to represent positive rational numbers.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations. & Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding or estimating when necessary	9-1 NR	7-1.1.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.A.1.3.4: The student understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.								
		1. knows the relationships among fractions, decimals, and percents.			Math I	Ratios, Rates, and Proportion	Analyzing problem situations and identifying appropriate strategies for solving problems involving multiplicative change and proportional relationships. & Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions.	4-5 NR	6-1.1.4
		2. expresses a given quantity in a variety of ways (for example, integers, fractions, decimals, numbers expressed as a percent, numbers expressed in scientific notation, ratios).			Math I	Ratios, Rates, and Proportion	Analyzing problem situations and identifying appropriate strategies for solving problems involving multiplicative change and proportional relationships. & Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions.	4-5 NR	7-1.1.4
		3. knows whether numbers expressed in different forms are equal.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	7-7 NR	7-1.1.7
		4. converts a number expressed in one form to its equivalent in another form.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	7-1 NR	7-1.1.7
Standard 2: The student understands number systems.									
	Benchmark MA.A.2.3.1: The student understands and uses exponential and scientific notation.								
		1. expresses whole numbers in exponential notation (for example, 36 = 62).			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	7-12 A	8-1.1.1
		2. evaluates numerical expressions that contain exponential notation.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	7-12 A	8-1.1.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		3. expresses numbers greater than one in scientific notation.			Math I	Integers and Nonnegative Rational Numbers	Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding or estimating when necessary	8-4 NR	9-1.1.1
		4. expresses numbers in scientific notation as numbers in standard form.			Math I	Integers and Nonnegative Rational Numbers	Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding or estimating when necessary	8-4 NR	9-1.1.1
	Benchmark MA.A.2.3.2: The student understands the structure of number systems other than the decimal number system.								
		1. applies knowledge of the decimal number system and of non-place-value systems.			Math I (for decimals - non-place value not covered)	Integers and Nonnegative Rational Numbers	Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding or estimating when necessary	D.N.A.	D.N.A.
Standard 3: The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.									
	Benchmark MA.A.3.3.1: The student understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.								
		1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, and decimals.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	7-7 NR	7-1.1.7
		2. uses models or pictures to show the effects of addition, subtraction, multiplication, and division on whole numbers, decimals, fractions, mixed numbers, and integers.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	6-13 NR	8-1.1.7

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		3. applies the properties of rational numbers to solve problems (commutative, associative, distributive, identity, equality, inverse).			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	7-7 NR	7-1.1.7
		4. knows the inverse relationship of positive and negative numbers.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	6-8 NR	7-1.1.7
	Benchmark MA.A.3.3.2: The student selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.								
		1. knows the appropriate operation to solve real-world problems involving fractions, decimals, and integers.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations. & Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding. & Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	7-7 NR	7-1.1.1
		2. solves real-world problems involving decimals and fractions using two- or three-step problems.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations. & Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding. & Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	7-7 NR	7-1.1.7
		3. solves real-world problems involving percents (for example, discounts, simple interest, taxes, tips).			Math I	Ratios, Rates, and Proportion	I - A, B, & C	8-8 NR	7-1.1.6

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		4. applies order of operations to solve problems (parentheses, exponents, multiplication, division, addition, and subtraction).			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations. & Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding. & Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	8-5 NR	8-1.1.7
		5. knows proportional relationships and uses tables, graphs, or "constant ratio" relationships to solve and explain problems.			Math I	Ratios, Rates, and Proportion	Analyzing problem situations and identifying appropriate strategies for solving problems involving multiplicative change and proportional relationships. & Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	8-8 NR	8-1.1.6
	Benchmark MA.A.3.3.3: The student adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.								
		1. solves multi-step real-world problems involving whole numbers, fractions or decimals using appropriate methods of computation, such as mental computation, paper and pencil, and calculator.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations. & Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding. & Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	7-7 NR	7-1.1.7
Standard 4: The student uses estimation in problem solving and computation.									
	Benchmark MA.A.4.3.1: The student uses estimation strategies to predict results and to check the reasonableness of results.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. knows an appropriate estimation technique for a given situation using whole numbers, fractions and decimals.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations. & Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding. & Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	7-8 NR	7-1.1.8
		2. estimates to predict results and check reasonableness of results.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations. & Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding. & Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	7-8 NR	7-1.1.8
		3. determines whether an exact answer is needed or an estimate would be sufficient.			Assumed Prerequisite to Math I	=	=	7-9 NR	7-1.1.8
Standard 5: The student understands and applies theories related to numbers.									
	Benchmark MA.A.5.3.1: The student uses concepts about numbers, including primes, factors, and multiples, to build number sequences.								
		1. knows if numbers are prime or composite.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	5-1 NR	7-1.1.1
		2. finds the greatest common factor and least common multiple of two or more numbers.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	6-3 NR	5-1.1.3
		3. determines the prime factorization of a composite number.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	6-1 NR	7-1.1.1
		4. applies number theory concepts to determine the terms in a sequence.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	5-33 PRF	8-1.1.1
		5. applies number theory concepts, including divisibility rules, to solve real-world or mathematical problems.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	D.N.A.	6-1.1.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
Strand B: Measurement Standard 1: The student measures quantities in the real world and uses the measures to solve problems.							Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.		
	Benchmark MA.B.1.3.1: The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.								
		1. uses concrete or graphic models to create formulas for finding volumes of solids (prisms and cylinders).			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-17 M	8-1.2.1
		2. uses concrete or graphic models to create formulas for finding surface area of prisms and cylinders.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-17 M	6-1.2.1
		3. solves and explains problems involving perimeter, area, and circumference.			Math I	Two-dimensional Geometry	Measuring and applying related formulas to find the perimeter/ circumference and area of triangles, quadrilaterals, circles and compound figures composed of these shapes	7-20 M	7-1.2.1
	Benchmark MA.B.1.3.2: The student uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.								
		1. finds the measure of an angle by measuring with a protractor or applying angle relationships (for example, corresponding, complementary, supplementary, interior, exterior).			Math I	Two Dimensional Geometry	Measuring and classifying angles visually and through measurement with a protractor	5-21 M	5-1.2.1
		2. . develops and uses the distance formula in solving real-world problems (d = rt).			Math I	Ratios, Rates, and Proportion	Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions.	8-15 A	8-1.2.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.B.1.3.3: The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.								
		1. given a two- or three-dimensional figure, creates a new figure by increasing or decreasing the original dimensions.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-32 G	7-1.2.1
		2. knows the relationships between the perimeters, areas, surface areas, or volumes of the original figure and those of the newly created figure.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-32 G	8-1.2.1
		3. solves real world or mathematical problems involving perimeter, area, circumference, surface area and volume and how these are affected by changes in the dimensions of the figures.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-32 G	8-1.2.1
	Benchmark MA.B.1.3.4: The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.								
		1. knows an appropriate scale needed to produce a proportional drawing or model.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-30 G	8-1.2.1
		2. knows proportional relationships used in scale drawings.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-30 G	8-1.2.1
		3. produces a scale drawing.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-30 G	8-1.2.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
Standard 2: The student compares, contrasts, and converts within systems of measurement (both standard/nonstandard and metric/customary).									
	Benchmark MA.B.2.3.1: The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.								
		1. measures length, weight or mass, and capacity or volume using customary or metric units.			Assumed Prerequisite to Math I	=	=	8-17 M	8-1.2.3
		2. knows relationships between metric units of mass and capacity (for example, one cubic centimeter of water weighs one gram).			Assumed Prerequisite to Math I	=	=	8-22 M	8-1.2.3
		3. finds measures of length, weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to	9-22 M	8-1.2.1
	Benchmark MA.B.2.3.2: The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.								
		1. compares units of measurement within a system (metric or customary).			Assumed Prerequisite to Math I	=	=	5-23 M	9-1.2.3
		2. performs operations on measurements within either the metric or customary system (for example, finds three times 27 inches and expresses the answer in yards).			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	5-23 M	9-1.2.3
		3. selects the appropriate unit of measurement when solving real-world problems (for example linear, square, and cubic units).			Assumed Prerequisite to Math I	=	=	6-23 M	9-1.2.3
		4. solves problems using the metric or customary system involving conversions within the same system.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	6-23 M	9-1.2.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
Standard 3: The student estimates measurements in real-world problem situations.									
	Benchmark MA.B.3.3.1: The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight/mass, temperature, money, perimeter, area, and volume, in either customary or metric units.								
		1. knows whether an exact answer is needed or if an estimate is sufficient.			Assumed Prerequisite to Math I	=	=	9-21 M	7-1.2.6
		2. estimates solutions to real-world problems by estimating the length, volume or capacity, weight or mass, perimeter, or area of objects or shapes in either customary and metric units.			Assumed Prerequisite to Math I	=	=	8-19 M	7-1.2.6
		3. estimates solutions to real-world problems involving measurement, including estimates of time, temperature, and money.			Assumed Prerequisite to Math I	=	=	8-19 M	7-1.2.6
Standard 4: The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.									
	Benchmark MA.B.4.3.1: The student selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement).								
		1. selects appropriate units of measurement in a real-world context.			Assumed Prerequisite to Math I	=	=	6-23 M	7-1.2.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		2. knows that measurements are always approximate and that the degree of accuracy of a measurement depends upon the precision of the instrument.			Not Covered in CB Standards	=	=	9-17 M	7-1.2.3
		3. knows the precision of different measuring instruments.			Not Covered in CB Standards	=	=	9-18 M	7-1.2.3
		4. determines the appropriate precision unit for a given situation.			Not Covered in CB Standards	=	=	9-21 M	7-1.2.3
	Benchmark MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.								
		1. selects a measurement tool (for example, scales, rulers, thermometers, measuring cups, protractors, gauges) appropriate to a given situation.			Assumed Prerequisite to Math I	=	=	4-22 M	7-1.2.3
		2. measures accurately with the measurement tools to the specified degree of accuracy for the task and in keeping with the precision of the measurement tool.			Not Covered in CB Standards	=	=	6-18 M	8-1.2.6
Strand C: Geometry and Spatial Sense Standard 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.									
	Benchmark MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two- and three-dimensions.								
		1. identifies, draws, and uses symbolic notation to denote the basic properties of geometric terms including lines (intersecting, skew, parallel, perpendicular) and congruent figures.			Math I	Two Dimensional Geometry	III - A & C	6-26 G	5-1.3.1
		2. determines the measure of various types of angles using a protractor or angle relationships (including complementary, supplementary, and vertical angles).			Math I	Two Dimensional Geometry	III - C	5-21 M	5-1.3.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		3. compares and describes the attributes of regular and irregular polygons (for example, parallelogram, trapezoid, pentagon, hexagon).			Math I	Two Dimensional Geometry	III - A & C	5-24 G	6-1.3.1
		4. identifies and classifies triangles and quadrilaterals.			Math I	Two Dimensional Geometry	III - A & C	5-24 G	6-1.3.1
		5. knows the attributes of and draws three-dimensional figures (pyramid, cone, sphere, hemisphere).			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	6-24 G	8-1.3.1
		6. knows the properties of two- and three-dimensional figures.			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	6-24 G	9-1.3.1
Standard 2: The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed.									
	Benchmark MA.C.2.3.1: The student understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		1. uses manipulatives and drawings to solve problems requiring spatial visualization.			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	6-25 G	8-1.3.1
		2. describes and applies the properties of parallelism, perpendicularity and symmetry in real-world contexts.			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	5-26 G	4-1.3.1
		3. recognizes, draws, and describes congruent and similar figures.			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	8-24 G	8-1.3.1
		4. creates and describes the attributes of a figure either congruent or similar to a given figure.			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	8-24 G	8-1.3.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		5. identifies and performs the various transformations (reflection, translation, rotation) of a given figure on a coordinate plane.			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	8-25 G	8-1.3.1
	Benchmark MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).								
		1. predicts and verifies whether a given shape or shapes will tessellate.			Not Covered in CB Standards	=	=	6-27 G	D.N.A.
		2. given a simple tessellated pattern, determines the shape(s) and transformation(s).			Not Covered in CB Standards	=	=	6-27 G	D.N.A.
		3. tessellates using reflection, translation, or rotation and any desired combinations.			Not Covered in CB Standards	=	=	6-27 G	D.N.A.
Standard 3: The student uses coordinate geometry to locate objects in both two- and three-dimensions and to describe objects algebraically.									
	Benchmark MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.								
		1. observes, explains, and makes conjectures regarding geometric properties and relationships (among angles, lines, regular and irregular polygons).			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps & Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-28 G	8-1.3.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		2. creates and solves angle measurement problems for triangles.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps & Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	7-30 G	9-1.3.1
		3. demonstrates the Pythagorean relationship in right triangles using models or diagrams (for example, manipulatives, dot, graph, or isometric paper).			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps & Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-31 G	8-1.3.3
		4. given two sides of a right triangle, uses the Pythagorean Theorem to find the length of the third side.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps & Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-21 G	8-1.3.3
	Benchmark MA.C.3.3.2: The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.								
		1. identifies each quadrant and the characteristics of points in each quadrant (positive and negative).			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations.	7-29 G	7-1.3.3
		2. identifies and plots ordered pairs in all four quadrants of the coordinate system.			Math I	Integers and Nonnegative Rational Numbers	Describing integer-based contexts in terms of order, inverses, and elementary integer operations.	7-29 G	7-1.3.3
Strand D: Algebraic Thinking Standard 1: The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.D.1.3.1: The student describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.								
		1. uses manipulatives and graphic materials to generate tables and charts (for example, input, output) to develop algebraic expressions, equations, or formulas.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-37 PRF	6-1.5.3
		2. given instances of a pattern, expresses a generalization of the pattern using algebraic expressions.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	8-11 A	7-1.5.4
		3. given an algebraic expression of a relationship or pattern, supplies specific instances of the relationship or pattern.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-37 PRF	6-1.5.5
		4. predicts outcomes based on a generalization of a pattern or relationship.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	6-37 PRF	6-1.5.5
	Benchmark MA.D.1.3.2: The student creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.								
		1. interprets and creates tables, function tables, and graphs (all four quadrants).			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	7-17 A	7-1.5.4
		2. writes expressions and equations to describe relationships.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	7-18 A	5-1.5.4
		3. graphs equations to explain cause-and-effect relationships.			Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions & Creating and solving simple linear equations	7-17 A	7-1.5.4
Standard 2: The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
	Benchmark MA.D.2.3.1: The student represents and solves real-world problems graphically, with algebraic expressions, equations, and inequalities.								
		1. translates verbal expressions and sentences into algebraic expressions and equations.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	7-17 A	7-1.5.4
		2. translates algebraic expressions, equations, or formulas representing real-world relationships into verbal expressions or sentences.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	7-17 A	7-1.5.4
		3. given an algebraic equation or expression of a real-world application, substitutes integral values for variables and simplifies the results.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	7-12 A	7-1.5.5
		4. uses pictures, models, manipulatives or other strategies to solve one-step and simple multi-step linear equations.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	7-16 A	7-1.5.6
		5. graphs solutions to equations and inequalities on a number line.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	7-17 A	6-1.5.4

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		6. graphs linear equations on the coordinate plane from a table of values.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	8-14 A	7-1.5.4
	Benchmark MA.D.2.3.2: The student uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.								
		1. knows how to solve linear equations and inequalities representing real-world situations, using pictures, models, manipulatives (such as algebra tiles), or other strategies.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	7-40 PRF	9-1.5.5
		2. simplifies algebraic expressions with one variable.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	9-8 A	9-1.5.5
Strand E: Data Analysis and Probability Standard 1: The student understands and uses the tools of data analysis for managing information.									
	Benchmark MA.E.1.3.1: The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.								
		1. generates and collects data for analysis.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-29 D	6-1.4.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		2. interprets and analyzes data presented in a variety of forms, including box-and-whisker graphs and scatter plots.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-37 D	7-1.4.5
		3. constructs, interprets, and explains displays of data, such as tables and graphs (circle graphs, single- and multiple- bar graphs, and single and multiple-line graphs) and explains how different displays of data lead to different interpretations.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-37 D	7-1.4.6
	Benchmark MA.E.1.3.2: The student understands and applies the concepts of range and central tendency (mean, median, and mode).								
		1. finds the range, mean, median, and mode of data from a table, chart, or graph.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-40 D	5-1.4.4
		2. draws conclusions from an analysis of range and central tendency of a set of real-world data.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-40 D	7-1.4.4
	Benchmark MA.E.1.3.3: The student analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.								
		1. applies and analyzes appropriate measures of central tendency (mode, mean, median, range) for a set of data.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-40 D	6-1.4.4
		2. uses technology, such as graphing calculators and computer spreadsheets, to analyze data and create graphs.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	5-31 D	9-1.4.4

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
Standard 2: The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.									
	Benchmark MA.E.2.3.1: The student compares experimental results with mathematical expectations of probabilities.								
		1. obtains experimental results using manipulatives.			Math I	Concepts of Probability: Measuring and Estimating Likelihood	Calculating probabilities associated with simple events and discussing the likelihood of a given outcome	7-37 D	7-1.4.2
		2. explains observed difference between mathematical and experimental results.			Math I	Concepts of Probability: Measuring and Estimating Likelihood	Calculating probabilities associated with simple events and discussing the likelihood of a given outcome	7-38 D	8-1.4.2
		3. calculates simple mathematical probabilities for independent and dependent events.			Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	8-45 D	9-1.4.2
	Benchmark MA.E.2.3.2: The student determines odds for and odds against a given situation.								
		1. computes the mathematical odds for and against a specified outcome in given real-world experiments.			Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	9-33 D	D.N.A.
Standard 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.									
	Benchmark MA.E.3.3.1: The student formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. formulates a hypothesis and designs an experiment.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-41 D	7-1.4.3
		2. performs the experiment and collects, organizes, and displays the data.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-34 D	7-1.4.3
		3. evaluates the hypothesis by making inferences and drawing conclusions based on statistical results.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	9-29 D	7-1.4.3
	Benchmark MA.E.3.3.2: The student identifies the common uses and misuses of probability or statistical analysis in the everyday world.								
		1. knows appropriate uses of statistics and probability in real-world situations.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-41 D	6-1.4.3
		2. knows when statistics and probability are used in misleading ways.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-41 D	6-1.4.3
Grade 8									
Strand A: Number Sense, Concepts, and Operations Standard 1: The student understands the different ways numbers are represented and used in the real world.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
	Benchmark MA.A.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.								
		1. knows word names and standard numerals for integers, fractions, decimals, numbers expressed as percents, numbers with exponents, numbers expressed in scientific notation, absolute value, radicals, and ratios.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	7-7 NR	9-1.1.1
	Benchmark MA.A.1.3.2: The student understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.								
		1. compares and orders fractions, decimals, integers, and radicals using graphic models, number lines, and symbols.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-1 NR	9-1.1.6
		2. compares and orders numbers expressed in absolute value, scientific notation, integers, percents, numbers with exponents, fractions, decimals, radicals, and ratios.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-1 NR	9-1.1.6
	Benchmark MA.A.1.3.3: The student understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.								
		1. knows examples of rational and irrational numbers in real-world situations.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-1 NR	9-1.1.6
		2. describes the meanings of rational and irrational numbers using physical or graphical displays.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-1 NR	9-1.1.6

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		3. constructs models to represent rational and irrational numbers.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-1 NR	9-1.1.6
	Benchmark MA.A.1.3.4: The student understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.								
		1. knows the relationships among fractions, decimals, and percents given a real-world context.			Math I	Ratios, Rates, and Proportion	Analyzing problem situations and identifying appropriate strategies for solving problems involving multiplicative change and proportional relationships. &Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions.	8-8 NR	7-1.1.6
		2. simplifies expressions using integers, exponents, and radicals.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	8-8 NR	8-1.1.6
		3. knows equivalent forms of large and small numbers in scientific and standard notation.			Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-3 NR	9-1.1.1
		4. identifies and explains the absolute value of a number.			Math II	Operations with Integers and Negative Rational Numbers	Reading, writing, modeling, comparing, ordering, and computing fluently with integers and numbers written in absolute value notation	11-8 A	9-1.1.1
Standard 2: The student understands number systems.									
	Benchmark MA.A.2.3.1: The student understands and uses exponential and scientific notation.								
		1. expresses rational numbers in exponential notation including negative exponents (for example, 2-3 = _3 = 1/8).			Math II	Operations with Integers and Negative Rational Numbers	Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding or estimating when necessary	9-2 NR	Grade 11
		2. expresses numbers in scientific or standard notation including decimals between 0 and 1.			Math 1	Integers and Nonnegative Rational Numbers	Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding or estimating when necessary	9-3 NR	9-1.1.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		3. evaluates numerical or algebraic expressions that contain exponential notation.			Math 1	Integers and Nonnegative Rational Numbers	Establishing fluency in representing and computing with nonnegative rational numbers, including decimals.	9-12 NR	9-1.1.1
	Benchmark MA.A.2.3.2: The student understands the structure of number systems other than the decimal number system.								
		1. expresses base ten numbers as equivalent numbers in different bases, such as base two, base five, and base eight.			Not Covered in CB Standards	=	=	D.N.A.	D.N.A.
		2. discusses the application of the binary (base two) number system in computer technology.			Not Covered in CB Standards	=	=	D.N.A.	D.N.A.
		3. expresses non-base ten numbers as equivalent numbers in base ten.			Not Covered in CB Standards	=	=	D.N.A.	D.N.A.
Standard 3: The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.									
	Benchmark MA.A.3.3.1: The student understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.								
		1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, decimals, and integers.			Math II	Operations with Integers and Negative Rational Numbers	Reading, writing, modeling, comparing, ordering, and computing fluently with integers and numbers written in absolute value notation	8-3 NR	8-1.1.5
		2. knows the inverse relationship of positive and negative numbers.			Math II	Operations with Integers and Negative Rational Numbers	Reading, writing, modeling, comparing, ordering, and computing fluently with integers and numbers written in absolute value notation	7-7 NR	7-1.1.5
		3. applies the properties of real numbers to solve problems (commutative, associative, distributive, identity, equality, inverse, and closure).			Math II	Operations with Integers and Negative Rational Numbers	Reading, writing, modeling, comparing, ordering, and computing fluently with integers and numbers written in absolute value notation	7-4 NR	7-1.1.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.A.3.3.2: The student selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.								
		1. knows the appropriate operations to solve real-world problems involving integers, ratios, rates, proportions, numbers expressed as percents, decimals, and fractions.			Math II	Operations with Integers and Negative Rational Numbers	Reasoning with ratios, rates, percents, and proportional relationships to solve problems and interpret results	8-9 NR	8-1,1,5
		2. solves real-world problems involving integers, ratios, proportions, numbers expressed as percents, decimals, and fractions in two- or three-step problems.			Math II	Operations with Integers and Negative Rational Numbers	Reasoning with ratios, rates, percents, and proportional relationships to solve problems and interpret results	8-9 NR	8-1.1.5
		3. solves real-world problems involving percents including percents greater than 100% (for example percent of change, commission).			Math II	Operations with Integers and Negative Rational Numbers	Reasoning with ratios, rates, percents, and proportional relationships to solve problems and interpret results	8-8 NR	8-1.1.5
		4. writes and simplifies expressions from real-world situations using the order of operations.			Math I	Integers and Nonnegative Rational Numbers	Representing and expressing the value of a quantity in terms of nonnegative rational numbers, nonnegative decimals, or scientific notation, using rounding or estimating when necessary	8-5 NR	7-1.1.5
	Benchmark MA.A.3.3.3: The student adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.								
		1. solves multi-step real-world problems involving fractions, decimals, and integers using appropriate methods of computation, such as mental computation, paper and pencil, and calculator.			Math II	Operations with Integers and Negative Rational Numbers	Reading, writing, modeling, comparing, ordering, and computing fluently with integers and numbers written in absolute value notation	8-6 NR	8-1.1.1
Standard 4: The student uses estimation in problem solving and computation.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.A.4.3.1: The student uses estimation strategies to predict results and to check the reasonableness of results.								
		1. knows appropriate estimation techniques for a given situation using real numbers.			Math II	Operations with Integers and Negative Rational Numbers	Reading, writing, modeling, comparing, ordering, and computing fluently with integers and numbers written in absolute value notation	8-3 NR	8-1.1.8
		2. estimates to predict results and to check reasonableness of results.			Math II	Operations with Integers and Negative Rational Numbers	Reading, writing, modeling, comparing, ordering, and computing fluently with integers and numbers written in absolute value notation	8-3 NR	8-1.1.8
Standard 5: The student understands and applies theories related to numbers.									
	Benchmark MA.A.5.3.1: The student uses concepts about numbers, including primes, factors, and multiples, to build number sequences.								
		1. knows if numbers are relatively prime.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	6-3 NR	5-1.1.3
		2. applies number theory concepts to determine the terms in a real number sequence.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	6-38 PRF	5-1.1.3
		3. applies number theory concepts, including divisibility rules, to solve real-world or mathematical problems.			Math I	Integers and Nonnegative Rational Numbers	Applying definitions and properties of positive exponents and number theory to representing and solving problems related to powers, multiples, and factors.	D.N.A.	6-1.1.1
Strand B: Measurement Standard 1: The student measures quantities in the real world and uses the measures to solve problems.									
	Benchmark MA.B.1.3.1: The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. uses concrete and graphic models to explore and derive formulas for surface area and volume of three-dimensional regular shapes, including pyramids, prisms, and cones.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	10-7 M	8-1.2.1
		2. solves and explains real-world problems involving surface area and volume of three-dimensional shapes.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	10-7 M	8-1.2.1
	Benchmark MA.B.1.3.2: The student uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.								
		1. applies formulas for finding rates, distance, time and angle measures.			Math I	Ratios, Rates, and Proportion	Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	8-15 A	8-1.2.2
		2. describes and uses rates of change (for example, temperature as it changes throughout the day, or speed as the rate of change in distance over time) and other derived measures.			Math I	Ratios, Rates, and Proportion	Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	8-15 A	8-1.2.2
	Benchmark MA.B.1.3.3: The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.								
		1. knows how a change in a figure's dimensions affects its perimeter, area, circumference, surface area, or volume.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-32 G	8-1.2.1
		2. knows how changes in the volume, surface area, area, or perimeter of a figure affect the dimensions of the figure.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-32 G	8-1.2.1

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		3. solves real-world or mathematical problems involving the effects of changes either to the dimensions of a figure or to the volume, surface area, area, perimeter, or circumference of figures.			Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-32 G	8-1.2.1
	Benchmark MA.B.1.3.4: The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.								
		1. interprets and applies various scales including those based on number lines, graphs, models, and maps. (Scale may include rational numbers.)			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-30 G	8-1.2.2
		2. constructs and uses scale drawings to recreate a given situation.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-30 G	8-1.2.2
Standard 2: The student compares, contrasts, and converts within systems of measurement (both standard/nonstandard and metric/customary).									
	Benchmark MA.B.2.3.1: The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.								
		1. finds measures of length, weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures.			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	5-23 M	8-1.3.2
	Benchmark MA.B.2.3.2: The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.								
		1. solves problems using mixed units within each system, such as feet and inches, hours and minutes.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	5-23 M	9-1.2.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		2. solves problems using the conversion of measurements within the customary system.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	5-23 M	9-1.2.3
		3. solves problems using the conversions of measurement within the metric system.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	5-23 M	9-1.2.3
Standard 3: The student estimates measurements in real-world problem situations.									
	Benchmark MA.B.3.3.1: The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight/mass, temperature, money, perimeter, area, and volume, in either customary or metric units.								
		1. knows a variety of strategies to estimate, describe, make comparisons, and solve real-world and mathematical problems involving measurements.			Math I	Ratios, Rates, and Proportion	Converting from one measure to another through the use of ratios and proportional relationships.	8-19 M	8-1.2.6
Standard 4: The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.									
	Benchmark MA.B.4.3.1: The student selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement).								
		1. selects the appropriate unit of measure for a given situation.			Assumed Prerequisite to Math I	=	=	8-20 M	6-1.2.4
		2. knows the precision of different measuring instruments.			Not Covered in CB Standards	=	=	9-18 M	7-1.2.3
		3. determines the appropriate precision unit for a given situation.			Not Covered in CB Standards	=	=	9-18 M	7-1.2.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		4. identifies the number of significant digits as it relates to the least precise unit of measure.			Not Covered in CB Standards	=	=	9-19 M	7-1.2.3
		5. determines the greatest possible error of a given measurement and the possible actual measurements of an object.			Not Covered in CB Standards	=	=	9-20 M	8-1.2.3
	Benchmark MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.								
		1. applies significant digits in the real-world context.			Not Covered in CB Standards	=	=	9-19 M	8-1.2.3
		2. selects and uses appropriate instruments, technology, and techniques to measure quantities and dimensions to a specified degree of accuracy.			Not Covered in CB Standards	=	=	9-21 M	8-1.2.5
Strand C: Geometry and Spatial Sense Standard 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.									
	Benchmark MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two- and three-dimensions.								
		1. determines and justifies the measures of various types of angles based upon geometric relationships in two- and three-dimensional shapes.			Math I	Two-dimensional Geometry	Measuring and classifying angles visually and through measurement with a protractor	10-18 G	5-1.2.1
		2. compares regular and irregular polygons and two- and three-dimensional shapes.			Math I	Two-dimensional Geometry	Representing and analyzing figures (including some three-dimensional figures) involving geometric relationships and measurements by sketches, figures on grids, or models	7-20 M	6-1.3.2
		3. draws and builds three-dimensional figures from various perspectives (for example, flat patterns, isometric drawings, nets).			Math I	Two-dimensional Geometry	Representing and analyzing figures (including some three-dimensional figures) involving geometric relationships and measurements by sketches, figures on grids, or models	8-27 G	7-1.3.2

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		4. knows the properties of two- and three-dimensional figures.			Math II	Three-dimensional Geometry and Measurement	Measuring and applying related formulas to find the perimeter/ circumference and area of triangles, quadrilaterals, circles and compound figures composed of these shapes	8-24 G	7-1.3.2
Standard 2: The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed.									
	Benchmark MA.C.2.3.1: The student understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.								
		1. use the properties of parallelism, perpendicularity, and symmetry in solving real-world problems.			Math I	Two-dimensional Geometry	Representing and analyzing figures (including some three-dimensional figures) involving geometric relationships and measurements by sketches, figures on grids, or models	8-33 G	5-1.3.2
		2. identifies congruent and similar figures in real-world situations and justifies the identification.			Math II	Three-dimensional Geometry and Measurement	Relating and applying knowledge of translations, reflections, and rotations of plane figures in discussing and applying motions of figures on coordinate systems and real-world settings	8-24 G	7-1.3.2
		3. identifies and performs the various transformations (reflection, translation, rotation, dilation) of a given figure on a coordinate plane.			Math I	Two-dimensional Geometry	Representing and analyzing figures (including some three-dimensional figures) involving geometric relationships and measurements by sketches, figures on grids, or models	8-25 G	7-1.3.2
	Benchmark MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).								
		1. continues a tessellation pattern using the needed transformations.			Not Covered in CB Standards	=	=	6-27 G	D.N.A.
		2. creates an original tessellating tile and tessellation pattern using a combination of transformations			Not Covered in CB Standards	=	=	6-27 G	D.N.A.

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
Standard 3: The student uses coordinate geometry to locate objects in both two- and three-dimensions and to describe objects algebraically.									
	Benchmark MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.								
		1. observes, explains, makes and tests conjectures regarding geometric properties and relationships (among regular and irregular shapes of two and three dimensions).			Math II	Three-dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres)	7-20 M	8-1.3.1
		2. applies the Pythagorean Theorem in real-world problems (for example, finds the relationship among sides in 45° – 45° and 30° – 60° right triangles).			Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps	8-31 G	8-1.3.3
	Benchmark MA.C.3.3.2: The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.								
		1. given an equation or its graph, finds ordered-pair solutions (for example, y = 2x).			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs,	9-23 G	7-1.3.2
		2. given the graph of a line, identifies the slope of the line (including the slope of vertical and horizontal lines).			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs,	9-23 G	9-1.5.4

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		3. given the graph of a linear relationship, applies and explains the simple properties of lines on a graph, including parallelism, perpendicularity, and identifying the x and y intercepts, the midpoint of a horizontal or vertical line segment, and the intersection point of two lines.			Algebra I	The Language of Algebra: Variables, Expressions, and Equations	Graphing to show relations and solve equations	9-23 G	9-1.5.4
Strand D: Algebraic Thinking Standard 1: The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions.									
	Benchmark MA.D.1.3.1: The student describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.								
		1. reads, analyzes, and describes graphs of linear relationships.			Algebra I	Linear Relationships: Bridging Patterns to Functions	Use linear functions to model situations and solve problems & Recognize, compare, and apply elementary examples of linear and non-linear functions and equations (now/next, recursive functions)	8-14 A	7-1.5.6
		2. uses variables to represent unknown quantities in real-world problems.			Algebra I	The Language of Algebra: Variables, Expressions, and Equations	Writing expressions, equations, and inequalities. & Distinguishing among the different uses of variables	4-15 A	6-1.5.3
		3. uses the information provided in a table, graph, or rule to determine if a function is linear and justifies reasoning.			Algebra I	Linear Relationships: Bridging Patterns to Functions	Use linear functions to model situations and solve problems & Recognize, compare, and apply elementary examples of linear and non-linear functions and equations (now/next, recursive functions)	7-18 A	7-1.5.4
		4. finds a function rule to describe tables of related input-output variables.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs,	7-40 PRF	7.1.5.2

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		5. predicts outcomes based upon function rules.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs,	6-37 PRF	7-1.5.5
	Benchmark MA.D.1.3.2: The student creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.								
		1. interprets and creates tables and graphs (function tables).			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs,	7-19 A	7-1.5.4
		2. writes equations and inequalities to express relationships.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs,	8-13 A	7-1.5.4
		3. graphs equations and inequalities to explain cause-and-effect relationships.			Algebra I	The Language of Algebra: Variables, Expressions, and Equations	Graphing to show relations and solve equations	9-14 A	7-1.5.4
		4. interprets the meaning of the slope of a line from a graph depicting a real-world situation.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & Solves two-step linear equations with integer coefficients using tables, graphs,	9-13 A	9-1.5.2
Standard 2: The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.									
	Benchmark MA.D.2.3.1: The student represents and solves real-world problems graphically, with algebraic expressions, equations, and inequalities.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. translates verbal expressions and sentences into algebraic expressions, equations, and inequalities.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Solves two-step linear equations with integer coefficients using tables, graphs,	9-9 A	7-1.5.1
		2. translates algebraic expressions, equations, or inequalities representing real-world relationships into verbal expressions or sentences.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Solves two-step linear equations with integer coefficients using tables, graphs,	8-13 A	7-1.5.1
		3. solves single- and multiple-step linear equations and inequalities in concrete or abstract form.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Solves two-step linear equations with integer coefficients using tables, graphs,	8-12 A	8-1.5.6
		4. graphs linear equations on the coordinate plane using tables of values.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Solves two-step linear equations with integer coefficients using tables, graphs,	9-14 A	7-1.5.4
		5. graphically displays real-world situations represented by algebraic equations or inequalities.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Solves two-step linear equations with integer coefficients using tables, graphs,	9-14 A	8-1.5.4
		6. evaluates algebraic expressions, equations, and inequalities by substituting integral values for variables and simplifying the results.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Solves two-step linear equations with integer coefficients using tables, graphs,	9-8 A	8-1.5.3
		7. simplifies algebraic expressions that represent real-world situations by combining like terms and applying the properties of real numbers.			Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Solves two-step linear equations with integer coefficients using tables, graphs,	9-8 A	8-1.5.3
	Benchmark MA.D.2.3.2: The student uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.								
		1. simplifies algebraic expressions with a maximum of two variables.			Algebra I	The Language of Algebra: Variables, Expressions, and Equations	Representing and solving linear equations, linear inequalities, and systems of linear equations and inequalities	9-15 A	9-1.5.6
		2. solves single- and multi-step linear equations and inequalities that represent real-world situations.			Algebra I	The Language of Algebra: Variables, Expressions, and Equations	Representing and solving linear equations, linear inequalities, and systems of linear equations and inequalities	8-12 A	8-1.5.6
Strand E: Data Analysis and Probability Standard 1: The student understands and uses the tools of data analysis for managing information.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.E.1.3.1: The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.								
		1. reads and interprets data displayed in a variety of forms including histograms.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-34 D	7-1.4.5
		2. constructs and interprets displays of data, (including circle, line, bar, and box-and-whisker graphs) and explains how different displays of data can lead to different interpretations.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-34 D	7-1.4.5
	Benchmark MA.E.1.3.2: The student understands and applies the concepts of range and central tendency (mean, median, and mode).								
		1. finds the mean, median, and mode of a set of data using raw data, tables, charts, or graphs.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-33 D	6-1.4.4
		2. interprets measures of dispersion (range) and of central tendency.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-32 D	7-1.4.4
		3. determines appropriate measures of central tendency for a given situation or set of data.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-40 D	6-1.4.4
	Benchmark MA.E.1.3.3: The student analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	Benchmark/Goal	Grade Level Expectation	Rater 1 DOK: FL	Rater 2 DOK: FL	Course	Focal Point	Enabling Objective		
		1. determines the mean, median, mode, and range of a set of real-world data using appropriate technology.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	5-31 D	9-1.4.4
		2. organizes, graphs and analyzes a set of real-world data using appropriate technology.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	5-31 D	9-1.4.4
Standard 2: The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.									
	Benchmark MA.E.2.3.1: The student compares experimental results with mathematical expectations of probabilities.								
		1. compares and explains the results of an experiment with the mathematically expected outcomes.			Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	7-38 D	8-1.4.2
		2. calculates simple mathematical probabilities for independent and dependent events.			Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	8-45 D	9-1.4.2
	Benchmark MA.E.2.3.2: The student determines odds for and odds against a given situation.								
		1. predicts the mathematical odds for and against a specified outcome in a given real-world situation.			Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	9-33 D	D.N.A.
Standard 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	Benchmark MA.E.3.3.1: The student formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.								
		1. formulates a hypothesis and designs an experiment.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-40 D	7-1.4.3
		2. performs the experiment and collects, organizes, and displays the data.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-40 D	7-1.4.3
		3. evaluates the hypothesis by making inferences and drawing conclusions based on statistical results.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-40 D	7-1.4.3
	Benchmark MA.E.3.3.2: The student identifies the common uses and misuses of probability or statistical analysis in the everyday world.								
		1. knows appropriate uses of statistics and probability in real-world situations.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-34 D	7-1.4.3
		2. knows when statistics and probability are used in misleading ways.			Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	8-41 D	8-1.4.3
		3. identifies and uses different types of sampling techniques (for example, random, systematic, stratified).			Algebra I	Data Analysis: Populations and Samples	Analyzing and explaining census or sample data to understand relationships or solve problems. & Describing and using methods for sampling from a population	8-41 D	8-1.4.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		4. knows whether a sample is biased.			Algebra I	Data Analysis: Populations and Samples	Analyzing and explaining census or sample data to understand relationships or solve problems. & Describing and using methods for sampling from a population	8-41 D	8-1.4.3
Grades 9–12									
Number Sense, Concepts, and Operations									
	State Goal 1: The student understands the different ways numbers are represented and used in the real world.								
		1. associates verbal names, written word names, and standard numerals with integers, rational numbers, irrational numbers, real numbers, and complex numbers.	1	2	Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	11-1 NR	Beyond Grade 10
		2. understands the relative size of integers, rational numbers, irrational numbers, and real numbers.	2	2	Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	8-1 NR	Beyond Grade 10
		3. understands concrete and symbolic representations of real and complex numbers in real-world situations.	2	2	Math II Complex in Algebra II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	11-1 NR	Beyond Grade 10
		4. understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, absolute value, and logarithms.	2	3	Math II Logarithms in Algebra II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	11-3 NR	Beyond Grade 10
	State Goal 2: The student understands number systems.								
		1. understands and uses the basic concepts of limits and infinity.	2	3	Precalculus	Representing and operating with functions	Comparing and contrasting properties of families of functions	11-7 A	Beyond Grade 10
		2. understands and uses the real number system.	3	3	Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	10-2 NR	Beyond Grade 10
		3. understands the structure of the complex number system.	3	2	Algebra II	Polynomial Functions and Equations	Represents, applies, and discusses the properties of imaginary and complex numbers	11-2 NR	Beyond Grade 10

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	State Goal 3: The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.								
		1. understands and explains the effects of addition, subtraction, multiplication, and division on real numbers, including square roots, exponents, and appropriate inverse relationships.	2	2	Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-6 NR	8-1.1.7
		2. selects and justifies alternative strategies, such as using properties of numbers, including inverse, identity, distributive, associative, transitive, that allow operational shortcuts for computational procedures in real-world or mathematical problems.	3	5	Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-5 NR	8-1.1.3
		3. adds, subtracts, multiplies, and divides real numbers, including square roots and exponents, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.	3	3	Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	9-5 NR	8-1.1.7
	State Goal 4: The student uses estimation in problem solving and computation.								8-1.1.8
		1. uses estimation strategies in complex situations to predict results and to check the reasonableness of results.	3	3	Math II	Operations with Integers and Negative Rational Numbers	Modeling and solving with negative rational numbers and developing the notion of real numbers	8-3 NR	8-1.1.8
	State Goal 5: The student understands and applies theories related to numbers.								
		1. applies special number relationships such as sequences and series to real-world problems.	3	3	Math I	Linear Patterns and Relationships: Recognizing and Describing	Creating and evaluate simple linear expressions	11-26 PRF	Beyond Grade 10
Measurement									
	State Goal 1: The student measures quantities in the real world and uses the measures to solve problems.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids, cylinders, cones, and pyramids.	3	3	Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-17 M	8-1.2.1
		2. uses concrete and graphic models to derive formulas for finding rate, distance, time, angle measures, and arc lengths.	3	3	Math I	Ratios, Rates, and Proportion	Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	7-18 A	8-1.2.2
		3. relates the concepts of measurement to similarity and proportionality in real-world situations.	3	2	Math II	Similarity and Measurement	Extending proportional relationships involved in similarity to find missing measures in similar figures in 2- and 3-dimensions and applying scales to measurements in drawings and on maps & Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-30 G	8-1.3.2
	State Goal 2: The student compares, contrasts, and converts within systems of measurement (both standard/nonstandard and metric/customary).								
		1. selects and uses direct (measured) or indirect (not measured) methods of measurement as appropriate.	3	3	Math II	Similarity and Measurement	Applying the concepts of surface area and volume in describing and characterizing rectangular solids, cylinders, prisms, pyramids, cones, and spheres	8-29 G	8-1.2.5
		2. solves real-world problems involving rated measures (miles per hour, feet per second).	3	3	Math I	Ratios, Rates, and Proportion	Applying the concept of ratios and proportions to solve problems involving unit rates, scales, discounts, interest, taxes, tips, and other real-world applications of proportions. & Converting from one measure to another through the use of ratios and proportional relationships.	7-18 A	8-1.2.2
	State Goal 3: The student estimates measurements in real-world problem situations.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. solves real-world and mathematical problems involving estimates of measurements, including length, time, weight/mass, temperature, money, perimeter, area, and volume, and estimates the effects of measurement errors on calculations.	3	3	Not Covered in CB Standards	=	=	9-20 M	8-1.2.5
	State Goal 4: The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.								
		1. determines the level of accuracy and precision, including absolute and relative errors or tolerance, required in real-world measurement situations.	2	3	Not Covered in CB Standards	=	=	9-18 M	8-1.2.3
		2. selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.	2	3		=	=	9-20 M	8-1.2.3
Geometry and Spatial Sense									
	State Goal 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.								
		1. uses properties and relationships of geometric shapes to construct formal and informal proofs.	5	3	Geometry	Geometric Thinking and Spatial Reasoning	Students develop an understanding of and an appreciation for the role that axiomatic structures and deductive reasoning play in the development of geometry & Applies deductive methods to develop justifications for central theorems of Euclidean Geometry	10-19 G	Beyond Grade 10
	State Goal 2: The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed.								

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		1. understands geometric concepts such as perpendicularity, parallelism, tangency, congruency, similarity, reflections, symmetry, and transformations including flips, slides, turns, enlargements, rotations, and fractals.	2	2	Math II	Three Dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships & Relating and applying knowledge of translations, reflections, and rotations of plane figures in discussing and applying motions of figures on coordinate systems and real-world settings	8-24 G	9-1.3.2
		2. analyzes and applies geometric relationships involving planar cross-sections (the intersection of a plane and a three-dimensional figure).	4	3	Math II	Three Dimensional Geometry and Measurement	Identifying, comparing, and describing the properties of circles and polygons (general quadrilaterals and triangles, regular polygons) and polyhedra and other solids (prisms, pyramids, cylinders, cones, and spheres) & Identifying, explaining, and applying angle relationships (i.e., vertical, alternate interior/exterior, corresponding, supplementary, complementary, triangle-sum, …) in describing figures and geometric relationships	D.N.A.	D.N.A.
	State Goal 3: The student uses coordinate geometry to locate objects in both two and three dimensions and to describe objects algebraically.								
		1. represents and applies geometric properties and relationships to solve real-world and mathematical problems including ratio, proportion, and properties of right triangle trigonometry.	3	3	Geometry	Similarity and Measurement	Understands the justification for and applies 2- and 3-dimensional measurement formulas in solving problems & • Solves problems involving indirect measurements using results from similarity, the Pythagorean theorem, and other geometric relationships.	10-18 G	9-1.3.2
		2. using a rectangular coordinate system (graph), applies and algebraically verifies properties of two and three-dimensional figures, including distance, midpoint, slope, parallelism, and perpendicularity.	3	4	Geometry	Geometric Thinking and Spatial Reasoning	Students develop an understanding of and an appreciation for the role that axiomatic structures and deductive reasoning play in the development of geometry & Applies deductive methods to develop justifications for central theorems of Euclidean Geometry	9-23 A	8-1.3.3
Algebraic Thinking									

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
	State Goal 1: The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions.								
		1. describes, analyzes, and generalizes relationships, patterns, and functions using words, symbols, variables, tables, and graphs.	4	3	Math II	Linear Equations and Inequalities	Interpreting rate of change and slope in real-world and theoretical settings & Using algebraic expressions involving variables to describe the terms in a sequential pattern & • Solves two-step linear equations with integer coefficients using tables, graphs, and symbolic manipulation	9-15 A	8-1.5.4
		2. determines the impact when changing parameters of given functions.	4	3	Algebra I	The Language of Algebra: Variables, Expressions, and Equations	Writing expressions, equations, and inequalities.	9-40 PRF	8-1.5.2
	State Goal 2: The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.								
		1. represents real-world problem situations using finite graphs, matrices, sequences, series, and recursive relations.	2	3	Algebra I	Linear Relationships: Bridging Patterns to Functions	Interpreting rate of change and slope in real-world and theoretical settings	11-24 PRF	9-1.5.2
		2. uses systems of equations and inequalities to solve real-world problems graphically, algebraically, and with matrices.	3	3	Algebra I	The Language of Algebra: Variables, Expressions, and Equations	Writing expressions, equations, and inequalities. & Distinguishing among the different uses of variables & Representing and solving linear equations, linear inequalities, and systems of linear equations and inequalities & Evaluating expressions and finding equivalent expressions and equations, recognizing the differences between the two & Solving equations and inequalities & Graphing to show relations and solve equations	11-24 PRF	Beyond Grade 10
Data Analysis and Probability									
	State Goal 1: The student understands and uses the tools of data analysis for managing information.								
		1. interprets data that has been collected, organized, and displayed in charts, tables, and plots.	3	3	Math I	Data Analysis: Describing Populations Using One Characteristic	Formulating questions and designing categorical data investigations (observations, measurements, surveys, or experiments) to compare and contrast univariate characteristics of two different samples drawn from a given population	6-29 D	7-1.4.3

Florida Sunshine State Standards and GLEs: Mathematics					College Board Standards			LA Stds	WA Stds
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	**Rater 1 DOK: FL**	**Rater 2 DOK: FL**	**Course**	**Focal Point**	**Enabling Objective**		
		2. calculates measures of central tendency (mean, median, and mode) and dispersion (range, standard deviation, and variance) for complex sets of data and determines the most meaningful measure to describe the data.	3	3	Precalculus	Survey Design and Confidence Intervals	Describes stratified random sampling in sample survey design and possibly other types of more complex probability sampling, such as cluster or multistage sampling. Recognize situations in which more complex types of probability sampling are needed. & Recognizes the effect of sampling variability on interpretations of results from samples.	8-40 D	6-1.4.4
		3. analyzes real-world data and makes predictions of larger populations by applying formulas to calculate measures of central tendency and dispersion using the sample population data, and using appropriate technology, including calculators and computers.	3	3	Precalculus	Survey Design and Confidence Intervals	Describes stratified random sampling in sample survey design and possibly other types of more complex probability sampling, such as cluster or multistage sampling. Recognize situations in which more complex types of probability sampling are needed. & Recognizes the effect of sampling variability on interpretations of results from samples.	8-40 D	8-1.4.3
	State Goal 2: The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.								
		1. determines probabilities using counting procedures, tables, tree diagrams, and formulas for permutations and combinations.	3	3	Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	8-43 D	9-1.4.1
		2. determines the probability for simple and compound events as well as independent and dependent events.	3	4	Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	8-45 D	9-1.4.1
	State Goal 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.								
		1. designs and performs real-world statistical experiments that involve more than one variable, then analyzes results and reports findings.	6	3	Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	8-39 D	8-1.4.5
		2. explains the limitations of using statistical techniques and data in making inferences and valid arguments.	2	2	Math II	Assigning Probabilities for Two-Stage Experiments	Establishing probabilities associated with simple compound events, using such methods as organized lists, tree diagrams, and area models	8-41 D	8-1.4.5
	State Goal 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.								

Appendix E: Qualitative Review of Florida Grade Level Expectations in Mathematics

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
Grade 6			
Number Sense, Concepts, and Operations			
	Benchmark MA.A.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.		
		1. knows word names and standard numerals for whole numbers, fractions, decimals (through hundred-thousandths), and percents.	Not clear what is new for this level. Perhaps the extension of decimals to more places.
		2. reads and writes whole numbers and decimals in expanded form.	An example of what type of expanded notation would help the reader. After reading Grade 7 and 8, it seems that Grade 6 is no exponents, Grade 7 is with positive exponents and Grade 8 is with negative exponents. Is this correct? EXAMPLE of lack of clarity.
	Benchmark MA.A.1.3.2: The student understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.		
		1. compares and orders fractions and decimals using graphic models, number lines, and symbols.	Is "graphic model" a commonly used term in Florida? It is not a commonly used descriptor for what is often called a pictorial representation or model. However, if it is explained in a glossary or if it does not conjure "graphs," then it may be fine. EXAMPLE of specialized jargon.
		2. compares and orders fractions, decimals, and common percents.	How is this different from the previous GLE since it also states that symbols are to be used? It appears that the previous is more conceptual and this is meant to be more algorithmic, but is this the intent? If so, it could be said more directly.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.A.1.3.3: The student understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.		
		1. knows examples of positive rational numbers in real-world situations.	What does it mean "to know examples of rational numbers in the real world?" Does it mean give or select examples of rational numbers in contrast to numbers that are not? At this point, all numbers are rational to students. Does it mean, show different uses of rational numbers such as for counting, measuring, identifying, etc.? Or, does it mean students should be aware that numbers are used? CLARITY
		2. describes the meanings of positive rational numbers using part/whole relationships and relative size comparisons in real-world situations.	What about the other meanings of fractions such as ratio and division? It is not clear how the comparisons are different from the ones expected in 1.3.2. REDUNDANCY in part.
		3. constructs models to represent positive rational numbers.	By this set of expectations, it becomes clear that the number focus in Grade 6 is on positive rationals. It would help if this was clear from the very beginning.
	Benchmark MA.A.1.3.4: The student understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.		
		1. knows the relationships among fractions, decimals, and percents.	What is meant? Do you expect a general statement that they all can be used to describe a part-whole relationship or a proportional relationship? The next expectations loExpectation is not repetitive at equivalency so this one must not mean that. CLARITY
		2. expresses a given quantity in a variety of ways, such as fractions, decimals, or numbers expressed as percents.	Can this be combined with the previous expectation? Would help grain size and perhaps clarify a way to show the relationship.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		3. knows whether numbers expressed in different forms are equal.	This and the next could be combined. Recognizes and expresses numbers in equivalent forms. GRAIN SIZE
		4. converts a number expressed in one form to its equivalent in another form.	
Standard 2: The student understands number systems.			
	Benchmark MA.A.2.3.1: The student understands and uses exponential and scientific notation.		
		1. knows the meaning and use of exponential notation (for example 2^3=2X2X2=8).	Would add positive, integral exponents to the stem. The example implies that, but again it is only in contrast to later levels that it becomes clear that this is the limiting parameter.
		2. expresses whole numbers in exponential notation or in factored form.	
		3. evaluates numerical expressions that contain exponential notation.	
	Benchmark MA.A.2.3.2: The student understands the structure of number systems other than the decimal number system.		
		1. compares the decimal number system to systems that do not use place value (for example, Roman numeral, ancient Egyptian).	There is a lot of emphasis on learning other number systems (grades 6-8) without tying it back to understanding of our base-ten system. It should be made clear that this is the main purpose for studying other systems.
Standard 3: The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.A.3.3.1: The student understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.		ALTHOUGH ALL THESE EXPECTATIONS ARE LAUDABLE, THERE IS NOT A CLEAR EXPECTATION OF WHAT COMPUTATIONAL FLUENCY IS EXPECTED AT THIS LEVEL. This needs to be addressed.
		1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, and decimals.	#1 AND #2 could be combined to knows and shows (or just shows).
		2. uses models or pictures to show the effects of addition, subtraction, multiplication, and division, on whole numbers, decimals, fractions, and mixed numbers.	As mentioned above, these are important but very small grain size. Combining will help.
		3. knows and applies the commutative, associative, and distributive properties in the addition and multiplication of rational numbers.	Small steps of GROWTH shown in this expectation to the next two levels.
		4. uses concrete models and real-world examples to explore the inverse relationship of positive and negative numbers.	Does this mean both integers and rationals? How much is done with negative rationals at this level?
	Benchmark MA.A.3.3.2: The student selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.		
		1. knows the appropriate operations to solve real-world problems involving whole numbers, decimals, and fractions.	
		2. solves real-world problems involving whole numbers, fractions, decimals, and common percents using one or two-step problems.	Including the number of steps is very limiting. There are often many steps in realistic problems. Do you mean problems with one or two operations? By grade 6, they should be expected to handle problems that are more open than this.
		3. applies order of operations when solving problems (parentheses, multiplication, division, addition, and subtraction).	Small steps of GROWTH shown in this expectation to the next two levels.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		4. knows proportional relationships and describes such relationships in words, tables, or graphs.	What is meant by knowing proportional relationships? Are they also symbolically represented? UNCLEAR
	Benchmark MA.A.3.3.3: The student adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.		IT IS THIS STANDARD THAT BEGS TO FOCUS ON COMPUTATIONAL FLUENCY WHILE THE PREVIOUS IS MORE ON PROBLEM SOLVING. WOULD RECOMMEND RELOCATING AT THESE TWO IN THIS LIGHT.
		1. solves one- or two-step real-world problems involving whole numbers and decimals using appropriate methods of computation (for example, mental computation, paper and pencil, and calculator).	See comment above about one and two-step problems. How does this differ from the previous #2. REDUNDANCY.
		2. justifies the choice of method for calculations, such as mental computation, concrete materials, algorithms, or calculators.	Good to have, but it stll does address doing the computation.
Standard 4: The student uses estimation in problem solving and computation.			
	Benchmark MA.A.4.3.1: The student uses estimation strategies to predict results and to check the reasonableness of results.		
		1. knows an appropriate estimation technique for a given situation using whole numbers (for example, clustering, compatible number, front-end).	WHAT GROWTH IS THERE IN ESTIMATION OF WHOLE NUMBERS FROM GRADES 4 AND 5?
		2. estimates to predict results and to check reasonableness of results.	This is a cluster that shows little growth to grade 7 and 8. It should be made clear that the growth comes in the type of problems and types of numbers being used at these levels. Do these include checking reasonableness when using fractions? (They are specifically mentioned in grade 7 but should be here if solving problems with fractions is expected.)

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		3. determines whether an exact answer is needed or an estimate would be sufficient.	
Standard 5: The student understands and applies theories related to numbers.			
	Benchmark MA.A.5.3.1: The student uses concepts about numbers, including primes, factors, and multiples, to build number sequences.		
		1. knows if numbers (less than or equal to 100) are prime or composite.	Growth from Grade 5? It is not clear that there is any growth.
		2. finds the greatest common factor and least common multiple of two or more numbers.	
		3. determines the prime factorization of a number less than or equal to 100.	
		4. uses divisibility rules.	How do students "use" the divisibility rules? This would be a great place to have students conjecture and justify some conjectures about divisibility. For example, why do you only need to loExpectation is not repetitive at the ones place to tell whether or not a number is divisible by 2.
Strand B: Measurement Standard 1: The student measures quantities in the real world and uses the measures to solve problems.			
	Benchmark MA.B.1.3.1: The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.		FOCUS--ON AREA AND PERIMETER (BUT OF WHAT FIGURES?) AND VOLUME OF RECTANGULAR SOLIDS.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. uses concrete and graphic models to create formulas for finding the perimeter and area of plane figures and the volume of rectangular solids.	Which plane figures? Does this grow from finding the area of a rectangle in previous grades to that of any reasonable plane figure?
		2. uses concrete and graphic models to discover an approximation for π and creates a formula for finding circumference.	More at the activity level than at the expectation level.
	Benchmark MA.B.1.3.2: The student uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.		
		1. identifies a protractor as a tool for measuring angles and measures angles using a protractor.	ANGLES---overlaps with geometry. Look for places in geometry where expectations overlap and put one place or the other.
		2. identifies and names angles according to their measure (including acute, right, obtuse, straight).	
		3. classifies triangles according to the measurement of their angles and according to the length of their sides.	
		4. determines the measure of a missing angle using angle relationships.	
	Benchmark MA.B.1.3.3: The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.		There is a lot of emphasis on dimensions. A good place to have students explore, use technology, make and verify conjectures. It does seem that 9 expectations on this topic is excessive.
		1. given a two-dimensional figure, creates a new figure by increasing or decreasing the original dimensions.	Looking at dimensions is fine, but think that these three can be combined.
		2. knows the relationship between the area or perimeter of an original figure and that of a newly created figure.	
		3. solves real-world or mathematical problems involving perimeter or area and how these are affected by changes in the dimensions of the figure.	
	Benchmark MA.B.1.3.4: The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.		

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. knows proportional relationships in scale drawings.	
		2. uses scale drawings to solve real-world problems including distance (as in map reading).	
Standard 2: The student compares, contrasts, and converts within systems of measurement (both standard/non-standard and metric/customary).			
	Benchmark MA.B.2.3.1: The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.		
		1. compares objects according to their length, weight or mass, and capacity using customary or metric units.	WHAT IS NEW FROM GRADE 5?
		2. measures length, weight or mass, and capacity using appropriate measuring instruments.	WHAT IS NEW FROM GRADE 5?
	Benchmark MA.B.2.3.2: The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.		
		1. changes one customary or metric unit of measurement to another within the same system.	WHAT IS NEW FROM GRADE 5?
		2. uses concrete manipulatives or constructs models of square units (such as square inch and square meter) for measuring area and cubic units (such as cubic centimeter or cubic yard) for measuring volume.	WHAT IS NEW FROM GRADE 5?
Standard 3: The student estimates measurements in real-world problem situations.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.B.3.3.1: The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight/mass, temperature, money, perimeter, area, and volume, in either customary or metric units.		
		1. estimates the measure (length, weight or mass, and capacity) of an object or figure and then compares the estimate with the actual measurement of the object or figure.	WHAT IS NEW FROM GRADE 5?
		2. knows whether an exact answer is needed or an estimate is sufficient.	REDUNDANT? How do this and the next three differ from what is done in number? Perhaps the real-world could reference measurement and not have as many expectations.
		3. estimates solutions to real-world problems by estimating the length, volume or capacity, weight or mass, perimeter, or area of objects or shapes in either customary or metric units.	It is not clear what GROWTH is meant. One can read this to be the same as Grade 5.
		4. estimates solutions to real-world problems involving measurement, including estimates of time, temperature and money.	It is not clear what GROWTH is meant. One can read this to be the same as Grade 5.
Standard 4: The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.			
	Benchmark MA.B.4.3.1: The student selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement).		

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. selects the appropriate unit of measure for a given real-world situation.	WHAT IS NEW FROM GRADE 5?
		2. knows the approximate nature of measurement and measures to the specified degree of accuracy (for example, nearest centimeter or sixteenth of an inch).	WHAT IS NEW FROM GRADE 5?
	Benchmark MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.		
		1. selects an appropriate measurement tool (for example, scales, rulers, thermometers, measuring cups, protractors, gauges).	WHAT IS NEW FROM GRADE 5?
		2. determines the interval of a scale and reads the scales on a variety of measuring instruments.	WHAT IS NEW FROM GRADE 5?
		3. measures accurately with the measurement tools.	WHAT IS NEW FROM GRADE 5? Perhaps the protractor?
Strand C: Geometry and Spatial Sense Standard 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.			
	Benchmark MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two- and three-dimensions.		
		1. identifies, draws, and uses symbolic notation to denote the attributes of two-dimensional geometric figures (including points, parallel and perpendicular lines, planes, rays, and parts of a circle).	WHAT IS NEW FROM GRADE 5?
		2. knows and draws angles (including acute, obtuse, right, and straight).	REPEAT FROM MEASUREMENT

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		3. analyzes relationships among two-dimensional geometric figures (for example, the diagonal of a rectangle divides the rectangle into two congruent triangles each having one half the area of the rectangle).	NICE
		4. uses appropriate measuring devices (including ruler and protractor) as needed in analysis of figures.	MEASURING? REPEAT of expectation in measurement.
		5. knows the attributes of and draws three-dimensional figures (including rectangular solids and cylinders).	DIFFERENCE BETWEEN ATTRIBUTES AND PROPERTIES? Expectation 5 and 6 can be combined.
		6. knows the properties of two- and three-dimensional figures.	
Standard 2: The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed.			
	Benchmark MA.C.2.3.1: The student understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.		
		1. uses manipulatives and drawings to solve problems requiring spatial visualization.	WHAT IS NEW FROM GRADE 5?
		2. describes and applies the property of symmetry in figures.	WHAT IS NEW FROM GRADE 5?
		3. recognizes and draws congruent and similar figures.	Expectation is not repetitive
		4. identifies and performs the various transformations (reflection, translation, rotation) of a given figure on a coordinate plane.	The move to coordinate plane is a nice tie to the Grade 6 expectations.
	Benchmark MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).		A LOT OF EMPHASIS ON TESSELLATIONS IN ALL THREE GRADES.
		1. constructs tiling patterns to cover a plane.	SMALL grain size
		2. identifies a tessellation.	SMALL grain size
		3. identifies geometric shapes that can be tessellated.	SMALL grain size

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		4. tessellates using translation and other desired transformations.	SMALL grain size
Standard 3: The student uses coordinate geometry to locate objects in both two- and three-dimensions and to describe objects algebraically.			
	Benchmark MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.		
		1. observes, explains, and makes conjectures regarding geometric properties and relationships (among angles, triangles, squares, rectangles, parallelograms).	Expectation is not repetitive
		2. applies known geometric properties (for example, symmetry, congruence) to solve real-world and mathematical problems.	Expectation is not repetitive
	Benchmark MA.C.3.3.2: The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.		
		1. identifies the x and y axes in a coordinate plane and identifies the coordinates of a given point in the first quadrant.	WHAT IS NEW FROM GRADE 5?
		2. plots specific points in the first quadrant of the Cartesian coordinate system.	WHAT IS NEW FROM GRADE 5?
Strand D: Algebraic Thinking Standard 1: The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.D.1.3.1: The student describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.		It is not clear what growth from grade 5 in patterns. There does seem to be some emphasis on solving simple equations and some translating along with some function tables. It appears to be rather elementary.
		1. describes, predicts, and creates numerical and geometric patterns through models (for example, manipulatives, tables, graphs).	Growth from Grade 5? It is not clear there is any.
		2. states in words a rule for a pattern.	Growth from Grade 5? It is not clear that there is any growth.
		3. predicts outcomes based on patterns.	Growth from Grade 5? It is not clear that there is any growth.
		4. finds patterns in real-world situations.	Growth from Grade 5? It is not clear there is any.
		5. describes relationships and patterns using words, tables, symbols, variables, expressions, or equations.	Growth shown through use of equations, etc.
		6. given initial terms in a pattern, supplies a specific missing term in the pattern (for example, given first four terms, supplies sixth term).	Growth from Grade 5? It is not clear there is any.
	Benchmark MA.D.1.3.2: The student creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.		
		1. interprets and creates function tables and graphs (first quadrant).	Growth could be the graphs. More indication that this is the change.
		2. substitutes values for variables in expressions and describes the results or patterns observed.	Expectation is not repetitive
		3. graphs (first quadrant) functions from function tables to explain cause-and-effect relationships.	Expectation is not repetitive
Standard 2: The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.D.2.3.1: The student represents and solves real-world problems graphically, with algebraic expressions, equations, and inequalities.		It is not clear what growth there is in this standard. It could be that this is the first time that variables are used. If so, this is late.
		1. uses variables to represent numbers and relationships.	
		2. translates verbal expressions into algebraic expressions.	
		3. translates simple algebraic expressions, equations or formulas representing real-world relationships into verbal expressions or sentences.	
		4. uses pictures, models, manipulatives or other strategies to solve simple one-step linear equations with rational solutions.	Growth from Grade 5?
	Benchmark MA.D.2.3.2: The student uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.		
		1. knows how to solve simple equations representing real-world situations, using pictures, models, manipulatives (such as algebra tiles), or other strategies.	Expectation is not repetitive
		2. uses concrete materials to solve equations and inequalities and explains reasoning orally or in writing.	Expectation is not repetitive
Strand E: Data Analysis and Probability Standard 1: The student understands and uses the tools of data analysis for managing information.			
	Benchmark MA.E.1.3.1: The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.		It is not clear what growth there is from Grade 5. Most of this could have been done previously. What is new?

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. reads and analyzes data displayed in a variety of forms (charts, pictographs, stem-and-leaf plots).	
		2. generates and collects data for analysis.	
		3. chooses appropriate titles, scales, labels, keys, and intervals for displaying data in graphs.	
		4. constructs, interprets, and explains displays of data, such as tables and graphs (single- and multiple-bar graphs and single- and multiple- line graphs).	
	Benchmark MA.E.1.3.2: The student understands and applies the concepts of range and central tendency (mean, median, and mode).		
		1. organizes items in a set of data.	It is not clear how this is different from previous levels.
		2. finds the range, mean, median, and mode of a set of data.	This is late if it is a new expectation. What is new? Weighted mean?
		3. describes real-world data by applying and explaining appropriate procedures for finding measures of central tendency.	
	Benchmark MA.E.1.3.3: The student analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.		
		1. describes a set of data by using the measures of central tendency.	How is this different from #2 above.
		2. uses technology, such as graphing calculators and computer spreadsheets, to create graphs.	TECHNOLOGY. One of the few times that technology is mentioned.
Standard 2: The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.E.2.3.1: The student compares experimental results with mathematical expectations of probabilities.		
		1. determines all possible outcomes of an event using a tree diagram or organized list.	This expectation is appropriate.
		2. calculates simple mathematical probabilities.	This expectation is appropriate.
		3. uses manipulatives to obtain experimental results, compares results to mathematical expectations, and discusses the validity of the experiment.	This expectation is appropriate.
	Benchmark MA.E.2.3.2: The student determines odds for and odds against a given situation.		
		1. examines and describes situations that include finding the odds for and against a specified outcome.	Could be included in finding simple probabilities, #2 above.
Standard 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.			
	Benchmark MA.E.3.3.1: The student formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.		
		1. with classmates, formulates hypotheses based on research and prior data, designs an appropriate experiment, collects and analyses data using appropriate statistics, and displays and interprets results in appropriate tables or graphs.	Expectation is not repetitive

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.E.3.3.2: The student identifies the common uses and misuses of probability or statistical analysis in the everyday world.		
		1. explores uses and misuses of statistics in real-world situations such as advertisements and polls.	Expectation is not repetitive
Grade 7 GLE			
Strand A: Number Sense, Concepts, and Operations Standard 1: The student understands the different ways numbers are represented and used in the real world.			
	Benchmark MA.A.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.		
		1. knows word names and standard numerals for integers, fractions, decimals, ratios, numbers expressed as percents, numbers with exponents, numbers expressed in scientific notation, and numbers expressed using the square root radical.	It is difficult, without careful examination of t the previous and the subsequent GLEs to ascertain that the focus in grade 7 is on integers, scientific notation with positive exponents. Square roots are mentioned, but is not clear what is expected---square roots of perfect squares, decimal approximations, estimation of size (greater than 2 but less than 3). Ratios were barely mentioned in grade 6 so it also appears that they are a focus of grade 7, but little is done (except in other content areas).
		2. reads and writes whole numbers and decimals in expanded form, including exponential notation.	Make clear what type of exponents. It appears that negative are introduced in grade 8, so here is only positive exponents.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.A.1.3.2: The student understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.		
		1. compares and orders integers, fractions, decimals, numbers with exponents, and numbers expressed as percents or in scientific notation, including ordering on a number line.	What is the purpose of the number line here? Is this leading to the density property? Or is it to use benchmarks on the number line to help with the ordering?
	Benchmark MA.A.1.3.3: The student understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.		
		1. knows examples of rational and irrational numbers in real-world situations, including the irrational numbers π and ^{2}.	Are there any other irrationals? Other than the circle, what is expected for pi? Same question can be asked here that was asked in the Grade 6 review.
		2. describes the meanings of positive rational numbers using part/whole relationships and relative size comparisons in real-world situations.	Growth? SAME AS GRADE 6
		3. constructs models to represent positive rational numbers.	Growth? SAME AS GRADE 6
	Benchmark MA.A.1.3.4: The student understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.		
		1. knows the relationships among fractions, decimals, and percents.	SAME AS GRADE 6
		2. expresses a given quantity in a variety of ways (for example, integers, fractions, decimals, numbers expressed as a percent, numbers expressed in scientific notation, ratios).	SAME AS GRADE 6 except for scientific notations. A RATIO is a relationship not a quantity. That may not be important, but it is not clear how ratios are being developed.
		3. knows whether numbers expressed in different forms are equal.	Small grain size. Combine some of these

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		4. converts a number expressed in one form to its equivalent in another form.	Small grain size. Combine some of these
Standard 2: The student understands number systems.			
	Benchmark MA.A.2.3.1: The student understands and uses exponential and scientific notation.		
		1. expresses whole numbers in exponential notation (for example, $36 = 6^2$).	SAME AS GRADE 6
		2. evaluates numerical expressions that contain exponential notation.	Could combine #1 and #2--would help grain size.
		3. expresses numbers greater than one in scientific notation.	Could combine #3 and #4--would help grain size.
		4. expresses numbers in scientific notation as numbers in standard form.	
	Benchmark MA.A.2.3.2: The student understands the structure of number systems other than the decimal number system.		
		1. applies knowledge of the decimal number system and of non-place-value systems.	VAGUE. What systems? And Why?
Standard 3: The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.			
	Benchmark MA.A.3.3.1: The student understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.		THIS IS BASICALLY THE SAME AS GRADE 6. ONLY CHANGE IS CLOSURE IS ADDED TO THE PROPERTIES.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, and decimals.	
		2. uses models or pictures to show the effects of addition, subtraction, multiplication, and division on whole numbers, decimals, fractions, mixed numbers, and integers.	
		3. applies the properties of rational numbers to solve problems (commutative, associative, distributive, identity, equality, inverse).	
		4. knows the inverse relationship of positive and negative numbers.	This changed from explore to know (Grade 6 to 7). Is that enough?
	Benchmark MA.A.3.3.2: The student selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.		AS IN GRADE 6, THESE TWO STANDARDS (3.3.2 AND 3.3.3) NEED TO BE REVISITED. COMPUTATIONAL FLUENCY SHOULD BE MADE CLEAR.
		1. knows the appropriate operation to solve real-world problems involving fractions, decimals, and integers.	Would combine #1 and #2. Surely by now, there is often not just one operation.
		2. solves real-world problems involving decimals and fractions using two- or three-step problems.	Watch getting into a bind of specifying the number of steps.
		3. solves real-world problems involving percents (for example, discounts, simple interest, taxes, tips).	New--should be clear that Grade 7 also focuses on percents.
		4. applies order of operations to solve problems (parentheses, exponents, multiplication, division, addition, and subtraction).	Growth---exponents.
		5. knows proportional relationships and uses tables, graphs, or “constant ratio” relationships to solve and explain problems.	New
	Benchmark MA.A.3.3.3: The student adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.		

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. solves multi-step real-world problems involving whole numbers, fractions or decimals using appropriate methods of computation, such as mental computation, paper and pencil, and calculator.	
Standard 4: The student uses estimation in problem solving and computation.			
	Benchmark MA.A.4.3.1: The student uses estimation strategies to predict results and to check the reasonableness of results.		NOT CLEAR WHAT GROWTH IS EXPECTED HERE. IT MAY BE FINE IF IT IS CLEAR THAT IT REFERS TO PROBLEMS APPROPRIATE FOR THIS LEVEL.
		1. knows an appropriate estimation technique for a given situation using whole numbers, fractions and decimals.	New---fraction and decimals---should not wait until this level, but be included when introducing such problem solving in previous grades.
		2. estimates to predict results and check reasonableness of results.	
		3. determines whether an exact answer is needed or an estimate would be sufficient.	Same as previous level. What growth would be expected?
Standard 5: The student understands and applies theories related to numbers.			
	Benchmark MA.A.5.3.1: The student uses concepts about numbers, including primes, factors, and multiples, to build number sequences.		SOME GROWTH---EXPANDS RANGE OF WHOLE NUMBERS AND MENTIONS SEQUENCES.
		1. knows if numbers are prime or composite.	
		2. finds the greatest common factor and least common multiple of two or more numbers.	
		3. determines the prime factorization of a composite number.	
		4. applies number theory concepts to determine the terms in a sequence.	
		5. applies number theory concepts, including divisibility rules, to solve real-world or mathematical problems.	

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
Strand B: Measurement Standard 1: The student measures quantities in the real world and uses the measures to solve problems.			
	Benchmark MA.B.1.3.1: The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.		Focus on volume and surface are as well as circle measurement and on some derived formulas. Good to see the emphasis on deriving formulas.
		1. uses concrete or graphic models to create formulas for finding volumes of solids (prisms and cylinders).	
		2. uses concrete or graphic models to create formulas for finding surface area of prisms and cylinders.	
		3. solves and explains problems involving perimeter, area, and circumference.	
	Benchmark MA.B.1.3.2: The student uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.		
		1. finds the measure of an angle by measuring with a protractor or applying angle relationships (for example, corresponding, complementary, supplementary, interior, exterior).	Expectation is not repetitive
		2. . develops and uses the distance formula in solving real-world problems (d = rt).	Expectation is not repetitive
	Benchmark MA.B.1.3.3: The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.		Emphasis on dimensions. Simplify to have one expectation.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. given a two- or three-dimensional figure, creates a new figure by increasing or decreasing the original dimensions.	Small grain size. Combine some of these
		2. knows the relationships between the perimeters, areas, surface areas, or volumes of the original figure and those of the newly created figure.	Small grain size. Combine some of these
		3. solves real world or mathematical problems involving perimeter, area, circumference, surface area and volume and how these are affected by changes in the dimensions of the figures.	Small grain size. Combine some of these
	Benchmark MA.B.1.3.4: The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.		
		1. knows an appropriate scale needed to produce a proportional drawing or model.	
		2. knows proportional relationships used in scale drawings.	What type of proportions? Unit? How much work has been done in the number GLES on ratios and proportions by this time? This could be a nice way to introduce, but the progression on ratios and proportions is not clear.
		3. produces a scale drawing.	GROWTH, not clear if there is any from Grade 6.
Standard 2: The student compares, contrasts, and converts within systems of measurement (both standard/nonstandard and metric/customary).			
	Benchmark MA.B.2.3.1: The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.		
		1. measures length, weight or mass, and capacity or volume using customary or metric units.	Appears to be the same as Grade 6.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		2. knows relationships between metric units of mass and capacity (for example, one cubic centimeter of water weighs one gram).	NEW
		3. finds measures of length, weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures (for example, using shadow measurement and properties of similar triangles to find the height of a flag pole).	NEW
	Benchmark MA.B.2.3.2: The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.		It is not clear what is new in this section.
		1. compares units of measurement within a system (metric or customary).	
		2. performs operations on measurements within either the metric or customary system (for example, finds three times 27 inches and expresses the answer in yards).	LATE
		3. selects the appropriate unit of measurement when solving real-world problems (for example linear, square, and cubic units).	
		4. solves problems using the metric or customary system involving conversions within the same system.	
Standard 3: The student estimates measurements in real-world problem situations.			
	Benchmark MA.B.3.3.1: The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight/mass, temperature, money, perimeter, area, and volume, in either customary or metric units.		
		1. knows whether an exact answer is needed or if an estimate is sufficient.	SAME

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		2. estimates solutions to real-world problems by estimating the length, volume or capacity, weight or mass, perimeter, or area of objects or shapes in either customary and metric units.	SAME
		3. estimates solutions to real-world problems involving measurement, including estimates of time, temperature, and money.	SAME
Standard 4: The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.			
	Benchmark MA.B.4.3.1: The student selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement).		
		1. selects appropriate units of measurement in a real-world context.	WHAT GROWTH?
		2. knows that measurements are always approximate and that the degree of accuracy of a measurement depends upon the precision of the instrument.	WHAT GROWTH?
		3. knows the precision of different measuring instruments.	SOME GROWTH
		4. determines the appropriate precision unit for a given situation.	SOME GROWTH
	Benchmark MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.		

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. selects a measurement tool (for example, scales, rulers, thermometers, measuring cups, protractors, gauges) appropriate to a given situation.	WHAT GROWTH?
		2. measures accurately with the measurement tools to the specified degree of accuracy for the task and in keeping with the precision of the measurement tool.	Minimal growth
Strand C: Geometry and Spatial Sense Standard 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.			
	Benchmark MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two- and three-dimensions.		
		1. identifies, draws, and uses symbolic notation to denote the basic properties of geometric terms including lines (intersecting, skew, parallel, perpendicular) and congruent figures.	WHAT IS NEW?
		2. determines the measure of various types of angles using a protractor or angle relationships (including complementary, supplementary, and vertical angles).	Expectation is not repetitive
		3. compares and describes the attributes of regular and irregular polygons (for example, parallelogram, trapezoid, pentagon, hexagon).	GROWTH?
		4. identifies and classifies triangles and quadrilaterals.	NEW
		5. knows the attributes of and draws three-dimensional figures (pyramid, cone, sphere, hemisphere).	SAME AS GRADE 6
		6. knows the properties of two- and three-dimensional figures.	SAME AS GRADE 6
Standard 2: The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.C.2.3.1: The student understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.		
		1. uses manipulatives and drawings to solve problems requiring spatial visualization.	SAME
		2. describes and applies the properties of parallelism, perpendicularity and symmetry in real-world contexts.	Appears to be the same as Grade 6.
		3. recognizes, draws, and describes congruent and similar figures.	SOME GROWTH
		4. creates and describes the attributes of a figure either congruent or similar to a given figure.	SOME GROWTH
		5. identifies and performs the various transformations (reflection, translation, rotation) of a given figure on a coordinate plane.	SOME GROWTH
	Benchmark MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).		AGAIN, A LOT OF EMPHASIS ON TESSELLATIONS
		1. predicts and verifies whether a given shape or shapes will tessellate.	Small grain size. Combine some of these
		2. given a simple tessellated pattern, determines the shape(s) and transformation(s).	Small grain size. Combine some of these
		3. tessellates using reflection, translation, or rotation and any desired combinations.	Small grain size. Combine some of these
Standard 3: The student uses coordinate geometry to locate objects in both two- and three-dimensions and to describe objects algebraically.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.		
		1. observes, explains, and makes conjectures regarding geometric properties and relationships (among angles, lines, regular and irregular polygons).	Expectation is not repetitive
		2. creates and solves angle measurement problems for triangles.	Expectation is not repetitive. Would help to know how deep this goes.
		3. demonstrates the Pythagorean relationship in right triangles using models or diagrams (for example, manipulatives, dot, graph, or isometric paper).	NEW
		4. given two sides of a right triangle, uses the Pythagorean Theorem to find the length of the third side.	NEW
	Benchmark MA.C.3.3.2: The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.		
		1. identifies each quadrant and the characteristics of points in each quadrant (positive and negative).	GROWTH---with other quadrants
		2. identifies and plots ordered pairs in all four quadrants of the coordinate system.	can these two be combined? GRAIN SIZE
Strand D: Algebraic Thinking Standard 1: The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.D.1.3.1: The student describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.		
		1. uses manipulatives and graphic materials to generate tables and charts (for example, input, output) to develop algebraic expressions, equations, or formulas.	Expectation is not repetitive
		2. given instances of a pattern, expresses a generalization of the pattern using algebraic expressions.	NEW
		3. given an algebraic expression of a relationship or pattern, supplies specific instances of the relationship or pattern.	NEW
		4. predicts outcomes based on a generalization of a pattern or relationship.	New
	Benchmark MA.D.1.3.2: The student creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.		
		1. interprets and creates tables, function tables, and graphs (all four quadrants).	Expectation is not repetitive
		2. writes expressions and equations to describe relationships.	What is new? Not clear
		3. graphs equations to explain cause-and-effect relationships.	What is new? Not clear
Standard 2: The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.			
	Benchmark MA.D.2.3.1: The student represents and solves real-world problems graphically, with algebraic expressions, equations, and inequalities.		The set of expectations here shows growth.
		1. translates verbal expressions and sentences into algebraic expressions and equations.	

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		2. translates algebraic expressions, equations, or formulas representing real-world relationships into verbal expressions or sentences.	
		3. given an algebraic equation or expression of a real-world application, substitutes integral values for variables and simplifies the results.	
		4. uses pictures, models, manipulatives or other strategies to solve one-step and simple multi-step linear equations.	
		5. graphs solutions to equations and inequalities on a number line.	
		6. graphs linear equations on the coordinate plane from a table of values.	
	Benchmark MA.D.2.3.2: The student uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.		
		1. knows how to solve linear equations and inequalities representing real-world situations, using pictures, models, manipulatives (such as algebra tiles), or other strategies.	Expectation is not repetitive
		2. simplifies algebraic expressions with one variable.	Expectation is not repetitive
Strand E: Data Analysis and Probability Standard 1: The student understands and uses the tools of data analysis for managing information.			
	Benchmark MA.E.1.3.1: The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.		
		1. generates and collects data for analysis.	

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		2. interprets and analyzes data presented in a variety of forms, including box-and-whisker graphs and scatter plots.	new representations
		3. constructs, interprets, and explains displays of data, such as tables and graphs (circle graphs, single- and multiple- bar graphs, and single and multiple-line graphs) and explains how different displays of data lead to different interpretations.	some growth
	Benchmark MA.E.1.3.2: The student understands and applies the concepts of range and central tendency (mean, median, and mode).		
		1. finds the range, mean, median, and mode of data from a table, chart, or graph.	SAME AS GRADE 6
		2. draws conclusions from an analysis of range and central tendency of a set of real-world data.	SAME AS GRADE 6
	Benchmark MA.E.1.3.3: The student analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.		
		1. applies and analyzes appropriate measures of central tendency (mode, mean, median, range) for a set of data.	SAME AS GRADE 6
		2. uses technology, such as graphing calculators and computer spreadsheets, to analyze data and create graphs.	SAME AS GRADE 6
Standard 2: The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.			
	Benchmark MA.E.2.3.1: The student compares experimental results with mathematical expectations of probabilities.		

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. obtains experimental results using manipulatives.	new
		2. explains observed difference between mathematical and experimental results.	new
		3. calculates simple mathematical probabilities for independent and dependent events.	New
	Benchmark MA.E.2.3.2: The student determines odds for and odds against a given situation.		
		1. computes the mathematical odds for and against a specified outcome in given real-world experiments.	Expectation is not repetitive
Standard 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.			
	Benchmark MA.E.3.3.1: The student formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.		
		1. formulates a hypothesis and designs an experiment.	Shows growth
		2. performs the experiment and collects, organizes, and displays the data.	Expectation is not repetitive
		3. evaluates the hypothesis by making inferences and drawing conclusions based on statistical results.	Expectation is not repetitive
	Benchmark MA.E.3.3.2: The student identifies the common uses and misuses of probability or statistical analysis in the everyday world.		
		1. knows appropriate uses of statistics and probability in real-world situations.	Expectation is not repetitive
		2. knows when statistics and probability are used in misleading ways.	

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
Grade 8 GLE			New
Strand A: Number Sense, Concepts, and Operations Standard 1: The student understands the different ways numbers are represented and used in the real world.			
	Benchmark MA.A.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.		
		1. knows word names and standard numerals for integers, fractions, decimals, numbers expressed as percents, numbers with exponents, numbers expressed in scientific notation, absolute value, radicals, and ratios.	NEW at this level: absolute values, radicals (but which ones?), scientific notation (for numbers less than 1---but not clear here)
	Benchmark MA.A.1.3.2: The student understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.		
		1. compares and orders fractions, decimals, integers, and radicals using graphic models, number lines, and symbols.	GROWTH--A little with new numbers (radicals) but not really much new at this level for either of these.
		2. compares and orders numbers expressed in absolute value, scientific notation, integers, percents, numbers with exponents, fractions, decimals, radicals, and ratios.	
	Benchmark MA.A.1.3.3: The student understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.		

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. knows examples of rational and irrational numbers in real-world situations.	These could be combined, would help grain size.
		2. describes the meanings of rational and irrational numbers using physical or graphical displays.	
		3. constructs models to represent rational and irrational numbers.	
	Benchmark MA.A.1.3.4: The student understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.		
		1. knows the relationships among fractions, decimals, and percents given a real-world context.	SAME as grade 7
		2. simplifies expressions using integers, exponents, and radicals.	NEW, but what type of exponents and radicals
		3. knows equivalent forms of large and small numbers in scientific and standard notation.	negative exponents is new
		4. identifies and explains the absolute value of a number.	
Standard 2: The student understands number systems.			
	Benchmark MA.A.2.3.1: The student understands and uses exponential and scientific notation.		
		1. expresses rational numbers in exponential notation including negative exponents (for example, $2^{-3} = \_^{3} = 1/8$).	It is only here that one sees clearly that negative exponents are the focus of the exponential expressions at this grade level
		2. expresses numbers in scientific or standard notation including decimals between 0 and 1.	REDUNDANT or could be combined with equivalent form
		3. evaluates numerical or algebraic expressions that contain exponential notation.	How does this differ from #2 in the previous standard?
	Benchmark MA.A.2.3.2: The student understands the structure of number systems other than the decimal number system.		

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. expresses base ten numbers as equivalent numbers in different bases, such as base two, base five, and base eight.	Three expectations indicate too much emphasis on this. Is that expected? It is also not quite clear which type of numbers--only whole numbers? Any decimals? Could make one expectation.
		2. discusses the application of the binary (base two) number system in computer technology.	
		3. expresses non-base ten numbers as equivalent numbers in base ten.	
Standard 3: The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.			
	Benchmark MA.A.3.3.1: The student understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.		
		1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, decimals, and integers.	SAME as grade 7
		2. knows the inverse relationship of positive and negative numbers.	SAME as grade 7
		3. applies the properties of real numbers to solve problems (commutative, associative, distributive, identity, equality, inverse, and closure).	Little growth--inverse, and closure.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.A.3.3.2: The student selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.		
		1. knows the appropriate operations to solve real-world problems involving integers, ratios, rates, proportions, numbers expressed as percents, decimals, and fractions.	It appears that ratios and proportions are central to grade 8, but there has been a lot of problem solving in geometry in grade 7. NEED TO REVISIT THE PROGRESSION
		2. solves real-world problems involving integers, ratios, proportions, numbers expressed as percents, decimals, and fractions in two- or three-step problems.	CONSIDER THREE-STEP PROBLEMS. DOES THIS MEAN THREE OPERATIONS. IT SHOULD BE MUCH MORE OPEN BY THIS POINT.
		3. solves real-world problems involving percents including percents greater than 100% (for example percent of change, commission).	
		4. writes and simplifies expressions from real-world situations using the order of operations.	
	Benchmark MA.A.3.3.3: The student adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.		ANY EMPHASIS ON COMPUTATIONAL FLUENCY? IF SO, FOR WHAT NUMBERS?
		1. solves multi-step real-world problems involving fractions, decimals, and integers using appropriate methods of computation, such as mental computation, paper and pencil, and calculator.	
Standard 4: The student uses estimation in problem solving and computation.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.A.4.3.1: The student uses estimation strategies to predict results and to check the reasonableness of results.		SAME, BUT THAT IS PROBABLY SENSIBLE.
		1. knows appropriate estimation techniques for a given situation using real numbers.	
		2. estimates to predict results and to check reasonableness of results.	
Standard 5: The student understands and applies theories related to numbers.			
	Benchmark MA.A.5.3.1: The student uses concepts about numbers, including primes, factors, and multiples, to build number sequences.		
		1. knows if numbers are relatively prime.	NEW
		2. applies number theory concepts to determine the terms in a real number sequence.	SAME
		3. applies number theory concepts, including divisibility rules, to solve real-world or mathematical problems.	WHAT IS NEW?
Strand B: Measurement Standard 1: The student measures quantities in the real world and uses the measures to solve problems.			
	Benchmark MA.B.1.3.1: The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.		OVERALL STATEMENT ABOUT GRADE 8 MEASUREMENT: A little more emphasis on 3-D figures and on derived measures, not much growth over Grade 7.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. uses concrete and graphic models to explore and derive formulas for surface area and volume of three-dimensional regular shapes, including pyramids, prisms, and cones.	adds pyramids and cones
		2. solves and explains real-world problems involving surface area and volume of three-dimensional shapes.	SAME AS GRADE 7
	Benchmark MA.B.1.3.2: The student uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.		
		1. applies formulas for finding rates, distance, time and angle measures.	SAME. What growth is expected?
		2. describes and uses rates of change (for example, temperature as it changes throughout the day, or speed as the rate of change in distance over time) and other derived measures.	Not much growth
	Benchmark MA.B.1.3.3: The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.		See comments about dimensions in grade 6 & 7
		1. knows how a change in a figure’s dimensions affects its perimeter, area, circumference, surface area, or volume.	Small grain size. Combine some of these
		2. knows how changes in the volume, surface area, area, or perimeter of a figure affect the dimensions of the figure.	Small grain size. Combine some of these
		3. solves real-world or mathematical problems involving the effects of changes either to the dimensions of a figure or to the volume, surface area, area, perimeter, or circumference of figures.	Small grain size. Combine some of these
	Benchmark MA.B.1.3.4: The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.		
		1. interprets and applies various scales including those based on number lines, graphs, models, and maps. (Scale may include rational numbers.)	SAME. Difficult to ascertain if anything is new.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		2. constructs and uses scale drawings to recreate a given situation.	SAME. Difficult to ascertain if anything is new.
Standard 2: The student compares, contrasts, and converts within systems of measurement (both standard/nonstandard and metric/customary).			
	Benchmark MA.B.2.3.1: The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.		
		1. finds measures of length, weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures.	NEW and could be emphasized more
	Benchmark MA.B.2.3.2: The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.		
		1. solves problems using mixed units within each system, such as feet and inches, hours and minutes.	seems late
		2. solves problems using the conversion of measurements within the customary system.	seems late
		3. solves problems using the conversions of measurement within the metric system.	seems late
Standard 3: The student estimates measurements in real-world problem situations.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.B.3.3.1: The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight/mass, temperature, money, perimeter, area, and volume, in either customary or metric units.		
		1. knows a variety of strategies to estimate, describe, make comparisons, and solve real-world and mathematical problems involving measurements.	Broad, but Expectation is not repetitive.
Standard 4: The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.			
	Benchmark MA.B.4.3.1: The student selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement).		
		1. selects the appropriate unit of measure for a given situation.	SAME as grade 7
		2. knows the precision of different measuring instruments.	SAME as grade 7
		3. determines the appropriate precision unit for a given situation.	SAME as grade 7
		4. identifies the number of significant digits as it relates to the least precise unit of measure.	NEW
		5. determines the greatest possible error of a given measurement and the possible actual measurements of an object.	NEW

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.		
		1. applies significant digits in the real-world context.	NEW
		2. selects and uses appropriate instruments, technology, and techniques to measure quantities and dimensions to a specified degree of accuracy.	TECHNOLOGY--WHAT TYPE? GOOD TO SEE IT MENTIONED.
Strand C: Geometry and Spatial Sense Standard 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.			
	Benchmark MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two- and three-dimensions.		
		1. determines and justifies the measures of various types of angles based upon geometric relationships in two- and three-dimensional shapes.	New-3-d angles.
		2. compares regular and irregular polygons and two- and three-dimensional shapes.	What is new?
		3. draws and builds three-dimensional figures from various perspectives (for example, flat patterns, isometric drawings, nets).	NEW
		4. knows the properties of two- and three-dimensional figures.	What is new?

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
Standard 2: The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed.			
	Benchmark MA.C.2.3.1: The student understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.		
		1. use the properties of parallelism, perpendicularity, and symmetry in solving real-world problems.	WHAT IS NEW?
		2. identifies congruent and similar figures in real-world situations and justifies the identification.	WHAT IS NEW?
		3. identifies and performs the various transformations (reflection, translation, rotation, dilation) of a given figure on a coordinate plane.	New
	Benchmark MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).		AGAIN, A LOT OF EMPHASIS ON TESSELLATIONS
		1. continues a tessellation pattern using the needed transformations.	
		2. creates an original tessellating tile and tessellation pattern using a combination of transformations	
Standard 3: The student uses coordinate geometry to locate objects in both two- and three-dimensions and to describe objects algebraically.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.		
		1. observes, explains, makes and tests conjectures regarding geometric properties and relationships (among regular and irregular shapes of two and three dimensions).	Expectation is not repetitive
		2. applies the Pythagorean Theorem in real-world problems (for example, finds the relationship among sides in 45° – 45° and 30° – 60° right triangles).	Expectation is not repetitive
	Benchmark MA.C.3.3.2: The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.		Nice tie to algebra. LoExpectation is not repetitive for repeats.
		1. given an equation or its graph, finds ordered-pair solutions (for example, $y = 2x$).	
		2. given the graph of a line, identifies the slope of the line (including the slope of vertical and horizontal lines).	
		3. given the graph of a linear relationship, applies and explains the simple properties of lines on a graph, including parallelism, perpendicularity, and identifying the x and y intercepts, the midpoint of a horizontal or vertical line segment, and the intersection point of two lines.	
Strand D: Algebraic Thinking Standard 1: The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.D.1.3.1: The student describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.		Reasonable growth shown in this set of expectations.
		1. reads, analyzes, and describes graphs of linear relationships.	
		2. uses variables to represent unknown quantities in real-world problems.	
		3. uses the information provided in a table, graph, or rule to determine if a function is linear and justifies reasoning.	
		4. finds a function rule to describe tables of related input-output variables.	
		5. predicts outcomes based upon function rules.	
	Benchmark MA.D.1.3.2: The student creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.		
		1. interprets and creates tables and graphs (function tables).	
		2. writes equations and inequalities to express relationships.	
		3. graphs equations and inequalities to explain cause-and-effect relationships.	
		4. interprets the meaning of the slope of a line from a graph depicting a real-world situation.	Repeat? From geometry but may be good to have it again. However, it should be clear that this cause redundancy.
Standard 2: The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.			
	Benchmark MA.D.2.3.1: The student represents and solves real-world problems graphically, with algebraic expressions, equations, and inequalities.		This set of expectations show some growth. Much more symbolic.

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		1. translates verbal expressions and sentences into algebraic expressions, equations, and inequalities.	
		2. translates algebraic expressions, equations, or inequalities representing real-world relationships into verbal expressions or sentences.	
		3. solves single- and multiple-step linear equations and inequalities in concrete or abstract form.	
		4. graphs linear equations on the coordinate plane using tables of values.	
		5. graphically displays real-world situations represented by algebraic equations or inequalities.	
		6. evaluates algebraic expressions, equations, and inequalities by substituting integral values for variables and simplifying the results.	
		7. simplifies algebraic expressions that represent real-world situations by combining like terms and applying the properties of real numbers.	
	Benchmark MA.D.2.3.2: The student uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.		
		1. simplifies algebraic expressions with a maximum of two variables.	Expectation is not repetitive
		2. solves single- and multi-step linear equations and inequalities that represent real-world situations.	Expectation is not repetitive
Strand E: Data Analysis and Probability Standard 1: The student understands and uses the tools of data analysis for managing information.			

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
	Benchmark MA.E.1.3.1: The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.		Little new in this set of expectations
		1. reads and interprets data displayed in a variety of forms including histograms.	
		2. constructs and interprets displays of data, (including circle, line, bar, and box-and-whisker graphs) and explains how different displays of data can lead to different interpretations.	
	Benchmark MA.E.1.3.2: The student understands and applies the concepts of range and central tendency (mean, median, and mode).		
		1. finds the mean, median, and mode of a set of data using raw data, tables, charts, or graphs.	SAME as grade 7 and previous grades.
		2. interprets measures of dispersion (range) and of central tendency.	SAME as grade 7
		3. determines appropriate measures of central tendency for a given situation or set of data.	SAME as grade 7
	Benchmark MA.E.1.3.3: The student analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.		
		1. determines the mean, median, mode, and range of a set of real-world data using appropriate technology.	SAME as grade 7
		2. organizes, graphs and analyzes a set of real-world data using appropriate technology.	SAME as grade 7

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
Standard 2: The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.			
	Benchmark MA.E.2.3.1: The student compares experimental results with mathematical expectations of probabilities.		
		1. compares and explains the results of an experiment with the mathematically expected outcomes.	some growth in the explaination
		2. calculates simple mathematical probabilities for independent and dependent events.	new
	Benchmark MA.E.2.3.2: The student determines odds for and odds against a given situation.		
		1. predicts the mathematical odds for and against a specified outcome in a given real-world situation.	same as previous grades
Standard 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.			
	Benchmark MA.E.3.3.1: The student formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.		Not clear what growth is expected in this set of expectations.
		1. formulates a hypothesis and designs an experiment.	
		2. performs the experiment and collects, organizes, and displays the data.	

Florida Sunshine State Standards and GLEs: Mathematics			Comments on GLEs
Strand/Standard	**Benchmark/Goal**	**Grade Level Expectation**	
		3. evaluates the hypothesis by making inferences and drawing conclusions based on statistical results.	
	Benchmark MA.E.3.3.2: The student identifies the common uses and misuses of probability or statistical analysis in the everyday world.		
		1. knows appropriate uses of statistics and probability in real-world situations.	SAME as grade 7
		2. knows when statistics and probability are used in misleading ways.	
		3. identifies and uses different types of sampling techniques (for example, random, systematic, stratified).	SAME as grade 7
		4. knows whether a sample is biased.	

Appendix F: Louisiana Mathematics Framework

Louisiana State Department of Education
MathematicsGrade-Level Expectations

Prekindergarten

Number and Number Relations

1. Count by ones to 10 (PK-CM-N3) (N-1-E) (N-3-E)
2. Count a set of 5 or fewer objects by establishing a 1-to-1 correspondence between number names and objects (PK-CM-N2) (N-1-E)
3. Identify an object's position as first or last (PK-CM-G3) (N-1-E)
4. Identify numerals 1 to 5 (PK-CM-N5) (N-1-E) (N-3-E)
5. Compare sets of objects using the words *same/different* and *more/less/fewer* (PK-CM-N1) (N-3-E) (N-7-E)

Measurement

6. Use comparative vocabulary in measurement settings (e.g., *long/longer, short/shorter, more/less, hotter/colder, heavier/lighter, bigger/smaller*) (PK-CM-M3) (M-1-E) (M-2-E) (M-3-E)
7. Use words such as *day, week, month, schedule, morning, noon, night* (PK-CM-M1) (M-2-E)

Geometry

8. Identify rectangles, squares, circles, and triangles using concrete models (G-2-E)
9. Sort concrete objects by an attribute (e.g., shape, size, color) (PK-CM-D1) (G-2-E) (D-1-E)
10. Use words that indicate direction and position of an object (e.g., up, down, over, under, above, below, beside, in, out, behind) (PK-CM-G3) (G-3-E)
11. Recognize and manipulate an object's position in space (e.g., blocks, assembling puzzles) (PK-CM-G3) (G-3-E) (G-4-E)

Data Analysis, Probability, and Discrete Math

12. Arrange objects or pictures of objects to make an object or picture graph (PK-CM-D2) (D-4-E)

Patterns, Relations, and Functions

13. Recognize and copy repeated patterns (e.g., concrete objects, songs, rhymes, and body movements) (PK-CM-P1) (PK-CM-P2) (P-1-E) (P-3-E)

Kindergarten

Number and Number Relations

1. Count by ones to 20 (N-1-E) (N-3-E)
2. Count a set of 20 or fewer objects by establishing a 1-to-1 correspondence between number names and objects (N-1-E) (N-3-E) (A-1-E)
3. Use the ordinal numerals 1st through 10th to discuss positions in ordered lists (N-1-E)
4. Identify the numerals for the numbers 0 through 20 (N-1-E) (N-3-E)
5. Using a number line or chart, identify the numbers coming before/after a given number and between 2 given numbers (N-1-E) (N-3-E) (A-1-E)
6. Identify pennies, nickels, and dimes and their values using the cent sign (¢) (N-1-E) (N-2-E) (N-6-E) (M-1-E)
7. Count forward and backward from a given number between 1 and 10 (N-3-E)
8. Compare sets containing 20 or fewer objects using the words *same/different* and *more/less/greater/fewer* (N-3-E) (N-1-E)
9. Use concrete objects to model simple real-life addition and subtraction problems (N-4-E)

10. Use operational vocabulary (*add, subtract, join, remove, take away, put together*) to explore sets of objects (N-5-E)

Algebra

11. Use the words *same, different, equal, not equal, greater than,* and *less than* while using concrete objects for comparative models (A-1-E)
12. Model and act out story problems, physically or with objects, to solve whole number sentences with sums less than or equal to 6 (A-2-E)

Measurement

13. Use vocabulary such as: *yesterday, today, tomorrow, hours, weeks*, names of days, names of months; sequence events; and identify calendars and clocks as objects that measure time (M-1-E) (M-2-E) (M-5-E)
14. Measure and estimate length and capacity using non-standard units (e.g., sticks, paper clips, blocks, beans) (M-2-E) (M-3-E)
15. Use comparative and superlative vocabulary in measurement settings (e.g., *longest, shortest, most, hottest, heaviest, biggest*) (M-3-E) (M-1-E) (M-2-E)

Geometry

16. Name and identify basic shapes using concrete models (e.g., circles, squares, triangles, rectangles, rhombuses, balls, boxes, cans, cones) (G-2-E) (G-1-E) (G-4-E) (G-5-E)
17. Compare, contrast, and sort objects or shapes according to two attributes (e.g., shape and size, shape and color, thickness and color) (G-2-E)
18. Use words that indicate direction and position of objects and arrange an object in a specified position and orientation (e.g., between, behind, above) (G-3-E)
19. Investigate the results of combining shapes (using paper shapes, pattern blocks, tangrams, etc.) (G-3-E) (G-1-E)
20. Draw circles, squares, rectangles, and triangles (G-4-E)

Data Analysis, Probability, and Discrete Math

21. Collect and organize concrete data using tally mark charts (D-1-E)
22. Collect and organize data in a simple bar graph using pictures or objects (D-1-E) (D-2-E)
23. Sort, represent, and use information in simple tables and bar/picture graphs (D-2-E) (D-3-E)

Patterns, Relations, and Functions

24. Recognize, copy, name, create, and extend repeating patterns (e.g., ABAB, AABB, ABBA) using concrete objects, shapes, pictures, numbers, and sounds (P-1-E)

Grade 1

Number and Number Relations

1. Count to 100 by 1s, 5s, 10s, and 25s (N-1-E) (N-3-E) (N-4-E)
2. Read and write numerals to 100 (N-1-E)
3. Write number words for 0 to 19 (N-1-E) (N-3-E)
4. Use ordinal numbers through 31^{st} as they relate to the calendar (N-1-E)
5. Model and read place value in word, standard, and expanded form for numbers through 99 (N-1-E)
6. Use region models and sets of objects to demonstrate understanding of the concept of halves (N-1-E)
7. Identify quarters, half-dollars, and their values (N-1-E) (N-2-E) (M-1-E)

8. Find the value of a set of coins up to $1.00, using one denomination of coin (N-2-E) (N-6-E) (M-1-E) (M-5-E)
9. Apply estimation strategies to estimate the size of groups up to 20 (N-2-E) (N-8-E)
10. Using a number line or chart, locate, compare, and order whole numbers less than 100 and identify the numbers coming before/after a given number and between 2 given numbers (N-3-E) (A-1-E)
11. From a given number between 1 and 100, count forward and backward (N-3-E)
12. Know the basic facts for addition and subtraction [0s, 1s, counting on and back 2s, doubles, doubles $\pm$ 1, then 10s facts, and related turn-around (commutative) pairs] and use them to solve real-life problems (N-4-E) (N-6-E) (N-8-E)
13. Recognize and apply addition and subtraction as inverse operations (N-4-E)
14. Add and subtract 2-digit numbers using manipulatives (N-4-E) (N-7-E)
15. Recognize real-life situations as addition or subtraction problems (N-5-E) (N-4-E)
16. Given a number and number line/hundreds chart, identify the nearest ten (N-7-E)

Algebra
17. Use the equal sign (=) to express the relationship of equality (A-1-E)
18. Use objects, pictures, and number sentences to represent real-life problem situations involving addition and subtraction (A-1-E) (A-3-E) (N-7-E)
19. Use objects, pictures, and verbal information to solve for missing numbers (A-2-E) (N-7-E)

Measurement
20. Measure length to the nearest inch and centimeter using appropriate tools (M-1-E) (M-2-E)
21. Tell time to the hour and half-hour, and identify date, day, week, month, and year on a calendar (M-1-E) (M-2-E) (M-5-E)
22. Select appropriate non-standard units for linear measurement situations (e.g., sticks, blocks, paper clips) (M-2-E)
23. Compare the measure of objects to benchmarks (e.g., the width of a child's thumb is about a centimeter, the weight of a loaf of bread is about a pound, and the mass of a textbook is about a kilogram) (M-2-E)
24. Measure capacity using cups (M-2-E) (M-3-E) (M-1-E)
25. Identify the thermometer as a tool for measuring temperature (M-2-E)

Geometry
26. Compare, contrast, name, and describe attributes (e.g., corner, side, straight, curved, number of sides) of shapes using concrete models [circle, rectangle (including square), rhombus, triangle] (G-1-E) (G-2-E) (G-4-E)
27. Connect the informal language used for 3-dimensional shapes to their proper mathematical name (e.g., a ball is a sphere, a box is a rectangular prism, a can is a cylinder) (G-2-E)
28. Determine if a shape has a line of symmetry by folding (G-2-E)
29. Visualize, predict, and create new shapes by cutting apart and combining existing 2- and 3-dimensional shapes (G-3-E) (G-1-E)
30. Identify congruent shapes (i.e., same size and shape) in a variety of positions and orientations (G-3-E) (G-2-E)
31. Draw line segments (G-5-E)

Data Analysis, Probability, and Discrete Math
32. Given a set of data, construct and read information from bar graphs and charts (D-1-E) (D-2-E)

33. Determine whether an object satisfies a simple logical classification rule (e.g., belongs and does not belong) (D-1-E)
34. Appropriately use basic probability vocabulary (e.g., *more likely to happen/less likely to happen*, *always/never, same as*) (D-5-E)

Patterns, Relations, and Functions

35. Identify, describe, and explain the patterns in repeating situations (adding the same number, e.g., 2, 5, 8, 11, or skip-counting) (P-1-E)
36. Explain patterns created with concrete objects, numbers, shapes, and colors (P-2-E)

Grade 2

Number and Number Relations

1. Model, read, and write place values for numbers through 999 in word, standard, and expanded form (N-1-E)
2. Model the concepts of thirds, fourths, fifths and sixths using regions, sets, and fraction words (e.g., one-third, three-fourths, five-sixths) (N-1-E)
3. Make reasonable estimates of the number of objects in a collection with fewer than 100 objects (N-2-E)
4. Count and write the value of amounts of money up to $1.00 using ¢ and $ (N-2-E) (N-6-E) (M-1-E) (M-5-E)
5. Read, write, compare, and order whole numbers through 999 using words, number lines, and models (N-3-E) (N-1-E)
6. From a given number, count forward and backward and count to 100 by 2s (N-3-E) (N-1-E) (N-4-E)
7. Know all basic facts for addition and subtraction and use them to solve real-life problems (N-5-E) (N-6-E) (N-7-E) (N-8-E) (N-9-E)
8. Recognize, select, connect, and use operations, operational words and symbols (+, –) for addition (join, part/part/whole) or subtraction (take away, comparison, missing addend, and set/subset) situations (N-6-E) (N-5-E)
9. Add and subtract 1- and 2-digit numbers (N-6-E) (N-7-E)
10. Round numbers to the nearest 10 or 100 and identify situations in which rounding is appropriate (N-7-E) (N-9-E)
11. Use the concept of one-to-several correspondence to trade single items for a greater quantity of items with unequal value (1 nickel for 5 pennies, 1 dime for 2 nickels) (N-9-E)

Algebra

12. Use number sentences to represent real-life problems involving addition and subtraction (A-1-E) (A-2-E)
13. Find the missing number in an equation involving addition or subtraction (e.g., # + 4 = 7, 8 - # = 3) (A-2-E) (N-4-E)

Measurement

14. Measure and appropriately label measures of length and perimeter (i.e., inch, centimeter, foot), capacity (i.e., cup, quart, liter), and weight/mass (i.e., pound, kilogram) (M-1-E)
15. Read a thermometer in degrees Fahrenheit and Celsius and interpret the temperature (M-1-E)
16. Tell time to the nearest 5 minutes, and identify the time one hour before or after a given time (M-1-E) (M-3-E)

17. Select and use appropriate tools and units to measure length, time, capacity, and weight (e.g., scales for pounds and kilograms; rulers for inches and centimeters; measuring containers for cup, quarts, and liters) (M-2-E)
18. Use non-standard units to cover a given region (M-2-E)
19. Estimate length in standard units (inch, foot, and centimeter) (M-3-E)
20. Compare units within the **same** system (inch is shorter than a foot, minute is shorter than an hour, day is shorter than a month, cup holds less than a quart) (M-3-E)

Geometry

21. Compare and contrast 3-dimensional shapes (i.e., sphere, cube, cylinder, cone, prism, pyramid) according to their attributes (e.g., number of faces, shape of faces) (G-2-E)
22. Identify a reduction or enlargement of a given shape (G-2-E)
23. Identify congruent 3-dimensional solids in a variety of positions and orientations (G-3-E) (G-4-E) (G-2-E)
24. Identify and draw horizontal and vertical line segments (G-5-E)

Data Analysis, Probability, and Discrete Math

25. Collect and organize data using observations, surveys, and experiments (D-1-E)
26. Construct and read line plots and tables (D-2-E)
27. Interpret pictographs in which each picture represents more than one object (D-2-E)
28. Generate questions that can be answered by collecting and analyzing data (D-3-E)
29. Solve logic problems involving two sets by using elementary set logic (i.e., *and*, *or*, and *is/is not* statements) (D-3-E)

Patterns, Relations, and Functions

30. Recognize, extend, create, and explain patterns of addition and subtraction as represented in charts and tables and in varied forms of skip-counting (P-1-E) (P-2-E)
31. Recognize, extend, create, and explain patterns that involve simple rotations or size changes with geometric objects (P-1-E) (P-2-E)
32. Recognize and apply patterns in problem-solving in other content areas and real-life situations (P-3-E) (N-9-E)

Grade 3

Number and Number Relations

1. Model, read, and write place value in word, standard, and expanded form for numbers through 9999 (N-1-E)
2. Read, write, compare, and order whole numbers through 9999 using symbols (i.e., <, =, >) and models (N-1-E) (N-3-E)
3. Use region and set models and symbols to represent, estimate, read, write, and show understanding of fractions through tenths (N-1-E) (N-2-E)
4. Use the concepts of associative and commutative properties of multiplication to simplify computations (N-4-E) (N-7-E)
5. Recognize and model multiplication as a rectangular array or as repeated addition (N-4-E) (N-7-E)
6. Recognize and model division as separating quantities into equal subsets (fair shares) or as repeated subtraction (N-4-E) (N-7-E)
7. Recognize and apply multiplication and division as inverse operations (N-4-E)
8. Recognize, select, connect, and use operations, operational words, and symbols (i.e., +, –, x, ÷) to solve real-life situations (N-5-E) (N-6-E) (N-9-E)
9. Know basic multiplication and division facts [0s, 1s, 2s, 5s, 9s, and turn-arounds (commutative facts), including multiplying by 10s] (N-6-E) (N-4-E)

10. Calculate the value of a combination of bills and coins and make change up to $5.00 (N-6-E) (M-1-E) (M-5-E)
11. Add and subtract numbers of 3 digits or less (N-6-E) (N-7-E)
12. Round to the nearest 1000 and identify situations in which such rounding is appropriate (N-7-E) (N-9-E)
13. Determine when and how to estimate, and when and how to use mental math, calculators, or paper/pencil strategies to solve addition and subtraction problems (N-8-E) (N-9-E)

Algebra

14. Use the symbols <, >, and ≠ to express inequalities (A-1-E)
15. Use objects, pictures, numbers, symbols, and words to represent multiplication and division problem situations (A-1-E)
16. Use number sentences to represent real-life problems involving multiplication and division (A-1-E) (N-4-E)
17. Analyze and describe situations where proportional trades or correspondences are required (e.g., trade 2 pieces of candy for 3 pieces of gum, make equivalent actions on pans to keep balance scale in equilibrium, plan for the number of pieces of bread needed for *x* sandwiches) (A-1-E)
18. Use letters as variables in mathematical statements that represent real-life problems (e.g., 2 x *n* = 8) (A-2-E)

Measurement

19. Measure length to the nearest yard, meter, and half-inch (M-1-E)
20. Measure capacity using pints and gallons (M-1-E)
21. Measure weight using grams and ounces (M-1-E)
22. Find the perimeter of a geometric shape given the length of its sides (M-1-E)
23. Find the area in square units of a given rectangle (including squares) drawn on a grid or by covering the region with square tiles (M-1-E)
24. Find elapsed time involving hours and minutes, without regrouping, and tell time to the nearest minute (M-1-E) (M-5-E)
25. Select and use the appropriate standard units of measure, abbreviations, and tools to measure length and perimeter (i.e., in., cm, ft., yd., m), area (square inch, square centimeter), capacity (i.e., cup, pint, quart, gallon, liter), and weight/mass (i.e., oz., lb., g, kg, ton) (M-2-E)
26. Order a set of measures within the **same** system (M-3-E)
27. Compare U.S. and metric measurements using approximate reference points without using conversions (e.g., a meter is longer than a yard) (M-3-E) (M-4-E)
28. Estimate length, weight/mass, and capacity (M-3-E)

Geometry

29. Classify and describe 2- and 3-dimensional objects according to given attributes (triangle vs. quadrilateral, parallelogram vs. prism) (G-2-E) (G-1-E) (G-4-E)
30. Apply concepts of congruence, similarity, and symmetry in real-life situations (G-2-E)
31. Draw or reconstruct figures from visual memory or verbal descriptions (G-3-E)
32. Recognize and execute specified flips, turns, and slides of geometric figures using manipulatives and correct terminology (including *clockwise* and *counterclockwise*) (G-3-E)
33. Construct and draw rectangles (including squares) with given dimensions (e.g., grid paper, square tiles) (G-4-E)
34. Fold a 2-dimensional net into a 3-dimensional object (G-4-E) (G-1-E)

35. Identify, give properties of, and distinguish among points, lines, line segments, planes, rays, and angles (G-5-E)
36. Identify and draw segments, rays, and lines that are perpendicular, parallel, and intersecting (G-5-E)
37. Identify, describe, and draw intersecting, horizontal, vertical, parallel, diagonal, and perpendicular lines, rays, and right angles in the real world (G-5-E) (G-6-E)
38. Find the length of a path (that does not include diagonals) between two points on a grid (G-6-E)

Data Analysis, Probability, and Discrete Math

39. Identify categories and sort objects based on qualitative (categorical) and quantitative (numerical) characteristics (D-1-E)
40. Read, describe, and organize a two-circle Venn diagram (D-1-E) (D-2-E)
41. Explain the word *average* and use it appropriately in discussing what is "typical" of a data set (D-1-E)
42. Match a data set to a graph, table, or chart and vice versa (D-2-E)
43. Represent and solve problems using data from a variety of sources (e.g., tables, graphs, maps, advertisements) (D-3-E)
44. Discuss chance situations in terms of *certain/impossible* and *equally likely* (D-5-E)
45. Use manipulatives to discuss the probability of an event (e.g., number cubes, spinners to determine what is most likely or least likely) (D-5-E)

Patterns, Relations, and Functions

46. Identify and model even and odd numbers with objects, pictures, and words (P-1-E)
47. Find patterns to complete tables, state the rule governing the shift between successive terms, and continue the pattern (including growing patterns) (P-1-E) (P-2-E)

Grade 4

Number and Number Relations

1. Read and write place value in word, standard, and expanded form through 1,000,000 (N-1-E)
2. Read, write, compare, and order whole numbers using place value concepts, standard notation, and models through 1,000,000 (N-1-E) (N-3-E) (A-1-E)
3. Illustrate with manipulatives when a number is divisible by 2, 3, 5, or 10 (N-1-E)
4. Know all basic facts for multiplication and division through 12 x 12 and 144 ÷ 12, and recognize factors of composite numbers less than 50 (N-1-E) (N-6-E) (N-7-E)
5. Read, write, and relate decimals through hundredths and connect them with corresponding decimal fractions (N-1-E)
6. Model, read, write, compare, order, and represent fractions with denominators through twelfths using region and set models (N-1-E) (A-1-E)
7. Give decimal equivalents of halves, fourths, and tenths (N-2-E) (N-1-E)
8. Use common equivalent reference points for percents (i.e., ¼, ½, ¾, and 1 whole) (N-2-E)
9. Estimate fractional amounts through twelfths, using pictures, models, and diagrams (N-2-E)
10. Solve multiplication and division number sentences including interpreting remainders (N-4-E) (A-3-E)
11. Multiply 3-digit by 1-digit numbers, 2-digit by 2-digit numbers, and divide 3-digit numbers by 1-digit numbers, with and without remainders (N-6-E) (N-7-E)
12. Count money, determine change, and solve simple word problems involving money amounts using decimal notation (N-6-E) (N-9-E) (M-1-E) (M-5-E)

13. Determine when and how to estimate, and when and how to use mental math, calculators, or paper/pencil strategies to solve multiplication and division problems (N-8-E)
14. Solve real-life problems, including those in which some information is not given (N-9-E)

Algebra

15. Write number sentences or formulas containing a variable to represent real-life problems (A-1-E)
16. Write a related story problem for a given algebraic sentence (A-1-E)
17. Use manipulatives to represent the distributive property of multiplication over addition to explain multiplying numbers (A-1-E) (A-2-E)
18. Identify and create true/false and open/closed number sentences (A-2-E)
19. Solve one-step equations with whole number solutions (A-2-E) (N-4-E)

Measurement

20. Measure length to the nearest quarter-inch and mm (M-2-E) (M-1-E)
21. Describe the concept of volume, and measure volume using cubic in. and cubic cm and capacity using fl. oz. and ml (M-2-E) (M-3-E)
22. Select and use the appropriate standard units of measure, abbreviations, and tools to measure length and perimeter (i.e., in., cm, ft., yd., mile, m, km), area (i.e., square inch, square foot, square centimeter), capacity (i.e., fl. oz., cup, pt., qt., gal., l, ml), weight/mass (i.e., oz., lb., g, kg, ton), and volume (i.e., cubic cm, cubic in.) (M-2-E) (M-1-E)
23. Set up, solve, and interpret elapsed time problems (M-2-E) (M-5-E)
24. Recognize the attributes to be measured in a real-life situation (M-2-E) (M-5-E)
25. Use estimates and measurements to calculate perimeter and area of rectangular objects (including squares) in U.S. (including square feet) and metric units (M-3-E)
26. Estimate the area of an irregular shape drawn on a unit grid (M-3-E)
27. Use unit conversions within the same system to solve real-life problems (e.g., 60 sec. = 1 min., 12 objects = 1 dozen, 12 in. = 1 ft., 100 cm = 1 m, 1 pt. = 2 cups) (M-4-E) (N-2-E) (M-5-E)

Geometry

28. Identify the top, bottom, or side view of a given 3-dimensional object (G-1-E) (G-3-E)
29. Identify, describe the properties of, and draw circles and polygons (triangle, quadrilateral, parallelogram, trapezoid, rectangle, square, rhombus, pentagon, hexagon, octagon, and decagon) (G-2-E)
30. Make and test predictions regarding transformations (i.e., slides, flips, and turns) of plane geometric shapes (G-3-E)
31. Identify, manipulate, and predict the results of rotations of 90, 180, 270, and 360 degrees on a given figure (G-3-E)
32. Draw, identify, and classify angles that are acute, right, and obtuse (G-5-E) (G-1-E)
33. Specify locations of points in the first quadrant of coordinate systems and describe paths on maps (G-6-E)

Data Analysis, Probability, and Discrete Math

34. Summarize information and relationships revealed by patterns or trends in a graph, and use the information to make predictions (D-1-E)
35. Find and interpret the meaning of mean, mode, and median of a small set of numbers (using concrete objects) when the answer is a whole number (D-1-E)
36. Analyze, describe, interpret, and construct various types of charts and graphs using appropriate titles, axis labels, scales, and legends (D-2-E) (D-1-E)

37. Determine which type of graph best represents a given set of discrete data (D-2-E) (D-1-E)
38. Solve problems involving simple deductive reasoning (D-3-E)
39. Use lists, tables, and tree diagrams to generate and record all possible combinations for 2 sets of 3 or fewer objects (e.g., combinations of pants and shirts, days and games) and for given experiments (D-3-E) (D-4-E)
40. Determine the total number of possible outcomes for a given experiment using lists, tables, and tree diagrams (e.g., spinning a spinner, tossing 2 coins) (D-4-E) (D-5-E)
41. Apply appropriate probabilistic reasoning in real-life contexts using games and other activities (e.g., examining fair and unfair situations) (D-5-E) (D-6-E)

Patterns, Relations, and Functions

42. Find and describe patterns resulting from operations involving even and odd numbers (such as even + even = even) (P-1-E)
43. Identify missing elements in a number pattern (P-1-E)
44. Represent the relationship in an input-output situation using a simple equation, graph, table, or word description (P-2-E)

Grade 5

Number and Number Relations

1. Differentiate between the terms *factor* and *multiple*, and *prime* and *composite* (N-1-M)
2. Recognize, explain, and compute equivalent fractions for common fractions (N-1-M) (N-3-M)
3. Add and subtract fractions with common denominators and use mental math to determine whether the answer is reasonable (N-2-M)
4. Compare positive fractions using number sense, symbols (i.e., <, =, >), and number lines (N-2-M)
5. Read, explain, and write a numerical representation for positive improper fractions, mixed numbers, and decimals from a pictorial representation and vice versa (N-3-M)
6. Select and discuss the correct operation for a given problem involving positive fractions using appropriate language such as *sum*, *difference*, *numerator*, and *denominator* (N-4-M) (N-5-M)
7. Select, sequence, and use appropriate operations to solve multi-step word problems with whole numbers (N-5-M) (N-4-M)
8. Use the whole number system (e.g., computational fluency, place value, etc.) to solve problems in real-life and other content areas (N-5-M)
9. Use mental math and estimation strategies to predict the results of computations (i.e., whole numbers, addition and subtraction of fractions) and to test the reasonableness of solutions (N-6-M) (N-2-M)
10. Determine when an estimate is sufficient and when an exact answer is needed in real-life problems using whole numbers (N-6-M) (N-5-M)
11. Explain concepts of ratios and equivalent ratios using models and pictures in real-life problems (e.g., understand that 2/3 means 2 divided by 3) (N-8-M) (N-5-M)

Algebra

12. Find unknown quantities in number sentences by using mental math, backward reasoning, inverse operations (i.e., unwrapping), and manipulatives (e.g., tiles, balance scales) (A-2-M) (A-3-M)
13. Write a number sentence from a given physical model of an equation (e.g., balance scale) (A-2-M) (A-1-M)

14. Find solutions to one-step inequalities and identify positive solutions on a number line (A-2-M) (A-3-M)

Measurement

15. Model, measure, and use the names of all common units in the U.S. and metric systems (M-1-M)
16. Apply the concepts of elapsed time in real-life situations and calculate equivalent times across time zones in real-life problems (M-1-M) (M-6-M)
17. Distinguish among the processes of counting, calculating, and measuring and determine which is the most appropriate strategy for a given situation (M-2-M)
18. Estimate time, temperature, weight/mass, and length in familiar situations and explain the reasonableness of answers (M-2-M)
19. Compare the relative sizes of common units for time, temperature, weight, mass, and length in real-life situations (M-2-M) (M-4-M)
20. Identify appropriate tools and units with which to measure time, mass, weight, temperature, and length (M-3-M)
21. Measure angles to the nearest degree (M-3-M)
22. Compare and estimate measurements between the U.S. and metric systems in terms of common reference points (e.g., l vs. qt., m vs. yd.) (M-4-M)
23. Convert between units of measurement for length, weight, and time, in U.S. and metric, within the same system (M-5-M)

Geometry

24. Use mathematical terms to classify and describe the properties of 2-dimensional shapes, including circles, triangles, and polygons (G-2-M)
25. Identify and use appropriate terminology for transformations (e.g., *translation* as *slide*, *reflection* as *flip*, and *rotation* as *turn*) (G-3-M)
26. Identify shapes that have rotational symmetry (G-3-M)
27. Identify and plot points on a coordinate grid in the first quadrant (G-6-M)

Data Analysis, Probability, and Discrete Math

28. Use various types of charts and graphs, including double bar graphs, to organize, display, and interpret data and discuss patterns verbally and in writing (D-1-M) (D-2-M) (P-3-M) (A-4-M)
29. Compare and contrast different scales and labels for bar and line graphs (D-1-M)
30. Organize and display data using spreadsheets, with technology (D-1-M)
31. Compare and contrast survey data from two groups relative to the same question (D-2-M)
32. Represent probabilities as common fractions and recognize that probabilities fall between 0 and 1, inclusive (D-5-M)

Patterns, Relations, and Functions

33. Fill in missing elements in sequences of designs, number patterns, positioned figures, and quantities of objects (P-1-M)

<u>Grade 6</u>

Number and Number Relations

1. Factor whole numbers into primes (N-1-M)
2. Determine common factors and common multiples for pairs of whole numbers (N-1-M)
3. Find the greatest common factor (GCF) and least common multiple (LCM) for whole numbers in the context of problem-solving (N-1-M)

4. Recognize and compute equivalent representations of fractions and decimals (i.e., halves, thirds, fourths, fifths, eighths, tenths, hundredths) (N-1-M) (N-3-M)
5. Decide which representation (i.e., fraction or decimal) of a positive number is appropriate in a real-life situation (N-1-M) (N-5-M)
6. Compare positive fractions, decimals, and positive and negative integers using symbols (i.e., <, =, >) and number lines (N-2-M)
7. Read and write numerals and words for decimals through ten-thousandths (N-3-M)
8. Demonstrate the meaning of positive and negative numbers and their opposites in real-life situations (N-3-M) (N-5-M)
9. Add and subtract fractions and decimals in real-life situations (N-5-M)
10. Use and explain estimation strategies to predict computational results with positive fractions and decimals (N-6-M)
11. Mentally multiply and divide by powers of 10 (e.g., 25/10 = 2.5; 12.56 x 100 = 1,256) (N-6-M)
12. Divide 4-digit numbers by 2-digit numbers with the quotient written as a mixed number or a decimal (N-7-M)
13. Use models and pictures to explain concepts or solve problems involving ratio, proportion, and percent with whole numbers (N-8-M)

Algebra

14. Model and identify perfect squares up to 144 (A-1-M)
15. Match algebraic equations and expressions with verbal statements and vice versa (A-1-M) (A-3-M) (A-5-M) (P-2-M)
16. Evaluate simple algebraic expressions using substitution (A-2-M)
17. Find solutions to 2-step equations with positive integer solutions (e.g., $3x - 5 = 13$, $2x + 3x = 20$) (A-2-M)

Measurement

18. Measure length and read linear measurements to the nearest sixteenth-inch and mm (M-1-M)
19. Calculate perimeter and area of triangles, parallelograms, and trapezoids (M-1-M)
20. Calculate, interpret, and compare rates such as $/lb., mpg, and mph (M-1-M) (A-5-M)
21. Demonstrate an intuitive sense of relative sizes of common units for length and area of familiar objects in real-life problems (e.g., estimate the area of a desktop in square feet, the average adult is between 1.5 and 2 meters tall) (M-2-M) (G-1-M)
22. Estimate perimeter and area of any 2-dimensional figure (regular and irregular) using standard units (M-2-M)
23. Identify and select appropriate units to measure area (M-3-M)

Geometry

24. Use mathematical terms to describe the basic properties of 3-dimensional objects (edges, vertices, faces, base, etc.) (G-2-M)
25. Relate polyhedra to their 2-dimensional shapes by drawing or sketching their faces (G-2-M) (G-4-M)
26. Apply concepts, properties, and relationships of points, lines, line segments, rays, diagonals, circles, and right, acute, and obtuse angles and triangles in real-life situations, including estimating sizes of angles (G-2-M) (G-5-M) (G-1-M)
27. Make and test predictions regarding tessellations with geometric shapes (G-3-M)
28. Use a rectangular grid and ordered pairs to plot simple shapes and find horizontal and vertical lengths and area (G-6-M)

Data Analysis, Probability, and Discrete Math

29. Collect, organize, label, display, and interpret data in frequency tables, stem-and-leaf plots, and scatter plots and discuss patterns in the data verbally and in writing (D-1-M) (D-2-M) (A-3-M)
30. Describe and analyze trends and patterns observed in graphic displays (D-2-M)
31. Demonstrate an understanding of precision, accuracy, and error in measurement (D-2-M) (M-2-M)
32. Calculate and discuss mean, median, mode, and range of a set of discrete data to solve real-life problems (D-2-M)
33. Create and use Venn diagrams with two overlapping categories to solve counting logic problems (D-3-M)
34. Use lists, tree diagrams, and tables to determine the possible combinations from two disjoint sets when choosing one item from each set (D-4-M)
35. Illustrate and apply the concept of complementary events (D-5-M)
36. Apply the meaning of *equally likely* and *equally probable* to real-life situations (D-5-M) (D-6-M)

Patterns, Relations, and Functions

37. Describe, complete, and apply a pattern of differences found in an input-output table (P-1-M) (P-2-M) (P-3-M)
38. Describe patterns in sequences of arithmetic and geometric growth and now-next relationships (i.e., growth patterns where the next term is dependent on the present term) with numbers and figures (P-3-M) (A-4-M)

Grade 7

Number and Number Relations

1. Recognize and compute equivalent representations of fractions, decimals, and percents (i.e., halves, thirds, fourths, fifths, eighths, tenths, hundredths) (N-1-M)
2. Compare positive fractions, decimals, percents, and integers using symbols (i.e., $<$, $\leq$, $=$, $\geq$, $>$) and position on a number line (N-2-M)
3. Solve order of operations problems involving grouping symbols and multiple operations (N-4-M)
4. Model and apply the distributive property in real-life applications (N-4-M)
5. Multiply and divide positive fractions and decimals (N-5-M)
6. Set up and solve simple percent problems using various strategies, including mental math (N-5-M) (N-6-M) (N-8-M)
7. Select and discuss appropriate operations and solve single- and multi-step, real-life problems involving positive fractions, percents, mixed numbers, decimals, and positive and negative integers (N-5-M) (N-3-M) (N-4-M)
8. Determine the reasonableness of answers involving positive fractions and decimals by comparing them to estimates (N-6-M) (N-7-M)
9. Determine when an estimate is sufficient and when an exact answer is needed in real-life problems using decimals and percents (N-7-M) (N-5-M)
10. Determine and apply rates and ratios (N-8-M)
11. Use proportions involving whole numbers to solve real-life problems (N-8-M)

Algebra

12. Evaluate algebraic expressions containing exponents (especially 2 and 3) and square roots, using substitution (A-1-M)
13. Determine the square root of perfect squares and mentally approximate other square roots by identifying the two whole numbers between which they fall (A-1-M)

14. Write a real-life meaning of a simple algebraic equation or inequality, and vice versa (A-1-M) (A-5-M)
15. Match algebraic inequalities with equivalent verbal statements and vice versa (A-1-M)
16. Solve one- and two-step equations and inequalities (with one variable) in multiple ways (A-2-M)
17. Graph solutions sets of one-step equations and inequalities as points, or open and closed rays on a number line (e.g., $x = 5$, $x < 5$, $x \leq 5$, $x > 5$, $x \geq 5$) (A-2-M)
18. Describe linear, multiplicative, or changing growth relationships (e.g., 1, 3, 6, 10, 15, 21, …) verbally and algebraically (A-3-M) (A-4-M) (P-1-M)
19. Use *function machines* to determine and describe the rule that generates outputs from given inputs (A-4-M) (P-3-M)

Measurement

20. Determine the perimeter and area of composite plane figures by subdivision and area addition (M-1-M) (G-7-M)
21. Compare and order measurements within and between the U.S. and metric systems in terms of common reference points (e.g., weight/mass and area) (M-4-M) (G-1-M)
22. Convert between units of area in U.S. and metric units within the **same** system (M-5-M)
23. Demonstrate an intuitive sense of comparisons between degrees Fahrenheit and Celsius in real-life situations using common reference points (M-5-M)

Geometry

24. Identify and draw angles (using protractors), circles, diameters, radii, altitudes, and 2-dimensional figures with given specifications (G-2-M)
25. Draw the results of reflections and translations of geometric shapes on a coordinate grid (G-3-M)
26. Recognize π as the ratio between the circumference and diameter of any circle (i.e., $\pi = C/d$ or $\pi = C/2r$) (G-5-M)
27. Model and explain the relationship between perimeter and area (how scale change in a linear dimension affects perimeter and area) and between circumference and area of a circle (G-5-M)
28. Determine the radius, diameter, circumference, and area of a circle and apply these measures in real-life problems (G-5-M) (G-7-M) (M-6-M)
29. Plot points on a coordinate grid in all 4 quadrants and locate the coordinates of a missing vertex in a parallelogram (G-6-M) (A-5-M)
30. Apply the knowledge that the measures of the interior angles in a triangle add up to 180 degrees (G-7-M)

Data Analysis, Probability, and Discrete Math

31. Analyze and interpret circle graphs, and determine when a circle graph is the most appropriate type of graph to use (D-2-M)
32. Describe data in terms of patterns, clustered data, gaps, and outliers (D-2-M)
33. Analyze discrete and continuous data in real-life applications (D-2-M) (D-6-M)
34. Create and use Venn diagrams with three overlapping categories to solve counting logic problems (D-3-M)
35. Use informal thinking procedures of elementary logic involving *if/then* statements (D-3-M)
36. Apply the fundamental counting principle in real-life situations (D-4-M)
37. Determine probability from experiments and from data displayed in tables and graphs (D-5-M)
38. Compare theoretical and experimental probability in real-life situations (D-5-M)

Patterns, Relations, and Functions

39. Analyze and describe simple exponential number patterns (e.g., 3, 9, 27 or 3^1, 3^2, 3^3) (P-1-M)
40. Analyze and verbally describe real-life additive and multiplicative patterns involving fractions and integers (P-1-M) (P-4-M)
41. Illustrate patterns of change in length(s) of sides and corresponding changes in areas of polygons (P-3-M)

Grade 8

Number and Number Relations

1. Compare rational numbers using symbols (i.e., <, ≤ , =, ≥, >) and position on a number line (N-1-M) (N-2-M)
2. Use whole number exponents (0-3) in problem-solving contexts (N-1-M) (N-5-M)
3. Estimate the answer to an operation involving rational numbers based on the original numbers (N-2-M) (N-6-M)
4. Read and write numbers in scientific notation with positive exponents (N-3-M)
5. Simplify expressions involving operations on integers, grouping symbols, and whole number exponents using order of operations (N-4-M)
6. Identify missing information or suggest a strategy for solving a real-life, rational-number problem (N-5-M)
7. Use proportional reasoning to model and solve real-life problems (N-8-M)
8. Solve real-life problems involving percentages, including percentages less than 1 or greater than 100 (N-8-M) (N-5-M)
9. Find unit/cost rates and apply them in real-life problems (N-8-M) (N-5-M) (A-5-M)

Algebra

10. Write real-life meanings of expressions and equations involving rational numbers and variables (A-1-M) (A-5-M)
11. Translate real-life situations that can be modeled by linear or exponential relationships to algebraic expressions, equations, and inequalities (A-1-M) (A-4-M) (A-5-M)
12. Solve and graph solutions of multi-step linear equations and inequalities (A-2-M)
13. Switch between functions represented as tables, equations, graphs, and verbal representations, with and without technology (A-3-M) (P-2-M) (A-4-M)
14. Construct a table of *x*- and *y*-values satisfying a linear equation and construct a graph of the line on the coordinate plane (A-3-M) (A-2-M)
15. Describe and compare situations with constant or varying rates of change (A-4-M)
16. Explain and formulate generalizations about how a change in one variable results in a change in another variable (A-4-M)

Measurement

17. Determine the volume and surface area of prisms and cylinders (M-1-M) (G-7-M)
18. Apply rate of change in real-life problems, including density, velocity, and international monetary conversions (M-1-M) (N-8-M) (M-6-M)
19. Demonstrate an intuitive sense of the relative sizes of common units of volume in relation to real-life applications and use this sense when estimating (M-2-M) (G-1-M)
20. Identify and select appropriate units for measuring volume (M-3-M)
21. Compare and estimate measurements of volume and capacity within and between the U.S. and metric systems (M-4-M) (G-1-M)
22. Convert units of volume/capacity within systems for U.S. and metric units (M-5-M)

Geometry

23. Define and apply the *terms measure, distance, midpoint, bisect, bisector*, and *perpendicular bisector* (G-2-M)
24. Demonstrate conceptual and practical understanding of symmetry, similarity, and congruence and identify similar and congruent figures (G-2-M)
25. Predict, draw, and discuss the resulting changes in lengths, orientation, angle measures, and coordinates when figures are translated, reflected across horizontal or vertical lines, and rotated on a grid (G-3-M) (G-6-M)
26. Predict, draw, and discuss the resulting changes in lengths, orientation, and angle measures that occur in figures under a similarity transformation (dilation) (G-3-M) (G-6-M)
27. Construct polyhedra using 2-dimensional patterns (nets) (G-4-M)
28. Apply concepts, properties, and relationships of adjacent, corresponding, vertical, alternate interior, complementary, and supplementary angles (G-5-M)
29. Solve problems involving lengths of sides of similar triangles (G-5-M) (A-5-M)
30. Construct, interpret, and use scale drawings in real-life situations (G-5-M) (M-6-M) (N-8-M)
31. Use area to justify the Pythagorean theorem and apply the Pythagorean theorem and its converse in real-life problems (G-5-M) (G-7-M)
32. Model and explain the relationship between the dimensions of a rectangular prism and its volume (i.e., how scale change in linear dimension(s) affects volume) (G-5-M)
33. Graph solutions to real-life problems on the coordinate plane (G-6-M)

Data Analysis, Probability, and Discrete Math

34. Determine what kind of data display is appropriate for a given situation (D-1-M)
35. Match a data set or graph to a described situation, and vice versa (D-1-M)
36. Organize and display data using circle graphs (D-1-M)
37. Collect and organize data using box-and-whisker plots and use the plots to interpret quartiles and range (D-1-M) (D-2-M)
38. Sketch and interpret a trend line (i.e., line of best fit) on a scatterplot (D-2-M) (A-4-M) (A-5-M)
39. Analyze and make predictions from discovered data patterns (D-2-M)
40. Explain factors in a data set that would affect measures of central tendency (e.g., impact of extreme values) and discuss which measure is most appropriate for a given situation (D-2-M)
41. Select random samples that are representative of the population, including sampling with and without replacement, and explain the effect of sampling on bias (D-2-M) (D-4-M)
42. Use lists, tree diagrams, and tables to apply the concept of permutations to represent an ordering with and without replacement (D-4-M)
43. Use lists and tables to apply the concept of combinations to represent the number of possible ways a set of objects can be selected from a group (D-4-M)
44. Use experimental data presented in tables and graphs to make outcome predictions of independent events (D-5-M)
45. Calculate, illustrate, and apply single- and multiple-event probabilities, including mutually exclusive, independent events and non-mutually exclusive, dependent events (D-5-M)

Patterns, Relations, and Functions

46. Distinguish between and explain when real-life numerical patterns are linear/arithmetic (i.e., grows by addition) or exponential/geometric (i.e., grows by multiplication) (P-1-M) (P-4-M)

47. Represent the n^{th} term in a pattern as a formula and test the representation (P-1-M) (P-2-M) (P-3-M) (A-5-M)
48. Illustrate patterns of change in dimension(s) and corresponding changes in volumes of rectangular solids (P-3-M)

Grade 9

Number and Number Relations

1. Identify and describe differences among natural numbers, whole numbers, integers, rational numbers, and irrational numbers (N-1-H) (N-2-H) (N-3-H)
2. Evaluate and write numerical expressions involving integer exponents (N-2-H)
3. Apply scientific notation to perform computations, solve problems, and write representations of numbers (N-2-H)
4. Distinguish between an exact and an approximate answer, and recognize errors introduced by the use of approximate numbers with technology (N-3-H) (N-4-H) (N-7-H)
5. Demonstrate computational fluency with all rational numbers (e.g., estimation, mental math, technology, paper/pencil) (N-5-H)
6. Simplify and perform basic operations on numerical expressions involving radicals (e.g., $2\sqrt{3}+5\sqrt{3}=7\sqrt{3}$) (N-5-H)
7. Use proportional reasoning to model and solve real-life problems involving direct and inverse variation (N-6-H)

Algebra

8. Use order of operations to simplify or rewrite variable expressions (A-1-H) (A-2-H)
9. Model real-life situations using linear expressions, equations, and inequalities (A-1-H) (D-2-H) (P-5-H)
10. Identify independent and dependent variables in real-life relationships (A-1-H)
11. Use equivalent forms of equations and inequalities to solve real-life problems (A-1-H)
12. Evaluate polynomial expressions for given values of the variable (A-2-H)
13. Translate between the characteristics defining a line (i.e., slope, intercepts, points) and both its equation and graph (A-2-H) (G-3-H)
14. Graph and interpret linear inequalities in one or two variables and systems of linear inequalities (A-2-H) (A-4-H)
15. Translate among tabular, graphical, and algebraic representations of functions and real-life situations (A-3-H) (P-1-H) (P-2-H)
16. Interpret and solve systems of linear equations using graphing, substitution, elimination, with and without technology, and matrices using technology (A-4-H)

Measurement

17. Distinguish between precision and accuracy (M-1-H)
18. Demonstrate and explain how the scale of a measuring instrument determines the precision of that instrument (M-1-H)
19. Use significant digits in computational problems (M-1-H) (N-2-H)
20. Demonstrate and explain how relative measurement error is compounded when determining absolute error (M-1-H) (M-2-H) (M-3-H)
21. Determine appropriate units and scales to use when solving measurement problems (M-2-H) (M-3-H) (M-1-H)
22. Solve problems using indirect measurement (M-4-H)

Geometry

23. Use coordinate methods to solve and interpret problems (e.g., slope as rate of change, intercept as initial value, intersection as common solution, midpoint as equidistant) (G-2-H) (G-3-H)
24. Graph a line when the slope and a point or when two points are known (G-3-H)
25. Explain slope as a representation of "rate of change" (G-3-H) (A-1-H)
26. Perform translations and line reflections on the coordinate plane (G-3-H)

Data Analysis, Probability, and Discrete Math

27. Determine the most appropriate measure of central tendency for a set of data based on its distribution (D-1-H)
28. Identify trends in data and support conclusions by using distribution characteristics such as patterns, clusters, and outliers (D-1-H) (D-6-H) (D-7-H)
29. Create a scatter plot from a set of data and determine if the relationship is linear or nonlinear (D-1-H) (D-6-H) (D-7-H)
30. Use simulations to estimate probabilities (D-3-H) (D-5-H)
31. Define probability in terms of sample spaces, outcomes, and events (D-4-H)
32. Compute probabilities using geometric models and basic counting techniques such as combinations and permutations (D-4-H)
33. Explain the relationship between the probability of an event occurring, and the odds of an event occurring and compute one given the other (D-4-H)
34. Follow and interpret processes expressed in flow charts (D-8-H)

Patterns, Relations, and Functions

35. Determine if a relation is a function and use appropriate function notation (P-1-H)
36. Identify the domain and range of functions (P-1-H)
37. Analyze real-life relationships that can be modeled by linear functions (P-1-H) (P-5-H)
38. Identify and describe the characteristics of families of linear functions, with and without technology (P-3-H)
39. Compare and contrast linear functions algebraically in terms of their rates of change and intercepts (P-4-H)
40. Explain how the graph of a linear function changes as the coefficients or constants are changed in the function's symbolic representation (P-4-H)

<u>Grade 10</u>

Number and Number Relations

1. Simplify and determine the value of radical expressions (N-2-H) (N-7-H)
2. Predict the effect of operations on real numbers (e.g., the quotient of a positive number divided by a positive number less than 1 is greater than the original dividend) (N-3-H) (N-7-H)
3. Define *sine, cosine*, and *tangent* in ratio form and calculate them using technology (N-6-H)
4. Use ratios and proportional reasoning to solve a variety of real-life problems including similar figures and scale drawings (N-6-H) (M-4-H)

Algebra

5. Write the equation of a line of best fit for a set of 2-variable real-life data presented in table or scatter plot form, with or without technology (A-2-H) (D-2-H)
6. Write the equation of a line parallel or perpendicular to a given line through a specific point (A-3-H) (G-3-H)

Measurement

7. Find volume and surface area of pyramids, spheres, and cones (M-3-H) (M-4-H)
8. Model and use trigonometric ratios to solve problems involving right triangles (M-4-H) (N-6-H)

Geometry

9. Construct 2- and 3-dimensional figures when given the name, description, or attributes, with and without technology (G-1-H)
10. Form and test conjectures concerning geometric relationships including lines, angles, and polygons (i.e., triangles, quadrilaterals, and *n*-gons), with and without technology (G-1-H) (G-4-H) (G-6-H)
11. Determine angle measurements using the properties of parallel, perpendicular, and intersecting lines in a plane (G-2-H)
12. Apply the Pythagorean theorem in both abstract and real-life settings (G-2-H)
13. Solve problems and determine measurements involving chords, radii, arcs, angles, secants, and tangents of a circle (G-2-H)
14. Develop and apply coordinate rules for translations and reflections of geometric figures (G-3-H)
15. Draw or use other methods, including technology, to illustrate dilations of geometric figures (G-3-H)
16. Represent and solve problems involving distance on a number line or in the plane (G-3-H)
17. Compare and contrast inductive and deductive reasoning approaches to justify conjectures and solve problems (G-4-H) (G-6-H)
18. Determine angle measures and side lengths of right and similar triangles using trigonometric ratios and properties of similarity, including congruence (G-5-H) (M-4-H)
19. Develop formal and informal proofs (e.g., Pythagorean theorem, flow charts, paragraphs) (G-6-H)

Data Analysis, Probability, and Discrete Math

20. Show or justify the correlation (match) between a linear or non-linear data set and a graph (D-2-H) (P-5-H)
21. Determine the probability of conditional and multiple events, including mutually and non-mutually exclusive events (D-4-H) (D-5-H)
22. Interpret and summarize a set of experimental data presented in a table, bar graph, line graph, scatter plot, matrix, or circle graph (D-7-H)
23. Draw and justify conclusions based on the use of logic (e.g., conditional statements, converse, inverse, contrapositive) (D-8-H) (G-6-H) (N-7-H)
24. Use counting procedures and techniques to solve real-life problems (D-9-H)
25. Use discrete math to model real life situations (e.g., fair games, elections) (D-9-H)

Patterns, Relations, and Functions

26. Generalize and represent patterns symbolically, with and without technology (P-1-H)
27. Translate among tabular, graphical, and symbolic representations of patterns in real-life situations, with and without technology (P-2-H) (P-3-H) (A-3-H)

Grades 11–12

Number and Number Relations

1. Read, write, and perform basic operations on complex numbers (N-1-H) (N-5-H)
2. Evaluate and perform basic operations on expressions containing rational exponents (N-2-H)

3. Describe the relationship between exponential and logarithmic equations (N-2-H)

Algebra

4. Translate and show the relationships among non-linear graphs, related tables of values, and algebraic symbolic representations (A-1-H)
5. Factor simple quadratic expressions including general trinomials, perfect squares, difference of two squares, and polynomials with common factors (A-2-H)
6. Analyze functions based on zeros, asymptotes, and local and global characteristics of the function (A-3-H)
7. Explain, using technology, how the graph of a function is affected by change of degree, coefficient, and constants in polynomial, rational, radical, exponential, and logarithmic functions (A-3-H)
8. Categorize non-linear graphs and their equations as quadratic, cubic, exponential, logarithmic, step function, rational, trigonometric, or absolute value (A-3-H) (P-5-H)
9. Solve quadratic equations by factoring, completing the square, using the quadratic formula, and graphing (A-4-H)
10. Model and solve problems involving quadratic, polynomial, exponential, logarithmic, step function, rational, and absolute value equations using technology (A-4-H)

Measurement

11. Calculate angle measures in degrees, minutes, and seconds (M-1-H)
12. Explain the unit circle basis for radian measure and show its relationship to degree measure of angles (M-1-H)
13. Identify and apply the unit circle definition to trigonometric functions and use this definition to solve real-life problems (M-4-H)
14. Use the Law of Sines and the Law of Cosines to solve problems involving triangle measurements (M-4-H)

Geometry

15. Identify conic sections, including the degenerate conics, and describe the relationship of the plane and double-napped cone that forms each conic (G-1-H)
16. Represent translations, reflections, rotations, and dilations of plane figures using sketches, coordinates, vectors, and matrices (G-3-H)

Data Analysis, Probability, and Discrete Math

17. Discuss the differences between samples and populations (D-1-H)
18. Devise and conduct well-designed experiments/surveys involving randomization and considering the effects of sample size and bias (D-1-H)
19. Correlate/match data sets or graphs and their representations and classify them as exponential, logarithmic, or polynomial functions (D-2-H)
20. Interpret and explain, with the use of technology, the regression coefficient and the correlation coefficient for a set of data (D-2-H)
21. Describe and interpret displays of normal and non-normal distributions (D-6-H)
22. Explain the limitations of predictions based on organized sample sets of data (D-7-H)
23. Represent data and solve problems involving Euler and Hamiltonian paths (D-9-H)

Patterns, Relations, and Functions

24. Model a given set of real-life data with a non-linear function (P-1-H) (P-5-H)
25. Apply the concept of a function and function notation to represent and evaluate functions (P-1-H) (P-5-H)
26. Represent and solve problems involving n^{th} terms and sums for arithmetic and geometric series (P-2-H)

27. Compare and contrast the properties of families of polynomial, rational, exponential, and logarithmic functions, with and without technology (P-3-H)
28. Represent and solve problems involving the translation of functions in the coordinate plane (P-4-H)
29. Determine the family or families of functions that can be used to represent a given set of real-life data, with and without technology (P-5-H)

LOUISIANA MATHEMATICS FRAMEWORK

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TABLE OF CONTENTS

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SECTION I: INTRODUCTION

LOUISIANA CONTENT STANDARDS
FOUNDATION SKILLS

The Louisiana Content Standards Task Force has developed the following foundation skills which should apply to all students in all disciplines.

1. **Communication: A process by which information is exchanged and a concept of "meaning" is being created and shared between individuals through a common system of symbols, signs, or behavior. Students should be able to communicate clearly, fluently, strategically, technologically, critically, and creatively in society and in a variety of workplaces. This process can best be accomplished through use of the following skills: reading, writing, speaking, listening, viewing, and visually representing.**

2. **Problem Solving: The identification of an obstacle or challenge and the application of knowledge and thinking processes, which include reasoning, decision making, and inquiry in order to reach a solution using multiple pathways, even when no routine path is apparent.**

3. **Resource Access and Utilization: The process of identifying, locating, selecting, and using resource tools to help in analyzing, synthesizing, and communicating information. The identification and employment of appropriate tools, techniques, and technologies are essential to all learning processes. These resource tools include pen, pencil, and paper; audio/video material, word processors, computers, interactive devices, telecommunication, and other emerging technologies.**

4. **Linking and Generating Knowledge: The effective use of cognitive processes to generate and link knowledge across the disciplines and in a variety of contexts. In order to engage in the principles of continual improvement, students must be able to transfer and elaborate on these processes. "Transfer" refers to the ability to apply a strategy or content knowledge effectively in a setting or context other than that in which it was originally learned. "Elaboration" refers to monitoring, adjusting, and expanding strategies into other contexts.**

5. **Citizenship: The application of the understanding of the ideals, rights, and responsibilities of active participation in a democratic republic that includes working**

respectfully and productively together for the benefit of the individual and the community; being accountable for one's choices and actions and understanding their impact on oneself and others; knowing one's civil, constitutional, and statutory rights; and mentoring others to become productive citizens and lifelong learners.

Note: These foundation skills are listed numerically in parentheses after each benchmark.

INFORMATION LITERACY MODEL FOR LIFELONG LEARNING

Students must become competent and independent users of information to be productive citizens of the 21st century. They must be prepared to live in an information-rich and changing global society. Due to the rapid growth of technology, the amount of information available is accelerating so quickly that teachers are no longer able to impart a complete knowledge base in a subject area. In addition, students entering the workforce must know how to access information, solve problems, make decisions, and work as part of a team. Therefore, information literacy -- the ability to recognize an information need and then locate, evaluate, and effectively use the needed information -- is a basic skill essential to the 21st century workplace and home. Information literate students are self-directed learners who, individually or collaboratively, use information responsibly to create quality products and to be productive citizens. Information literacy skills must not be taught in isolation; they must be integrated across all content areas, utilizing fully the resources of the classroom, the school library media center, and the community. The Information Literacy Model for Lifelong Learners is a framework that teachers at all levels can apply to help students become independent lifelong learners.

1. **Defining/Focusing: The first task is to recognize that an information need exists. Students make preliminary decisions about the type of information needed based on prior knowledge.**

2. **Selecting Tools and Resources: After students decide what information is needed, they then develop search strategies for locating and accessing appropriate, relevant sources in the school library media center, community libraries and agencies, resource people, and others as appropriate.**

3. **Extracting and Recording: Students examine the resources for readability, currency, usefulness, and bias. This task involves skimming or listening for key words, "chunking" reading, finding main ideas, and taking notes.**

4. **Processing Information: After recording information, students must examine and evaluate the data in order to utilize the information retrieved. Students must interact with the information by categorizing, analyzing, evaluating, and comparing for bias, inadequacies, omissions, errors, and value judgments. Based on their findings, they either move on to the next step or do additional research.**

5. **Organizing Information: Students effectively sort, manipulate, and organize the information that was retrieved. They make decisions on how to use and communicate their findings.**

6. **Presenting Findings: Students apply and communicate what they have learned (e.g., research report, project, illustration, dramatization, portfolio, book, book report, map, oral/audio/visual presentation, game, bibliography, hyperstack).**

7. **Evaluating Efforts: Throughout the information problem solving process, students evaluate their efforts. This assists students in determining the effectiveness of the research process. The final product may be evaluated by the teacher and also other qualified or interested resource persons.**

PHILOSOPHY

In mathematics classrooms in Louisiana, each student actively participates in a learning environment guided by a capable teacher and supported by the home and community. The student values mathematics and is confident and competent in his or her ability to use mathematics in an ever-changing world. The student develops mathematical understanding through individual and group instruction that includes investigating, discovering, communicating, and reasoning. Assessment, an integral part of the teaching and learning process, is carefully integrated with instructional practices.

NEED AND CONTEXT FOR REFORM

Rationale for Change

The rationale for change in mathematics education is driven by the implications of the evolving ages of technology and information and their implications for future societal and work force needs. "In tomorrow's world, the best opportunities for jobs and advancement will go to those best prepared to cope confidently and competently with mathematical, scientific, and technological issues" (Everybody Counts, 1989). To adequately prepare students for the future, mathematics education must change to include the following:

- **the student as an active participant in learning rather than a passive recipient of knowledge;**

- **equitable access for all students to manipulatives and state-of-the-art technologies, including electronic networking; and**

- **the incorporation of a variety of individual and group activities that use real-life experiences to develop critical thinking.**

Because the demands of the workplace are changing, our efforts to prepare students for the workplace must continually change. Schools must prepare students to adapt productively to change by focusing on the process of lifelong learning. The nation's business leaders agree that to become productive workers and informed citizens in today's society, students must develop the ability to:

- **reason critically and understand concepts;**

- **work with others;**

- **communicate ideas effectively;**

- **understand and interpret statistical information;**

- **become lifelong learners; and**

- **adapt to a dynamic work environment.**

Implications for Curricula Change

The processing of vast amounts of numerical information available through modern technology makes more imperative than ever the ability to synthesize mathematical information as a basis for rational decision making. Thus, quantitative thinking is becoming more pervasive in virtually all aspects of the workplace and everyday life experiences. School mathematics must remain attuned to the needs of students, adjusting to include the handling and understanding of data; the appreciation, recognition, and use of numerical and geometrical patterns; and the integration and synthesis of information leading to creative problem solving.

The basic facts of addition, subtraction, multiplication, and division are important; however, technology, specifically the development of calculators, allows all students to expand and extend much of traditional school mathematics far beyond the basic math facts and repeated drill and practice. Students should concentrate on understanding ideas, reasoning, solving problems, communicating, and making connections within mathematics and between mathematics and its growing applications in other fields.

Numbers and a sense of numbers are of greater value than ever before. Number sense -- the intuitive, meaningful use of numbers in mental computation, estimation, problem solving, and applications is vital. It is essential for students to develop this intuitive sense in order to determine, for example, if a number in a news account, on a printout, or on a display screen is appropriate and acceptable.

National Direction

In the 1980s after reports concerning the low performance of American students on international assessments, several publications emerged that directly addressed the urgent national need to revitalize mathematics education. The nation recognized that to be competitive in a global economy, American students had to be prepared to work competently and confidently in the age of technology and information. The most significant publications include the following:

1. **Curriculum and Evaluation Standards for School Mathematics. (1989). National Council of Teachers of Mathematics.**
2. **Everybody Counts: A Report to the Nation on the Future of Mathematics Education. (1989). National Research Council.**
3. **Reshaping School Mathematics: A Philosophy and Framework for Curriculum. (1990). Mathematical Sciences Education Board.**

4. **Professional Standards for Teaching Mathematics. (1991). National Council of Teachers of Mathematics.**
5. **Mathematics Assessment. (1991). National Council of Teachers of Mathematics.**
6. **Assessment Standards for School Mathematics. (1995). National Council of Teachers of Mathematics.**

The Louisiana Mathematics Framework is based on the direction reflected in these and other reform-based publications.

Collaborative Systemic Reform

In 1990, the National Science Foundation (NSF) solicited proposals for Statewide Systemic Initiatives (SSI) Programs. In its program solicitation, the NSF described the proposals eligible for funding, stating that the initiatives "...must involve all those who have a responsibility to the system or to particular parts of it whether at the state or local level." It further stated that partners involved in the initiatives must include "state leaders; teachers and other school system leaders; university faculty; leaders in science-rich institutions, including business and industry; and leaders of parent groups and other community based organizations." The change to funding "systemic" efforts to involve all major stakeholders in education was a major shift by NSF to effect reform of mathematics and science education throughout the nation.

The reform effort in Louisiana began with a successful application to establish an NSF-funded statewide systemic initiative. A broad-based coalition of Louisianians worked to secure a five-year, $10 million grant for the Louisiana Systemic Initiatives Program (LaSIP). Louisiana provided matching funds from the Louisiana Board of Elementary and Secondary Education (LBESE) and the Louisiana Board of Regents (LBoR) for colleges and universities to support the reform of mathematics and science education.

The Louisiana Department of Education (LDE) was awarded a Dwight D. Eisenhower National Program for Mathematics and Science Education grant from the United States Department of Education. This grant enabled the LDE, in collaboration with LaSIP, to develop the Louisiana Mathematics and Science Curriculum and Assessment Frameworks.

Framework Development Process

Using recommendations from statewide leaders in mathematics, panel members were selected to assist in the development of the Louisiana Mathematics and Science Frameworks. The panel was divided into subpanels for mathematics and science, consisting of approximately 40 members each. Membership consisted of: LDE personnel; LaSIP staff; educators from both public and private schools; educators who had expertise in working with students with disabilities; educators with expertise in working with minorities and underserved populations; and university faculty from mathematics, the sciences, and education.

After assessing the current state of affairs in Louisiana in light of national reform, the mathematics subpanel began the development of a strategic plan to reform mathematics curricula in Louisiana. Two 15-member Mathematics Framework Steering Committees, consisting of LDE staff, LaSIP staff, university faculty, supervisors, and classroom teachers, were formed to oversee the writing of the Framework and grade-level handbooks. As drafts of the Framework were completed, extensive reviews were conducted by state educational stakeholders and national leaders in mathematics reform. In collaboration with the steering committee, exemplary classroom teachers helped write grade-level handbooks. Drafts of the handbooks were reviewed by classroom teachers from across the state.

PURPOSE

This Framework document was formulated to articulate the shared vision of the mathematical, business, professional, and vocational communities of Louisiana concerning mathematics education. It provides a unifying structure which encompasses instructional methodologies and course content, while maintaining sufficient flexibility to permit adaptability within local districts. The Framework should guide the teacher in designing a comprehensive program that assists in the development of the mathematical power of each student. Using national mathematics standards as a guide, the Framework forms the foundation of a comprehensive mathematics educational program upon which state mathematics assessment can be based.

Intended Audience

The Louisiana Mathematics Framework is intended for a broad audience: teachers, curriculum supervisors, school and district administrators, school boards, business and industry leaders, parents, college, university, and state education agency staff and policy makers. With the Framework as a common reference point, it will be possible for these varied

groups to work to achieve a shared vision of what and how mathematics should be taught in Louisiana schools.

Intended Use

The Louisiana Mathematics Framework serves as a guide for curriculum and instruction and as a general reference to the basic principles of mathematics education.

Intended uses for this Framework include the following:

! **For teachers, a guide for planning curriculum, instruction, and assessment;**

! **For parents, a means for assessing the effectiveness of their children's mathematics education;**

! **For administrators and school board members, a vision for mathematics education and a basis for planning resource allocations, materials purchases, local curriculum development, and teachers' professional development;**

! **For policy makers and state education staffs, a basis for developing laws, policies, and funding priorities to support local reforms;**

! **For staff developers, a basis for creating professional development materials and strategies designed to increase teachers' knowledge of mathematics content, teaching methodologies and assessment strategies;**

! **For assessment specialists and test developers, a guide to establishing tools and strategies that effectively assess students' mathematical understanding and ability;**

! **For colleges and universities, a guide for content and design of teacher preparation programs; and**

! **For business and industry leaders and governmental agencies, a basis for developing effective partnerships and local reforms for funding instructional materials and professional development.**

FRAMEWORK CRITERIA

The following criteria, which provided the foundation for the development of the Framework, are critical to strengthen, support, and sustain mathematics education.

- **The Louisiana Mathematics Framework reflects national standards in defining K-12 curricula.**

- **A National Validation Team consisting of nationally recognized mathematics educators and mathematicians reviewed the documents during development to ensure content validity.**

- **The Louisiana Mathematics Framework is equitable for all students.**

In addition to involving representatives from under represented groups in the development process, a Louisiana Equity Review Team, consisting of state leaders representing the following groups, reviewed the documents: students with learning disabilities, students with special education needs (including disabled and gifted students), minorities, students who speak English as a second language, and women. Professional development activities for Framework implementation will include specific strategies to assist the teacher in addressing the needs of all students.

- **Classroom teachers are significantly involved in the development of the Louisiana Mathematics Framework.**

Through the organizational structures of the Louisiana Department of Education (LDE) and the Louisiana Systemic Initiatives Program (LaSIP), the drafts of the documents were reviewed by over 2,000 mathematics teachers from throughout the state.

- **The Louisiana Mathematics Framework includes a comprehensive, well-developed structure that demonstrates cohesiveness and continuity from kindergarten through 12th grade.**

University faculty were an integral part of the framework development process. Classroom teachers from grades K-4, 5-8, and 9-12 were involved in the development of all components of the framework.

- **The Louisiana Mathematics Framework demonstrates the relevance of mathematics to real-life activities.**

The Framework and handbooks have a pervasive theme of interconnectedness to real-life situations. The classroom activities included in the handbooks engage students in mathematical activities that are relevant and genuinely motivating. The documents were reviewed by representatives from Louisiana business and industry to ensure their relevance to activities in which specific mathematical principles are applied.

- **The Louisiana Mathematics Framework reflects national trends in assessment by thoroughly integrating assessment and instruction.**

The handbooks include grade-level alternative assessment samples for both classroom and large-scale assessment. Several nationally recognized leaders in student assessment reviewed the documents.

- **The Louisiana Mathematics Framework is dynamic and easily adaptable to future changes that better prepare both teachers and students to be lifelong learners.**

Representatives from the LDE and the Louisiana Association of Teachers of Mathematics (LATM) will convene each year, as needed at the annual LATM meeting to review the Framework to ensure that it remains dynamic. Revisions will be transmitted electronically to each district.

PERVASIVE THEMES

The vision of mathematics education in this Framework is expressed through five pervasive and thoroughly interwoven themes which encompass the strands of school mathematics.

- **Mathematics as Problem Solving**

  Classroom instruction should focus on more diverse and complex problem-solving situations that arise from relevant, real-life circumstances. Students should be able to design problems and generate appropriate solutions. For a given problem, teachers must actively encourage students to find alternative approaches to the problem, as well as using formal procedures.

- **Mathematics as Numerical Intuition**

  Students should develop a common-sense approach to using numbers, an intuitive feel for numbers including various uses and meanings, an appreciation for different levels of accuracy needed, and the ability to determine the reasonableness of answers.

- **Mathematics as Reasoning**

  Students should use critical thinking skills in questioning, elaborating, validating, and justifying.

- **Mathematics as Connections**

  Topics within mathematics should be interconnected rather than taught in isolation. Additionally, problems and procedures should be connected to other subject areas and to real-life, relevant situations that are challenging and motivating to the student.

- **Mathematics as Communication**

  Students should be provided opportunities to express their mathematical ideas through speaking, writing, demonstrating, and modeling.

SECTION II: EDUCATIONAL ENVIRONMENT

VISION OF TEACHING

The teacher must have the content knowledge and skills to be an instructor and facilitator of mathematical learning. The teacher must have the necessary supplies and materials to encourage individual and group explorations by the students. The teacher allows time for students to investigate mathematical ideas or tasks and encourages the use of models, materials, and technology. The teacher ensures an environment that encourages risk-taking, questioning, discovery, and cooperation. The teacher listens and values all students' ideas and encourages students to construct understandings based on their personal learning style and prior experiences.

The teacher demonstrates the connectedness of mathematics by utilizing instructional activities that encompass benchmarks from several strands. These activities may require several days or weeks to complete, depending on grade-level appropriateness. While some exercises or independent problems will be used, they are embedded in large problems or issues that are relevant to the student.

VISION OF LEARNING

The classroom experience envisioned in this document is a dynamic one in which students become autonomous learners, while capable and empowered teachers guide them in taking charge of their own quest for knowledge. Students work independently, in small groups, or in large groups on problem-solving investigations. They have the materials and appropriate manipulatives to explore problems. They become risk takers through exploring ideas, forming questions, making and supporting conjectures, and learning to communicate and reason mathematically.

With problem solving at the heart of the curriculum, students develop an understanding of relevant problem-solving strategies including, but not limited to, the following: draw a picture or diagram; develop a chart, list, or table; guess and check; work backwards; simplify problems; use manipulatives, etc. Both student-generated and teacher-generated strategies are explored in developing an understanding of the various approaches to solving a problem.

EQUITY

Regardless of ability level, all students in Louisiana must be exposed to a challenging and motivating mathematics curriculum based on relevant problem-solving situations. Traditionally, high-achieving students have participated in activities that required critical thinking and reasoning, whereas students working at or below grade level spent large amounts of time in drill-and-practice activities. One of the myths identified in Mathematics Assessment, (NCTM, 1991) that abounds in mathematics education is that "problems and applications come only after mastery of skills." Research supports the position that students learn skills and content in the context of challenging and motivating problems. The Louisiana Framework advocates a common core of significant mathematics that actively and interestingly engages all students.

In addition to having access to the common core curriculum, all students should have equal access to resources, qualified teachers, and quality instructions. The teacher is instrumental in creating an environment that encourages and facilitates each student's mathematical development. Problem-solving situations should reflect and build upon real-life experiences of all students and should reflect diverse cultures.

The ability to learn mathematics is not determined by one's socioeconomic level, gender, or ethnic origin. The teacher models the belief that all students can learn and demonstrates an appreciation and understanding of cultural diversity and varied learning styles. By challenging all students, the teacher creates the environment in which all students learn to approach mathematics with enthusiasm and confidence.

TECHNOLOGY

In past decades, the classroom environment was a reflection of the workplace. Employees at factories worked independently on routing assembly lines to construct products, while mathematics classrooms consisted of rows of students working independently on routine practice problems. The age of technology has dramatically changed the workplace environment. Employees now work cooperatively and use a variety of techniques to solve real, nonroutine problems. Classrooms must reflect these changes to prepare students for the 21st century.

The relevance of technology is expressed in the following underlying beliefs:

- **Calculators and computers are basic tools of today's mathematics just as paper, pencil, and slide rules were basic tools of past years.**

- **Calculators and computers have reduced the need to make precise calculations by hand, but in doing so they have increased the importance of acquiring a well-developed number sense. (Goldsmith, 1992).**

- **Appropriate calculators and computers should be available for all students.**

- **Appropriate use of technology should be naturally integrated into the teaching of mathematics to assist the student to investigate and solve problems, not simply to check answers or to practice skills.**

- **As resources become available via telecommunications, they should be used in the mathematics classroom to support standards-based instruction.**

SUPPORT STRUCTURES

The collaborative effort of all stakeholders is imperative if significant change is to occur in Louisiana schools. Support of mathematics reform must be demonstrated by teachers, students, administrators, school boards, parents, business and industry, elected officials, the media, community organizations, etc. The state and local communities must commit to long-range planning to schedule time for appropriate staff development, to ensure funds for necessary resources, and to provide appropriate learning environments and facilities for students. A professional development model, with an accompanying dissemination plan, has been designed by the LDE and LaSIP to support teachers as they implement the framework.

Louisiana is developing a state school improvement plan to address content, performance, and opportunity-to-learn standards in all subject disciplines. The Mathematics Framework will be a critical component of the state school improvement plan. As each local district develops its mathematics curriculum, the new curriculum should be aligned with the state Mathematics Framework and should become a part of the local school improvement plan.

SECTION III: ASSESSMENT

PURPOSE

Assessment in mathematics is a process through which evidence is gathered about a student's understanding and ability to apply that understanding. The changes in mathematics content and in the way mathematics is taught must be reflected through accompanying changes in assessment. Assessment is an ongoing, dynamic process which is both diagnostic and prescriptive in nature. It communicates, illustrates, and identifies the mathematics that is most important for students to learn and enhances mathematics learning. Assessment and instruction must be intertwined so that each supports the other in promoting the development of mathematical power for all students. Various assessment techniques should be used to:

- **improve teaching and learning;**
- **evaluate student progress;**
- **assist in making decisions regarding individual student performance;**
- **provide information on the effectiveness of educational programs;**
- **provide data relative to the progress toward established educational goals;**
- **address accountability issues; and**
- **address the appreciation and understanding of various cultural differences and learning styles.**

CLASSROOM ASSESSMENT

Educational purposes for assessment may be as varied as assessment techniques. Assessment is the link between teaching and learning and provides information for making instructional decisions, monitoring student progress, and communicating student progress to appropriate audiences.

Assessment is moving away from the use of a single type of instrument to assess students' understanding and toward the use of a wide range of assessment techniques that require students to demonstrate critical thinking skills. Combinations of the following techniques,

integrated with instruction, can provide a comprehensive assessment of student understanding: observations, oral questions, journals, portfolios, multiple choice tests, projects, activities, concept maps, presentations, etc.

LARGE-SCALE ASSESSMENT

Large-scale assessment refers to assessment at the district, state, and national level. This type of assessment is used as an external monitoring of student progress on criteria established outside the classroom but with teacher input.

When external monitoring is aligned with the curriculum and teaching strategies, it has a positive impact on mathematics education. Appropriate use of external monitoring will enhance learning by providing external support for the teacher's own monitoring of student progress. The monitoring of student progress externally through established performance standards can provide the following:

- **a measurement of student performance on a dynamic, authentic curriculum;**
- **information for decision makers;**
- **a measure of pupil progression;**
- **a criterion for graduation;**
- **information for education program evaluation;**
- **demographic data;**
- **system-wide data; and**
- **data for national comparisons.**

SECTION IV: CONTENT STRANDS

The six content strands translate the vision of the new mathematics curriculum: Number and Number Relations (N); Algebra (A); Measurement (M); Geometry (G); Data Analysis, Probability, and Discrete Math (D); and Patterns, Relations, and Functions (P). Each of the strands is introduced with a focus statement followed by the standard and benchmarks for that strand.

The strands are intended to be thoroughly interwoven, providing rich connections at all grade levels. There should be deliberate reinforcement of concepts throughout the school year.

Although the content is delineated by strands, it is not a recipe to be followed line by line. Instead, the content provides the building blocks upon which a dynamic, cohesive, and comprehensive mathematics program can be built. It supports student explorations and investigations that relate objectives from several strands. The very nature of the content implies that concepts and understandings should not be taught in isolation.

To assist teachers, a handbook that contains sample classroom activities has been developed. The handbook will assist the teacher to translate the content into standards-based classroom instruction. Three or four activities are included for each grade level. The Framework and sample activities should assist the teacher in developing curriculum and instruction that enhance the mathematical power of all students.

NUMBER AND NUMBER RELATIONS

FOCUS

Developing an intuitive, common-sense approach to number relationships and operations is of primary importance and should permeate every area of the mathematics curriculum. Number sense involves the use of "friendly easy numbers" and of actively seeking alternative ways of making computations. Number sense is not a topic to be taught as a unit, but is a prevailing theme throughout all mathematics. All students should develop a conceptual understanding of number magnitude and number operations through participation in hands-on investigative activities. These activities should provide many opportunities for students to discover and develop problem-solving strategies. Student involvement in these activities should assist in the development of estimation skills (particularly when an approximate answer is sufficient) and other mental arithmetic skills (when an exact answer is required). When the numbers are not manageable for mental arithmetic and an exact answer is required, calculators or paper and pencil should be used. Parallel with the need to develop an understanding of the methods and usage of various computational techniques is the students' need for an informal development of mathematical language and symbolism. Inherent in our increasing dependence on technology is the danger of accepting machine answers at face value. A well-developed number sense can combat this danger. Furthermore, number sense leads naturally to the development of symbol sense necessary for use with technology, such as graphing calculators and symbolic manipulators. This developing mathematical power will allow the students to function and communicate more effectively and with greater confidence in real-life experiences.

STANDARD

In problem-solving investigations, students demonstrate an understanding of the real number system and communicate the relationships within that system using a variety of techniques and tools.

BENCHMARKS K-4

Students in Grades K-4 use estimation, mental arithmetic, number lines, graphs, appropriate models, manipulatives, calculators, and computers as they investigate problems involving whole numbers. As a result, what they know and are able to do includes:

N-1-E **constructing number meaning and demonstrating that a number can be expressed in many different forms (e.g., standard notation, number words, number lines, geometrical representation, fractions, and decimals);**
(1, 2, 4)

N-2-E **demonstrating number sense and estimation skills, giving particular attention to common equivalent reference points (i.e., 1/4 = 25% = .25; ½ = 50% = .5; $1 = 100%, etc.);**
(1)

N-3-E **reading, writing, representing, comparing, ordering, and using whole numbers in a variety of forms (e.g., standard notation, number line, and geometrical representation;**
(1, 4)

N-4-E **demonstrating a conceptual understanding of the meaning of the basic arithmetic operations (add, subtract, multiply, and divide) and their relationships to each other;**
(1)

N-5-E **selecting appropriate operation(s) (add, subtract, multiply, and divide) for a given situation;**
(2, 3, 4)

N-6-E **applying a knowledge of basic math facts and arithmetic operations to real-life situations;**
(2, 4, 5)

N-7-E **constructing, using, and explaining procedures to compute and estimate with whole numbers (e.g., mental math strategies)**
(1, 4)

N-8-E **selecting and using appropriate computational methods and tools for given situations involving whole numbers (e.g., estimation, mental arithmetic, calculator, or paper and pencil);**
(2, 4)

N-9-E **demonstrating the connection of number and number relations to the other strands and to real-life situations.**

(1, 4, 5)

BENCHMARKS 5-8

Students in Grades 5-8 use estimation, mental arithmetic, number lines, graphs, appropriate models, manipulatives, calculators, and computers as they extend their investigations of problems involving rational numbers. As a result, what they know and are able to do includes:

N-1-M **demonstrating that a rational number can be expressed in many forms, and selecting an appropriate form for a given situation (e.g., fractions, decimals, and percents);**
(1, 2, 4)

N-2-M **demonstrating number sense and estimation skills to describe, order, and compare rational numbers (e.g., magnitude, integers, fractions, decimals, and percents);**
(2, 4)

N-3-M **reading, writing, representing, and using rational numbers in a variety of forms (e.g., integers, mixed numbers, and improper fractions);**
(1)

N-4-M **demonstrating a conceptual understanding of the meaning of the basic arithmetic operations (add, subtract, multiply and divide) and their relationships to each other;**
(1, 2)

N-5-M **applying an understanding of rational numbers and arithmetic operations to real-life situations;**
(1, 2, 3, 4)

N-6-M **constructing, using, and explaining procedures to compute and estimate with rational numbers employing mental math strategies;**
(1, 2, 3, 4)

N-7-M **selecting and using appropriate computational methods and tools for given situations involving rational numbers (e.g., estimation, or exact computation using mental arithmetic, calculator, computer, or paper and pencil);**
(2, 3, 4)

N-8-M **demonstrating a conceptual understanding and applications of proportional reasoning (e.g., determining equivalent ratios, finding a missing term of a given proportion).**
(2, 4)

BENCHMARKS 9-12

Students in Grades 9-12 use estimation, mental arithmetic, number lines, graphs, appropriate models, manipulatives, calculators, and computers as they extend their investigations of problems involving real numbers. As a result, what they know and are able to do includes:

N-1-H **demonstrating an understanding of the real number system;**
(1, 2, 4)

N-2-H **demonstrating that a number can be expressed in many forms, and selecting an appropriate form for a given situation (e.g., fractions, decimals, percents, and scientific notation);**
(1, 4)

N-3-H **using number sense to estimate and determine if solutions are reasonable;**
(2, 4)

N-4-H **determining whether an exact or approximate answer is necessary;**
(2, 3, 4)

N-5-H **selecting and using appropriate computational methods and tools for given situations (e.g., estimation, or exact computation using mental arithmetic, calculator, symbolic manipulator, or paper and pencil);**
(3)

N-6-H **applying ratios and proportional thinking in a variety of situations (e.g., finding a missing term of a proportion);**
(2, 4)

N-7-H **justifying reasonableness of solutions and verifying results.**
(1, 2, 4)

ALGEBRA

FOCUS

Algebra is much more than the study of generalized forms of arithmetic. It is a powerful language used to interpret real-world experience. This language is a communication tool used to analyze and describe relationships and mathematical structures. Beginning at the elementary level, the school mathematics curriculum should integrate the use of the language of Algebra throughout all strands of the curriculum to enable students to shift progressively from informal to formal concepts and from concrete to symbolic representations. The middle school mathematics curriculum should integrate the use of this language throughout all strands of the curriculum to enable students to progressively shift from the concrete to the symbolic. At this level, algebra should be conceptual and intuitive, not formally computational. It should involve actively seeking easy and alternative ways of looking at problems. These transitions should be powered by investigations involving the use of appropriate manipulatives, models, and technology, and should encourage the development of communication, reasoning, and problem-solving skills. Algebra, in the K-8 classrooms, refers to informal explorations and understandings of symbolism. It is beneficial to introduce the algebraic terminology (equation, inequality, variable, etc.) in the early grades. In this way high school students will be able to understand algebra as a natural outgrowth of their study of various number properties. The high school curriculum should continue the development of symbolic representatives. The use of modern technology frees teachers and students from the need to develop complicated pencil and paper manipulative skills in algebra. More classroom time is now available to apply algebra in solving challenging real-world problems. This will allow students to recognize the worth, importance, and power of the mathematics of abstraction and symbolism.

STANDARD

In problem-solving investigations students demonstrate an understanding of concepts and processes that allow them to analyze, represent, and describe relationships among variable quantities and to apply algebraic methods to real-world situations.

BENCHMARKS K-4

Students in Grades K-4 use manipulatives, models, graphs, tables, technology, number sense, and estimation as they investigate problems involving the concepts and application of algebra. As a result, what they know and are able to do includes:

A-1-E **demonstrating a conceptual understanding of variables, expressions, equations, and inequalities (e.g., use letters or boxes to represent values; understand =, …, <, and > symbols);**
(1, 4)

A-2-E **modeling and developing strategies for solving equations and inequalities;**
(1, 2, 3, 4)

A-3-E **recognizing the connection of algebra to the other strands and to real-life situations (e.g., number sentences or formulas to represent real-world problems).**
(4, 5)

BENCHMARKS 5-8

Students in Grades 5-8 use manipulatives, models, graphs, tables, technology, number sense, and estimation as they extend their investigations of problems involving the concepts and application of algebra. As a result, what they know and are able to do includes:

A-1-M **demonstrating a conceptual understanding of variables, expressions, equations, and inequalities (e.g., symbolically represent real-world problems as linear terms, equations, or inequalities);**
(1, 2, 4)

A-2-M **modeling and developing methods for solving equations and inequalities (e.g., using charts, graphs, manipulatives, and/or standard algebraic procedures);**
(2, 3, 4)

A-3-M **representing situations and number patterns with tables, graphs, and verbal and written statements, while exploring the relationships among these representations (e.g., multiple representations for the same situation);**
(1,4)

A-4-M **analyzing tables and graphs to identify relationships exhibited by the data and making generalizations based upon these relationships;**
(2, 3, 4)

A-5-M **demonstrating the connection of algebra to the other strands and to real-life situations.**

(1, 2, 3, 4, 5)

BENCHMARKS 9-12

Students in Grades 9-12 use manipulatives, models, graphs, tables, technology, number sense, and estimation as they extend their investigations of problems involving the concepts and application of algebra. As a result, what they know and are able to do includes:

A-1-H **demonstrating the ability to translate real-world situations (e.g., distance versus time relationships, population growth, growth functions for diseases, growth of minimum wage, auto insurance tables) into algebraic expressions, equations, and inequalities and vice versa;**
(1, 2, 4)

A-2-H **recognizing the relationship between operations involving real numbers and operations involving algebraic expressions;**
(2, 4)

A-3-H **using tables and graphs as tools to interpret algebraic expressions, equations, and inequalities;**
(1, 3)

A-4-H **solving algebraic equations and inequalities using a variety of techniques with the appropriate tools (e.g., hand-held manipulatives, graphing calculator, symbolic manipulator, or pencil and paper).**
(2, 3)

MEASUREMENT

FOCUS

Measurement is the connection between numbers and the real world and as such is a vital component of an attempt to organize the world. It allows one to communicate effectively and make decisions. It relates geometry and algebra, as well as geometry and numbers, in both intuitive and formal ways. It is also a connecting theme between such diverse fields as athletics, music, travel, astronomy, and engineering. The study of measurement should consist of active investigations based on real-world problems in both individual and group format. These explorations should include the appropriate use of manipulatives and technology and should encourage the development of communications, reasoning, and problem-solving skills. Students need to learn the effect of unit choice on mathematical entities, such as the shape of graphs and the magnitude of answers. Secondary students should become so adept with the use of units that they are comfortable with the use of compound units (foot-pounds, miles per second) and specialized units (atmospheres, millennia, gigabytes) as they occur in real-world problems.

STANDARD

In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurement.

BENCHMARKS K-4

Students in Grades K-4 use number sense, estimation, appropriate manipulatives, tools, and technology as they investigate problems involving measurement. As a result, what they know and are able to do includes:

M-1-E **applying (measure or solve measurement problem) the concepts of length (inches, feet, yards, miles, millimeters, centimeters, decimeters, meters, kilometers), area, volume, capacity (cups, liquid pints and quarts, gallons, milliliters, liters), weight (ounces, pounds, tons, grams, kilograms), mass, time (seconds, minutes, hours, days, weeks, months, years), money, and temperature (Celsius and Fahrenheit) to real-world experiences;**
(1, 2, 3, 4, 5)

M-2-E **selecting and using appropriate standard and non-standard units of measure (e.g., paper clips and Cuisenaire rods) and tools for measuring length, area, capacity, weight/mass, and time for a given situation by considering the purpose and precision required for the task;**
(1, 2, 3, 4)

M-3-E **using estimation skills to describe, order, and compare measures of length, capacity, weight/mass, time, and temperature;**
(1, 2, 3, 4)

M-4-E **converting from one unit of measurement to another within the same system (customary and metric); comparisons between systems should be based on intuitive reference points, not formal computations (e.g., a meter is a little longer than a yard);**
(2, 3, 4)

M-5-E **demonstrating the connection of measurement to the other strands and to real-life situations.**
(2, 4, 5)

BENCHMARKS 5-8

Students in Grades 5-8 use number sense, estimation, appropriate manipulatives, tools, and technology as they extend their investigations of problems involving measurement. As a result, what they know and are able to do includes:

M-1-M **applying the concepts of length, area, surface area, volume, capacity, weight, mass, money, time, temperature, and rate to real-world experiences;**
(2, 3, 4)

M-2-M **demonstrating an intuitive sense of measurement (e.g., estimating and determining reasonableness of measures);**
(1, 2, 4)

M-3-M **selecting appropriate units and tools for tasks by considering the purpose for the measurement and the precision required for the task (e.g., length of a room in feet rather than inches);**
(2, 3, 4)

M-4-M **using intuition and estimation skills to describe, order, and compare formal and informal measures (e.g., ordering cup, pint, quart, gallon; comparing a meter to a yard);**
(1, 2, 4)

M-5-M **converting from one unit of measurement to another within the same system (Comparisons between systems, customary and metric, should be based on intuitive reference points, not formal computation.);**
(2, 4)

M-6-M **demonstrating the connection of measurement to the other strands and to real-life situations.**
(1, 2, 3, 4, 5)

BENCHMARKS 9-12

Students in Grades 9-12 use number sense, estimation, appropriate manipulatives, tools, and technology as they extend their investigations of problems involving measurement. As a result, what they know and are able to do includes:

M-1-H **selecting and using appropriate units, techniques, and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements;**
(3)

M-2-H **demonstrating an intuitive sense of measurement (e.g., estimating and determining reasonableness of results as related to area, volume, mass, rate, and distance);**
(1, 2, 4)

M-3-H **estimating, computing, and applying physical measurement using suitable units (e.g., calculate perimeter and area of plane figures, surface area and volume of solids presented in real-world situations);**
(1, 3, 4)

M-4-H **demonstrating the concept of measurement as it applies to real-world experiences.**
(1, 2, 3, 4, 5)

GEOMETRY

FOCUS

Geometry is the study of the physical shapes of the world in which we live. It provides a natural environment for the use of inductive and deductive reasoning. It is not only basic to design, construction, and engineering, but also to law, medicine, and other fields that depend on critical deductive thinking skills. It provides models for representing many numerical and algebraic concepts. In Grades K-4, students must have opportunities to examine, manipulate, and construct geometric models using concrete materials. These activities should take place in a setting where students may freely explore and discuss ideas in order to develop and use appropriate vocabulary. After such first-hand experiences, many students should be able to progress to pictorial and abstract representations. The study of geometry should center around cooperative group investigations designed to promote the discovery of geometric concepts and principles and should encourage the development of communication, reasoning, and problem-solving skills. Secondary students should develop coordinate and transformational geometry as well as the usual axiomatic geometry. They should develop deductive reasoning skills by way of written proofs in a variety of formats. In the study of geometry, students should have access to appropriate manipulatives, technology, and construction materials to enhance their investigations.

STANDARD

In problem-solving investigations, students demonstrate an understanding of geometric concepts and applications involving one-, two-, and three-dimensional geometry, and justify their findings.

BENCHMARKS K-4

Students in Grades K-4 use number sense, estimation, models, drawings, manipulatives, and technology as they investigate problems involving geometric concepts. As a result, what they know and are able to do includes:

G-1-E **determining the relationships among shapes;**
(1, 2, 3, 4)

G-2-E **identifying, describing, comparing, constructing, and classifying two-dimensional and three-dimensional geometric shapes using a variety of materials; (1, 2, 3, 4)**

G-3-E **making predictions regarding combinations, subdivisions, and transformations (slides, flips, turns) of simple plane geometric shapes; (1, 2, 4)**

G-4-E **drawing, constructing models, and comparing geometric shapes, with special attention to developing spatial sense; (1, 2, 4)**

G-5-E **identifying and drawing lines and angles and describing their relationships to each other and to the real world; (1, 4, 5)**

G-6-E **demonstrating the connection of geometry to the other strands and to real-life situations. (1, 2, 3, 4, 5)**

BENCHMARKS 5-8

Students in Grades 5-8 use number sense, estimation, models, drawings, manipulatives, and technology as they extend their investigations of problems involving geometric concepts. As a result, what they know and are able to do includes:

G-1-M **using estimation skills to describe, order, and compare geometric measures; (1, 2)**

G-2-M **identifying, describing, comparing, constructing, and classifying geometric figures and concepts; (1, 2, 3)**

G-3-M **making predictions regarding transformations of geometric figures (e.g., make predictions regarding translations, reflections, and rotations of common figures); (1, 4)**

G-4-M **constructing two- and three-dimensional models;**
(3)

G-5-M **making and testing conjectures about geometric shapes and their properties;**
(1, 2, 3, 4)

G-6-M **demonstrating an understanding of the coordinate system (e.g., locate points, identify coordinates, and graph points in a coordinate plane to represent real-world situations);**
(1, 3, 4)

G-7-M **demonstrating the connection of geometry to the other strands and to real-life situations (e.g., applications of the Pythagorean Theorem).**
(1, 3, 4, 5)

BENCHMARKS 9-12

Students in Grades 9-12 use number sense, estimation, models, drawings, manipulatives, and technology as they extend their investigations of problems involving geometric concepts. As a result, what they know and are able to do includes:

G-1-H **identifying, describing, comparing, constructing, and classifying geometric figures in two and three dimensions using technology where appropriate to explore and make conjectures about geometric concepts and figures;**
(1, 2, 3, 4)

G-2-H **representing and solving problems using geometric models and the properties of those models (e.g., Pythagorean Theorem or formulas involving radius, diameter, and circumference);**
(1, 2, 3)

G-3-H **solving problems using coordinate methods, as well as synthetic and transformational methods (e.g., transform on a coordinate plane a design found in real-life situations);**
(2)

G-4-H **using inductive reasoning to predict, discover, and apply geometric properties and relationships (e.g., patty paper constructions, sum of the angles in a polygon); (1, 2, 4)**

G-5-H **classifying figures in terms of congruence and similarity and applying these relationships; (4)**

G-6-H **demonstrating deductive reasoning and mathematical justification (e.g., oral explanation, informal proof, and paragraph proof). (1, 2, 4)**

DATA ANALYSIS, PROBABILITY, AND DISCRETE MATH

FOCUS

Data analysis is the collecting, organizing, presenting, and analyzing of numerical information using appropriate statistical methods. Discrete mathematics is that branch of mathematics that involves finite sets and structured sets, including matrices and graph theory. Probability is that branch of mathematics that deals with uncertainty and the likelihood of events occurring or not occurring. These three subjects are closely interwoven. Concepts from these subjects should develop gradually through many varied experiences based on students' natural interests. These concepts are essential to help students relate mathematical thinking to real-life situations, such as weather, games, sports, newspapers, and business. Classroom explorations involving these concepts should encourage the development of communication, connections, reasoning, and problem-solving skills and should effectively incorporate the use of appropriate models, manipulatives, and technology. Talking and writing should be of particular importance in this strand as students learn to analyze information and express similarities, differences, and patterns based on their investigations. The concepts studies will enable students to effectively communicate information in an organized and graphic manner that will enhance problem-solving skills.

STANDARD

In problem-solving investigations, students discover trends, formulate conjectures regarding cause-and-effect relationships, and demonstrate critical thinking skills in order to make informed decisions.

BENCHMARKS K-4

Students in Grades K-4 use collection and organizational techniques, number sense, estimation, manipulatives, and technology as they investigate problems involving data. As a result, what they know and are able to do includes:

D-1-E **collecting, organizing, and describing data based on real-life situations; (1, 3, 4, 5)**

D-2-E **constructing, reading, and interpreting data in charts, graphs, tables, etc; (1, 2, 3, 4)**

D-3-E **formulating and solving problems that involve the use of data; (2, 3, 4)**

D-4-E **exploring, formulating, and solving sequence-of-pattern problems involving selection and arrangement of objects/numerals; (2, 3, 4)**

D-5-E **predicting outcomes based on probability (e.g., make predictions of same chance, more likely, or less likely; determine fair and unfair games); (1, 2, 4)**

D-6-E **demonstrating the connection of data analysis, probability, and discrete math to other strands and real-life situations. (1, 2, 3, 4, 5)**

BENCHMARKS 5-8

Students in Grades 5-8 use collection and organizational techniques, number sense, estimation, manipulatives, and technology as they extend their investigations of problems involving data. As a result, what they know and are able to do includes:

D-1-M **systematically collecting, organizing, describing, and displaying data in charts, tables, plots, graphs, and/or spreadsheets; (1, 2, 3, 4)**

D-2-M **analyzing, interpreting, evaluating, drawing inferences, and making estimations, predictions, decisions, and convincing arguments based on organized data (e.g., analyze data using concepts of mean, median, mode, range, random samples, sample size, bias, and data extremes); (1, 2, 3, 4, 5)**

D-3-M **describing informal thinking procedures (e.g., solving elementary logic problems using Venn diagrams, tables, charts, and/or elementary logic operatives to solve logic problems in real-life situations; reach valid conclusions in elementary logic problems involving "and, or, not, if/then"); (2, 3)**

D-4-M **analyzing various counting and enumeration procedures with and without replacement (e.g., find the total number of possible outcomes or possible choices in a given situation);**
(2, 4)

D-5-M **comparing experimental probability results with theoretical probability (e.g., representing probabilities of concrete situations as common fractions, investigating single-event and multiple-event probability, using sample spaces, geometric figures, tables, and/or graphs);**
(2, 3, 4)

D-6-M **demonstrating the connection of data analysis, probability, and discrete math to other strands and to real-life situations.**
(1, 2, 3, 4, 5)

BENCHMARKS 9-12

Students in Grades 9-12 use collection and organizational techniques, number sense, estimation, manipulatives, and technology as they extend their investigations of problems involving data. As a result, what they know and are able to do includes:

D-1-H **designing and conducting statistical experiments that involve the collection, representation, and analysis of data in various forms (Analysis should reflect an understanding of factors such as: sampling, bias, accuracy, and reasonableness of data.);**
(1, 2, 3, 4)

D-2-H **recognizing data that relate two variables as linear, exponential, or otherwise in nature (e.g., match a data set, linear or non-linear, to a graph and vice versa);**
(1, 2, 3, 4)

D-3-H **using simulations to estimate probabilities (e.g., lists and tree diagrams);**
(1, 2, 3, 4)

D-4-H **demonstrating an understanding of the calculation of finite probabilities using permutations, combinations, sample spaces, and geometric figures;**
(1, 3)

D-5-H **recognizing events as dependent or independent in nature and demonstrating techniques for computing multiple-event probabilities;**
(1, 2, 4)

D-6-H **recognizing and answering questions about data that are normally or non-normally distributed;**
(1,2, 4)

D-7-H **making inferences from data that are organized in charts, tables, and graphs (e.g., pictograph; bar, line, or circle graph; stem-and-leaf plot or scatter plot);**
(1, 3, 4)

D-8-H **using logical thinking procedures, such as flow charts, Venn diagrams, and truth tables;**
(2, 3, 4)

D-9-H **using discrete math to model real-life situations (e.g., fair games or elections, map coloring).**
(1, 2, 3, 4, 5)

PATTERNS, RELATIONS, AND FUNCTIONS

FOCUS

The concepts of patterns, relations, and functions play a central role in modern mathematics. These concepts arise naturally from observations of the world. Business people, social scientists, and physical scientists use mathematics to make predictions following their study of patterns and relationships found among the quantities measured in their respective fields. In Grades K-8, students should use informal investigations to observe patterns created by nature and man (flowers, leaves, insects, music, predictable literature, wallpaper, fabric). Students should continue to use the study of patterns to explore mathematical relationships as they verbalize, complete, create, and analyze patterns. This gradual transition from the concrete to the symbolic provides a foundation for the study of functions. Not only does the high school curriculum contain the formal study of functions and inverse relations, it also uses functions and inverse relations as modeling tools for the study of relationships found in our world. This study of functions and how things change leads naturally to powerful analytic techniques, which are collectively called calculus.

STANDARD

In problem-solving investigations, students demonstrate an understanding of patterns, relations, and functions that represent and explain real-world situations.

BENCHMARKS K-4

Students in Grades K-4 use number sense, estimation, manipulatives, drawings, tables, graphs, formulas, and technology as they investigate problems involving patterns, relations, and functions. As a result, what they know and are able to do includes:

P-1-E **recognizing, describing, extending, and creating a wide variety of numerical (e.g., skip counting of whole numbers), geometrical, and statistical patterns;**
(1, 2, 3, 4)

P-2-E **representing and describing mathematical relationships using tables, variables, open sentences, and graphs;**
(1, 2, 4)

P-3-E **recognizing the use of patterns, relations, and functions in other strands and in real-life situations.**
(2, 3, 4, 5)

BENCHMARKS 5-8

Students in Grades 5-8 use number sense, estimation, manipulatives, drawings, tables, graphs, formulas, and technology as they extend their investigations of problems involving patterns, relations, and functions. As a result, what they know and are able to do includes:

P-1-M **describing, extending, analyzing, and creating a wide variety of numerical, geometrical, and statistical patterns (e.g., skip counting of rational numbers and simple exponential number patterns);**
(1, 2, 3, 4)

P-2-M **describing and representing relationships using tables, rules, simple equations, and graphs;**
(1, 3, 4)

P-3-M **analyzing relationships to explain how a change in one quantity results in a change in another (e.g., change in the dimensions of a rectangular solid affects the volume);**
(1, 2, 4)

P-4-M **demonstrating the pervasive use of patterns, relations, and functions in other strands and in real-life situations.**
(1, 4, 5)

BENCHMARKS 9-12

Students in Grades 9-12 use number sense, estimation, manipulatives, drawings, tables, graphs, formulas, and technology as they extend their investigations of problems involving patterns, relations, and functions. As a result, what they know and are able to do includes:

P-1-H **modeling the concepts of variables, functions, and relations as they occur in the real world and using the appropriate notation and terminology;**
(1, 3, 4)

P-2-H **translating between tabular, symbolic, or graphic representations of functions; (1, 3, 4)**

P-3-H **recognizing behavior of families of elementary functions, such as polynomial, trigonometric, and exponential functions, and, where appropriate, using graphing technologies to represent them; (3, 4)**

P-4-H **analyzing the effects of changes in parameters (e.g., coefficients and constants) on the graphs of functions, using technology whenever possible; (2, 3)**

P-5-H **analyzing real-world relationships that can be modeled by elementary functions. (1, 3, 4)**

SECTION V: GLOSSARY

<u>accuracy</u> **(see precision)**	**Accuracy refers to relative error, that is, the maximum allowable error (tolerance) of a measurement divided by the measurement. (*For example, if a stick is measured to the nearest centimeter as 25 centimeters long, the accuracy of that measurement is one-half—the maximum error is half a centimeter—divided by 25, or two percent.*)**
<u>algebra</u>	**The branch of mathematics that is the symbolic generalization of the ideas of arithmetic.**
<u>basic facts</u>	**Addition facts through 10 (0 + 0, 1 + 0, ... , 10 + 10), subtraction facts which are the inverses of the addition facts (20 - 10, ... , 1 - 0, 0 - 0), multiplication facts (1 x 1, 1 x 2, ... , 10 x 10), and division facts which are the inverses of the multiplication facts (1 ÷ 1, 2 ÷ 1, ... , 100 ÷ 10).**
<u>coordinate geometry</u>	**Geometry based on the coordinate system.**
<u>data analysis</u>	**The collection, organization, and interpretation of numerical data arising in the real world.**
<u>discrete math</u>	**The branch of mathematics dealing with countable sets including matrices, graph theory, and counting procedures.**
<u>experimental probability</u>	**Probability determined by collecting data from repeated trials of an experiment.**
<u>function</u>	**A relationship between two sets of numbers (or other mathematical objects). Functions can be used to understand how one quantity varies in relation to another (*for example, the relationship between the number of cars and the number of tires*). Once a member of the first set is chosen, the associated member of the second set is uniquely determined.**
<u>integers</u>	**The set of numbers consisting of the counting numbers (that is, 1, 2, 3, 4, 5, ...), their opposites (that is, negative numbers, -1, -2, -3, ...), and zero.**

<u>intuitive</u>	**Perceived insight or awareness.**
<u>magnitude</u>	**Size or largeness.**
<u>measurement</u>	**A way of quantifying the world in which we live.**
<u>patty paper</u>	**Thin, waxy squares of paper used in geometric constructions (e.g., hamburger paper).**
<u>precision</u> **(see accuracy)**	**The precision of a measurement is determined by the size of the unit used. The smaller the unit, the more precise the measurement. Precision refers to the fineness of the measurement and is limited by the measuring instrument used.**
<u>rational number</u>	**A number that can be expressed in the form a/b, where a and b are integers and b … 0 (*for example, 3/4, 2/1, or 11/3*). Every integer is a rational number, since it can be expressed in the form a/b (*for example, 5 = 5/1*). Rational numbers may be expressed as fractional or decimal numbers (*for example, 3/4 or .75*). Finite decimals, repeating decimals, and mixed numbers all represent rational numbers.**
reflection **<u>(also called a flip)</u>**	**A transformation which produces the mirror image of a geometric figure.**
<u>relation</u>	**A correspondence between two sets of numbers.**
rotation **<u>(also called a turn)</u>**	**A transformation which turns a figure about a point by a given number of degrees.**
<u>sample space</u>	**The portion of a population from which data is drawn.**
<u>statistics</u>	**The branch of mathematics which is the study of the methods of collecting and analyzing data.**
symbolic **<u>manipulator</u>**	**Technological tool (graphing calculator, computer) that performs traditional algebraic tasks, such as changing the form of expressions (e.g., factoring) and solving equations and inequalities.**

<u>tolerance</u>	**The tolerance of a measurement is the largest possible error, generally half of the unit of measure.**
<u>transformation</u>	**The process of changing one configuration or expression into another in accordance with a rule. Common geometric transformations include translations, rotations, and reflections.**
translation **<u>(also called a slide)</u>**	**A transformation that moves a geometric figure by sliding. Each of the points of the geometric figure moves the same distance in the same direction.**
<u>Venn diagrams</u>	**A method of illustrating sets and their properties using overlapping and non-overlapping circles and other plane geometric figures.**

SECTION VI: REFERENCES AND RESOURCES

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SECTION VII: ACKNOWLEDGMENTS

Louisiana Department of Education Project Staff

Rebecca Christian
Project Co-Director

William Miller
Project Co-Director

Janie Johnson
Assessment Coordinator

Thelda Adams
Curriculum Coordinator

Cindy DeLaughter
Project Secretary

Louisiana Systemic Initiatives Program Staff

Richard Anderson
Senior Advisor

Mic Lang
Associate Director for Testing and Evaluation

Stephanie Williamson
Assistant Director for Mathematics

Claudia Townsend
Mathematics Coordinator

Framework Writers

Thelda Adams, Teacher
Livingston Parish

Karen Aguillard, Teacher
Lafayette Parish

Candi Bagley, Teacher
Bossier Parish

Kathleen Chadick, Teacher
East Baton Rouge Parish

Bradd Clark, Assistant Professor
University of Southwestern Louisiana

Phyllis Desormeaux, Teacher
Lafayette Diocese

Mary Lou Hughes, Teacher
Bossier Parish

Mathematics Committee Members

Ann Allred, Teacher
Bossier Parish

Gwen Barsley
Bureau of Secondary Education, LDE

Ginnie Bolin
Supervisor of Instructional Services
East Baton Rouge Parish

Linda Bosch, Teacher
East Baton Rouge Parish

Patrick Bouillion
Teacher, Lafayette Parish

Michelle Bourgeois, Teacher
East Baton Rouge Parish

Jo Boutte, Teacher
East Baton Rouge Parish

Connie Buck
Bureau of Secondary
Vocational Education, LDE

Donna Bucko, Teacher
Ouachita Parish

Janice Carter, Teacher
Orleans Parish

Stan Chadick
Mathematics Department
Northwestern State University

Theresa Champagne, Teacher
Bossier Parish

Pennie Childs, Teacher
Livingston Parish

Fen Chou
Bureau of Pupil Accountability, LDE

Jean Clement
Bureau of Secondary Education, LDE

Ann Clouatre
Office of Special Education, LDE

Wilfred Parl Cluse, Teacher
St. Martin Parish

Beverly Cole, Teacher
Caddo Parish

Lovenia DeConge-Watson
Department of Mathematics
Southern University

Debbie Dees, Teacher
Ouachita Parish

Debra Dixon
Bureau of Program Development,
LDE

Gervis Duhon, Title 1 Supervisor
Lafayette Parish

Alice Efferson, Teacher
East Baton Rouge Parish

Velma Fuller, Teacher
Caddo Parish

Brenda Gates, Teacher
Livingston Parish

Clara Glasper
Supervisor of Science
East Baton Rouge Parish

Cathy Glover, Teacher
East Baton Rouge Parish

Sharon Grand, President
Louisiana Association of Teachers of Mathematics

Pam Haley
Mathematics Coordinator
Bossier Parish

Zoe Harrell, Teacher
East Baton Rouge Parish

Octavio Hernandez, Teacher
Jefferson Parish

Mary Hitt, Teacher
St. Charles Parish

Jan Jarrell, Supervisor
Jefferson Parish

Susan Johnson
Bureau of Elementary Education, LDE

Willie Johnson
Vice President of Education
Baton Rouge Chamber of Commerce

Colonel Johnson, Professor
Southern University

Patricia Jones
Mathematics Department
University of Southwestern Louisiana

Candy Jones
Bureau of Elementary Education, LDE

Eliza Jones, Supervisor
Child Welfare and Attendance
Natchitoches Parish

Kathy Jordan
LaSIP Site Coordinator
Northwestern State University

Mary Lou Jumonville
LaSIP Site Coordinator
University of Southwestern Louisiana

Latrenda Knighten, Teacher
East Baton Rouge Parish

Sherrye Lacy, Teacher
Monroe City Schools

Alvin Lasseigne, Teacher
St. Martin Parish

Kim LeBlanc, Teacher
Jefferson Davis Parish

Ellen Lee, Teacher
St. Joseph Academy

Paul Long
Bureau of Secondary Education, LDE

Mary Lou Maples, Teacher
Bossier Parish

Marcia Machen, Teacher
Bossier Parish

Kimberly McAlister, Teacher
Rapides Parish

Danny McNabb, Teacher
Jefferson Davis Parish

Nora Miller, Teacher
East Baton Rouge Parish

Stuart Mills
Mathematics Department
Louisiana State University

Bart Moore, Teacher
Orleans Parish

Anna Beth Neasom
Bureau of Secondary Vocational Education, LDE

Linda Painter, Teacher
Livingston Parish

Thelemese Porter, Supervisor
East Baton Rouge Parish

Tommie Powell
Supervisor of Instruction
St. Bernard Parish

Dawn Pryne, Teacher
East Baton Rouge Parish

Bonnie Reeves, Teacher
Orleans Parish

Ron Retherford
Mathematics Department
Louisiana State University

Carole Risher, Supervisor
St. Tammany Parish

Marlene Ritter
Director of Secondary Education, LDE

Ray Robicheaux
Mathematics Department
Louisiana State University-Eunice

Polly Rodrigue
Nicholls State University

Gerrie Schexnayder
Mathematics Curriculum Specialist
Terrebonne Parish

Charles Scribner
Curriculum Coordinator
Lincoln Parish

Trudy Segars, Teacher
East Baton Rouge Parish

Carolyn Sessions, Teacher
East Baton Rouge Parish

Delores Simoneaux
Education Department
Southeastern Louisiana University

Ivy Smith, Teacher
East Baton Rouge Parish

Rosalyn Smith, Teacher
Orleans Parish

Pat Speeg
Mathematics Consultant
Jefferson Parish

Brenda Sterling, Teacher
East Baton Rouge Parish

John Taylor
Jacobs Engineering Company

Judy Vail
Mathematics Coordinator
Calcasieu Parish

Clinton Wallace, Teacher
Caddo Parish

Louvinia Wallace, Teacher
Orleans Parish

Ann Watts, Teacher
East Baton Rouge Parish

Mattie White, Teacher
Orleans Parish

Lawrence Woodard
Department of Mathematics
Dillard University

Activity Writers for Teacher Handbook

Thelda Adams, Teacher
Livingston Parish

Tandy Arnold, Teacher
Bienville Parish

Linda Beyt, Teacher
Lafayette Parish

Suzanne Bumgardner, Teacher
Bienville Parish

Kathleen Chadick, Teacher
East Baton Rouge Parish

Nancy Crochet, Teacher
St. Mary Parish

Victoria Danna, Teacher
St. Charles Parish

Torrie Guzzetta, Teacher
Lafayette Parish

Martha Kilgore, Teacher
Webster Parish

Leslie Koenck, Teacher
Vernon Parish

Peggy Marcel, Teacher
Terrebonne Parish

Carolyn Mercer, Teacher
Bossier Parish

Beth Miller, Teacher
East Baton Rouge Parish

Patricia Miller, Teacher
Ascension Parish

Monica Mitchell, Teacher
Ascension Parish

Carol Price, Teacher
East Baton Rouge Parish

Genevieve Ross, Teacher
East Baton Rouge Parish

Rebecca Runnels, Teacher
East Baton Rouge Parish

Delores Simoneaux,
Assistant Professor
Southeastern Louisiana University

Ellen Watson, Teacher
Rapides Parish

Field Review Teachers

Ronnie Ackal
Iberia Parish

Vanessa Adams
Franklin Parish

Kay Ambrose
Lincoln Parish

Kay Andrews
Bienville Parish

Alisa Antley
Lincoln Parish

Suzzette Armentor
Iberia Parish

Emily Armond
Plaquemines Parish

Judy Bacle
Union Parish

Elizabeth Badeaux
Lafourche Parish

Rosemary Balfantz
Livingston Parish

Guyette Barham
Lincoln Parish

Brian Barrios
Grant Parish

Susan Baston
Caddo Parish

Pat Beams
Winn Parish

Amy Beatty
Iberville Parish

Alva Benson
Bossier Parish

Beverly Blanchard
Ascension Parish

Patricia Blanchard
Jefferson Parish

Karla Booth
Tangipahoa Parish

Gwen Boudreaux
Ascension Parish

Evette Broussard
Jefferson Davis Parish

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Ed Calvin
Richland Parish

Kim Campbell
St. Bernard Parish

Alberatha Campbell
Lafourche Parish

Rachel Canady
Jackson Parish

Mona Champagne
St. John Parish

Aline Chaney
East Baton Rouge Parish

Darilyn Chanik
Cameron Parish

James Combs
Webster Parish

Kathy Couvillion
Avoyelles Parish

Marie Delord
Cameron Parish

Lori Dick
DeSoto Parish

Angell Diggs
St. James Parish

Dana Dodds
Bogalusa Schools

Katrina Dowden
Sabine Parish

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Grant Parish

Gloria Edmonds
LaSalle Parish

Donna Edwards
Madison Parish

Gary Edwards
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Florence Ferrington

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Winn Parish

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St. Charles Parish

Susan Gauthier
West Baton Rouge Parish

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LaSalle Parish

Charlotte Gilley
Allen Parish

Amy Gros
St. John Parish

Evelyn Guion
St. Mary Parish

Sylvia Hammett
West Carroll Parish

Donald Hampton
East Carroll Parish

Vicky Hand
Calcasieu Parish

Julia Hardy
St. Charles Parish

Jolise Heiderhoff
Orleans Parish

Marta Hernandez
Bossier Parish

David Hillman

Franklin Parish
Roslyn Holmes
Caddo Parish

Lisa Honore
Orleans Parish

Evelyn Holloway
West Feliciana Parish

Monay Howard
Grant Parish

John Howe
Rapides Parish

Mary Hymel
St. Martin Parish

Emelda Irvin
St. Tammany Parish

Katherine Jensen
East Feliciana Parish

Diane Jones
Iberville Parish

Hueylene Jordan
Webster Parish

Edwin Kelly
Beauregard Parish

Edna King
East Carroll Parish

Holly King
Washington Parish

Caldwell Parish
Donna Kirkpatrick
Caddo Parish

Kathy Knight
Bogalusa Schools

Gayle Laffite
DeSoto Parish

Jacqueline Langlinais
Vermilion Parish

Debbie Laviolette
Beauregard Parish

Jo-Lynn Lewis
Calcasieu Parish

Willie Lloyd
Calcasieu Parish

Janie Mabry
Lafayette Parish

Deonne Manuel
Allen Parish

Cynthia Martin
Terrebonne Parish

Carol Massey
Jackson Parish

Beatrice Matthews
St. Helena Parish

Becky Maudlin
Rapides Parish

William Kirby
Catahoula Parish

Karen Melerine
St. Bernard Parish

Catherine Menard
Iberia Parish

Patricia Merrill
Concordia Parish

Clarice Monroe
East Baton Rouge Parish

Roland Moore
Assumption Parish

Carolyn Moore
Tensas Parish

Sandy Morgan
Washington Parish

Marilyn Morgan
Claiborne Parish

Betty Morris
Acadia Parish

Penny Morris
Jackson Parish

Gloria Myers
Pointe Coupee Parish

Donna Myers
West Feliciana Parish

Pamela Naifeh

Debbie McKay
Richland Parish

Niki Pannett
St. Mary Parish

Marian Phillips
West Carroll Parish

Lisa Piner
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St. Landry Parish

Unaka Pugh
Morehouse Parish

Michael Rachal
Avoyelles Parish

Shelia Robert
Lafayette Parish

Yolanda Riberia
Jefferson Parish

Jeanine Roche
St. Bernard Parish

Joanna Roubique
Tangipahoa Parish

Gerald Sandidge
DeSoto Parish

Sara Seeliger
Claiborne Parish

Charlene Serrette

Bossier Parish

Ann Pace
Lafayette Parish

Edith Simon
Orleans Parish

Lola Smith
Sabine Parish

Shirley Sneed
Natchitoches Parish

Lucinda Stark
Jefferson Davis Parish

Glenn Stephens
St. Landry Parish

Susan Stewart
Monroe City Schools

Marie Stout
St. Charles Parish

Kay Terry
Catahoula Parish

Thomas Theaux
Beauregard Parish

Terry Thibodeaux
Rapides Parish

Bryan Trahan
Allen Parish

St. Martin Parish

Linda Simmons
St. Mary Parish

Dorothy Ulmer
Concordia Parish

Van-Bradley Veillon
Evangeline Parish

Debbie Vicknair
Ascension Parish

Betty Walters
Red River Parish

Darlene Watson
Ouachita Parish

Patty Watts
Madison Parish

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Bossier Parish

May Lou Hughes, Teacher
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LaSIP Site Coordinator
University of Southwestern Louisiana

Nora Miller, Teacher
East Baton Rouge Parish

Kay Neuse
LaSIP Regional Coordinator
Region VII

Ray Robicheaux
Mathematics Department
Louisiana State University-Eunice

Ellen Watson
LaSIP Regional Coordinator
Region VI

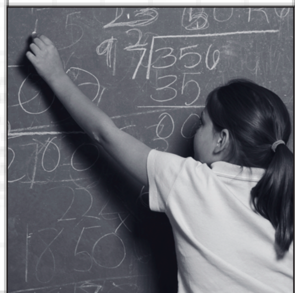
Year One Monitoring Team

Gayle Potter
Arkansas Department of Education

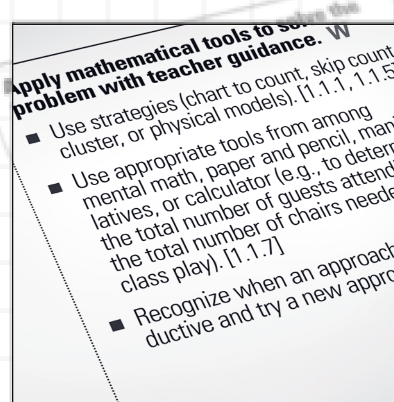
Cynthia Ward
Mississippi Department of Education

Catherine Wilcoxson
Nebraska Department of Education

Appendix G: Washington K-10 Grade Level Expectations

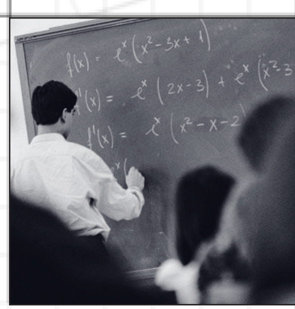


Mathematics



K–10 Grade Level Expectations:

A New Level of Specificity



Washington State's

Essential Academic Learning Requirements

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Office of Superintendent of Public Instruction — 2004

Contents

A New Level of Specificity

"Grade level expectations in mathematics will help more students understand and apply math concepts. This detailed roadmap outlines the mathematics skills and processes students need to develop as they progress through school. This is a much-needed, valuable tool that will help teachers guide their K–10 instruction and help all students achieve mathematics proficiency."

Dr. Terry Bergeson
Superintendent of Public Instruction

This publication is designed to help students in Washington's classrooms become proficient in the skills and processes of mathematics.

Washington's school reform efforts focus on setting clear, high expectations for what students should know and be able to do. The Essential Academic Learning Requirements (EALRs) articulate the state's expectations and learning standards. The Washington Assessment of Student Learning (WASL) measures whether students have met these standards.

The original EALRs defined benchmarks, or cumulative indicators, for grades 4, 7, and 10. Written in very broad terms to provide flexibility and local control, each district had the responsibility to determine the learning expectations for students in the other grades. Content frameworks were developed to provide grade level guidance. The new Grade Level Expectations (GLEs) provide specific learning standards for students in grades K–10, clarifying the skills and strategies all students need to demonstrate proficiency in each content area.

Just as EALRs were developed by Washington educators, administrators, parents, and community members, developing or creating the Grade Level Expectations involved hundreds of participants and countless feedback opportunities. Drafting teams not only defined what students should know and be able to do at each grade level, they developed descriptions of how students could demonstrate proficiency. The resulting "evidence of learning" statements take the specificity of the EALRs to a new level. As an example, a third grade teacher looking for signs of fluency in addition with whole numbers will expect students to describe and compare strategies to solve three-digit addition problems.

The Office of Superintendent of Public Instruction is committed to helping educators provide high quality instruction for all Washington students. This document provides all educators access to essential learning expectations to ensure all students achieve mathematics success.

A Decade of Education Reform

"... provide students with the opportunity to become responsible citizens, to contribute to their own economic well-being and to that of their families and communities and to enjoy productive and satisfying lives."

■ **Basic Education Act Preamble**, 1993

Ten years ago, Washington established the commitment that all children would achieve at high levels. The purpose of this reform is clearly spelled out in the preamble of the Basic Education Act of 1993: *"... provide students with the opportunity to become responsible citizens, to contribute to their own economic well-being and to that of their families and communities and to enjoy productive and satisfying lives."* The law established four common learning goals for all Washington students designed to create high quality academic standards and raise student achievement. The four learning goals provided the foundation for the development of standards, called Essential Academic Learning Requirements, for reading, communications, writing, mathematics, science, social studies, health/fitness, and the arts. Establishing an assessment system to measure progress and establishing an accountability system to monitor progress complete the key components of the Basic Education Act.

Washington State Learning Goals

- **Read** with comprehension, **write** with skill, and **communicate** effectively and responsibly in a variety of ways and settings.
- **Know and apply the core concepts and principles** of mathematics; social, physical, and life sciences; civics and history; geography; arts; and health and fitness.
- **Think** analytically, logically, and creatively, and integrate experience and knowledge to form reasoned judgments and solve problems.
- **Understand** the importance of work and how performance, effort, and decisions directly affect **future career and educational opportunities**.

In the last decade, educators at every level contributed tremendous effort, bringing greater clarity to the EALRs. The creation of Grade Level Expectations is a logical next step to provide educators with greater specificity, as well as to respond to the Elementary and Secondary Act of 2001. This federal legislation, known as the *No Child Left Behind Act*, calls for each state to adopt challenging academic standards for all students. The Grade Level Expectations will be used to develop new assessments in reading, mathematics, and science required by this law.

Mathematics EALRs with Grade Level Expectations

K–10 EALR Statement									
K–10 Component									
Grade Level Expectations (GLEs)									
K	1	2	3	4	5	6	7	8	9/10

- Evidence of Learning
- Evidence of Learning
- Evidence of Learning

EALR 1: The student understands and applies the concepts and procedures of mathematics.

EALR 1 is commonly referred to as the content (or content strands) of mathematics. This EALR is subdivided into five components: *number sense, measurement, geometric sense, probability and statistics,* and *algebraic sense*.

EALR 2: The student uses mathematics to define and solve problems.

Problem solving should be "… a primary goal of all mathematics instruction and an integral part of all mathematical activity. Problem solving is not a distinct topic but a process that should permeate the entire program and provide the context in which concepts and skills can be learned" (*Curriculum and Evaluation Standards for School Mathematics, NCTM 1989*).

EALR 3: The student uses mathematical reasoning.

A major goal of mathematics instruction is to help children believe they can do mathematics and have control over their own success. Autonomy develops as children gain confidence in their ability to reason and justify their thinking. This power grows as children learn that mathematics is not simply memorizing rules and procedures, but also using logic to develop understanding (*ibid.*).

EALR 4: The student communicates knowledge and understanding in both everyday and mathematical language.

Mathematics is a language and science of patterns and means for describing the world in which we live. With its symbols and vocabulary, mathematics offers a universal way of communicating about relationships and patterns.

EALR 5: The student understands how mathematical ideas connect within mathematics, or other subject areas, and to real-life situations.

It is important that children see how mathematical ideas are related and connect ideas among and within areas of mathematics. Without such connections, children have to learn and remember isolated concepts and skills rather than overarching principles. When mathematical ideas are connected to everyday experiences, both in and out of school, children learn to value and appreciate the usefulness of mathematics (*ibid.*).

Grounding the Work in Research

Research documents utilized to develop the GLEs were the *Curriculum and Evaluation Standards for School Mathematics* (NCTM 1989), *Principles and Standards* (NCTM 2000), *Adding It Up: Helping Children Learn Mathematics* (NRC 2001), *On the Shoulders of Giants: New Approaches to Numeracy* (MSEB 1990), *A Research Companion to Principles and Standards for School Mathematics* (NCTM 2003), and *Elementary and Middle School Mathematics: Teaching Developmentally* (Van de Walle 2003), *Culturally Responsive Teaching: Theory, Research, & Practice* (Dr. Geneva Gay 2000).

Technology

Technology should be available and used throughout the K–12 mathematics curriculum. In the early years, students can use basic calculators to examine and create patterns of numbers. In the upper elementary and lower middle school years, students should be encouraged to continue examining patterns, and also extend the use of technology to create charts and graphs and to develop reports. Students at these ages can also use spreadsheet software to enhance their algebraic understanding of variables and iteration. During the middle school and high school years, a wide range of technology should be available to examine complex numerical ideas, data, functions and their graphs, and interactive systems. Technology should also be used to create and examine geometric relationships, as well as to communicate.

Culturally Responsive Teaching

For all students to meet grade level expectations, mathematics instruction should "... incorporate everyday-life concepts, such as economics, employment, consumer habits, of various ethnic groups. In order to teach to the different learning styles of students, activities should reflect a variety of sensory opportunities — visual, auditory, tactile." (Gay, 2000)

Culturally responsive teaching defines the context of the mathematics classroom and may well provide the corner-stone that allows all of our students to achieve proficiency in mathematics. Culturally responsive teaching:

- Acknowledges the legitimacy of the cultural heritages of different ethnic groups, both as legacies that affect students' dispositions, attitudes, and approaches to learning and as worthy content to be taught in the formal curriculum;
- Builds bridges of meaningfulness between home and school experiences as well as between academic abstractions and lived socio-cultural realities;
- Uses a wide variety of instructional strategies that are connected to different learning styles;
- Teaches students to know and praise their own and each others' cultural heritages; and
- Incorporates multicultural information, resources, and materials in all the subjects and skills routinely taught in schools (*ibid.*, p. 29).

Introduction

Understanding Grade Level Expectations

An ***Essential Academic Learning Requirement*** is a broad statement of learning that applies to grades K–10.

The ***Component*** is a K–10 statement that further defines the EALR. There is at least one component for each EALR.

The ***Grade Level Expectation*** is a statement of *cognitive demand,* using Bloom's Taxonomy, and the *essential content* or *process to be learned.* The statement, specific to one or more grades, defines the component.

The ***Evidence of Learning*** is a bulleted list of *student demonstrations* that provide educators with common illustrations of the learning. Because the bulleted list is not exhaustive, educators are encouraged to seek additional evidence of student learning.

The GLE ***Numbering System*** identifies the EALR, the component, and the GLE. For example, in the number 1.2.1, the first number stands for the EALR, the second for the component, and the third for the GLE. Note: Grade levels are not referenced in the numbering system.

Grade Level Expectations with a "**w**" denote the specific expectations which are eligible for the WASL. Not all GLEs have a "**w**." Note: Narrowing instruction to just those expectations with a "**w**" may adversely affect student mathematics success.

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.2: Understand and apply concepts and procedures from measurement.

GLE	Grade 5
Attributes, units, and systems	
1.2.1	**Understand the concept of angle measurement.** W ■ Describe and compare angles in a variety of objects. [CU] ■ Identify angles in the environment. [MC] ■ Classify or sort angles as right, acute, or obtuse. [RL, CU] ■ Identify types of angles in polygons (e.g., right, acute, obtuse). [MC] ■ Explain and provide examples of how angles are formed.

Connecting Content and Process

The relationship between content and process in mathematics is critical. It is the combination of these that gives students mathematical power. Either used in isolation will not develop mathematically proficient students. Teachers are expected to use instructional practices that provide opportunities for students to experience both on a regular basis.

Links between content and process are noted throughout the document. GLEs from EALR 1 (commonly referred to as the *content strands*) include references to the mathematical processes. GLEs for the mathematical processes (EALRs 2–5) include references to content GLEs from EALR 1. These references are found in brackets following evidence of learning statements.

Content to Process Example:

Grade 5

GLE 1.2.1: Understand the concept of angle measurement.

- Identify types of angles in polygons (e.g., right, acute, obtuse). **[MC]**

The **[MC]** links the geometric concept of angle measurement (content) to the mathematical process of Makes Connections.

EALR 2 — [SP] Solves Problems
EALR 3 — [RL] Reasons Logically
EALR 4 — [CU] Communicates Understanding
EALR 5 — [MC] Makes Connections

Process to Content Example:

Grade 3

GLE 4.1.2: Understand how to extract information for a given purpose from one or two different sources using reading, listening, and observation.

- Read and report on data from tables, charts, and bar graphs. **[1.4.5]**

The **[1.4.5]** refers to the GLE from EALR 1 in Grade 3. This links the process of Communicates Understanding (EALR 4) to content in probability and statistics.

Alignment for Student Achievement

"Without alignment, there can be no fair judgment about how well schools are really doing."

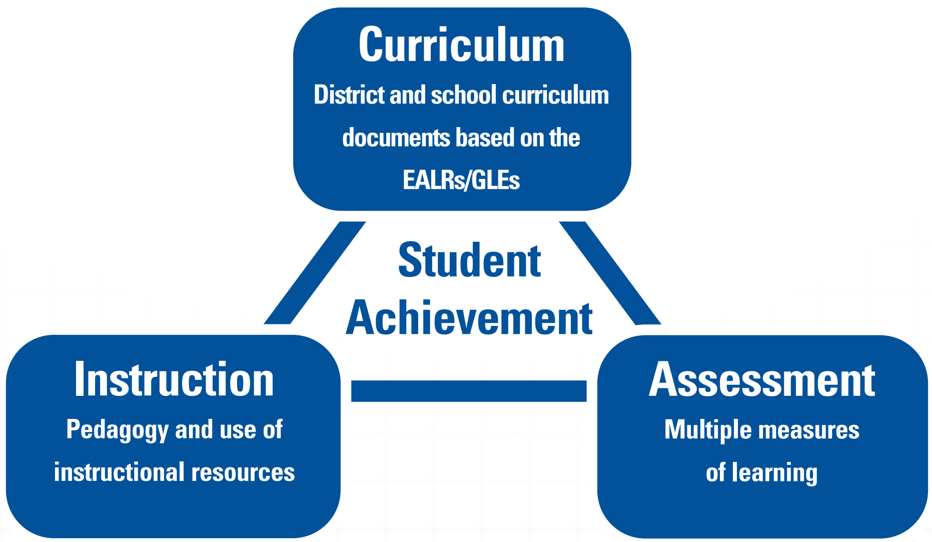
■ **Fenwick English**, 2000

It is critical that the **curriculum**, **instruction**, and **assessment** deeply align. The Essential Academic Learning Requirements (EALRs), including the Grade Level Expectations (GLEs), provide the foundation for the development of district and school curriculum documents. Instruction refers to both the teacher's pedagogy and use of instructional resources. Assessment includes diagnostic, formative (classroom-based), and summative (including the WASL) assessments.

Alignment refers to the match between curriculum, instruction, and assessment in regard to the **content**, the **context**, and the **cognitive demand** of the learning. The content identifies the concepts, procedures, and/or processes to be learned. **Topical alignment** occurs when content and curriculum match.

Context encompasses the learning environment, format, instructional resources and support provided students for acquiring and practicing the content. Cognitive demand refers to the type of cognition required of the student, as defined in Bloom's Taxonomy of the Cognitive Domain (see appendix). It is important to note that the use of Bloom's Taxonomy in this document reflects a classification of six types of cognition rather than a hierarchy of dependent levels of cognition.

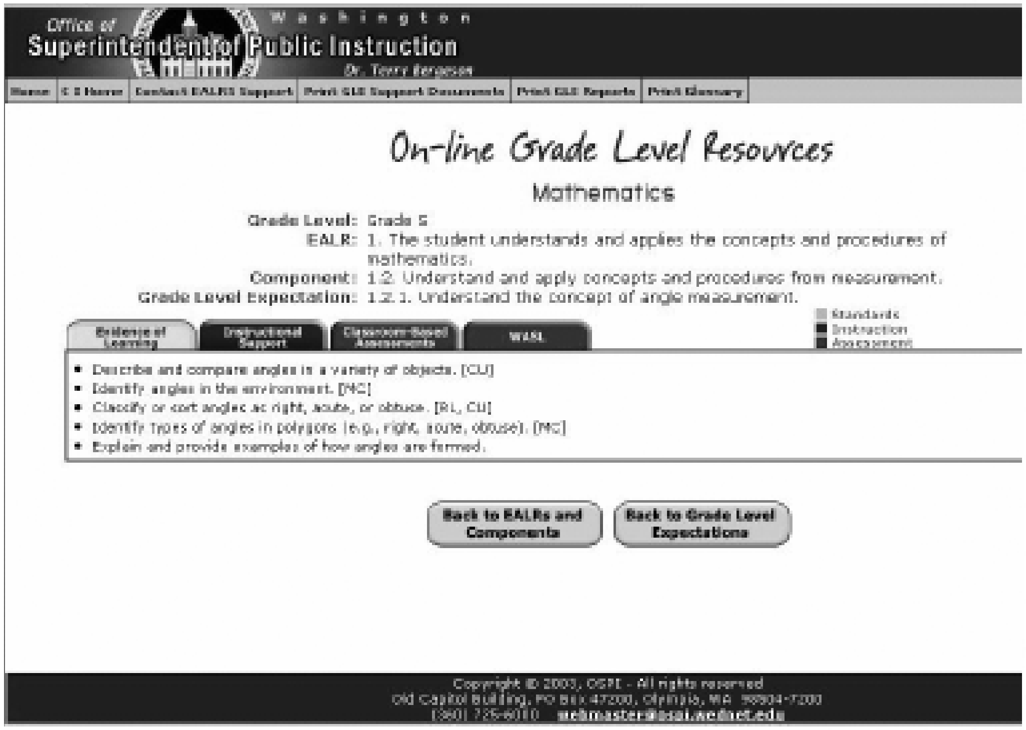
Deep alignment requires not only **content** alignment, but alignment of **context** and **cognitive demand** as well.



Accessing the On-line Grade Level Resources

Aligned GLE support can be accessed via On-line Grade Level Resources at the Curriculum and Instruction home page on the OSPI website. This interactive resource provides the following features:

- GLE Reports (grade level, grade spans, K–10 GLEs).
- Links to GLE glossary.
- Aligned instructional support.
- Integration links to other content areas.
- Support for classroom-based assessments.
- Links to WASL strands, learning targets, released items, and annotations.



www.k12.wa.us/CurriculumInstruct

An Overview of K–10 Mathematics Instruction

The Grade Level Expectations (GLEs) describe a connected series of learning competencies necessary to create mathematically proficient citizens. The GLEs define the knowledge and skills that students should gain from kindergarten through the 10th grade. These expectations should not be the end of the mathematical experience for students. Rather, they serve as a solid foundation on which continued application and learning of mathematics contributes to success in high school and beyond.

Kindergarten
In kindergarten, students begin developing the concept of number by counting, representing and ordering, combining, sorting, and comparing sets of objects. They understand addition as putting sets together. In describing and identifying objects based on attributes and recognizing and describing simple repeating patterns, students develop a beginning sense of geometry and algebra. They also develop an understanding of the relationship between data and picture representations of the data.

Grade 1
In first grade, students count, sort, and compare sets, understanding the relative values of numbers. Students understand subtraction as separating or undoing addition and expand their understanding of number through application of basic addition and subtraction facts. Students read a clock, work with two-dimensional figures and use nonstandard units to measure. They also develop their understanding of statistics by organizing and interpreting data. They recognize and describe simple repeating and growing patterns to develop their algebraic sense.

Grade 2
In second grade, students expand their understanding of number to include three-digit numbers. They continue to gain proficiency in the basic addition and subtraction facts and expand concepts in measurement, using procedures to find measures (time, weight). By interpreting and creating picture and bar graphs, students further develop their early understanding of statistics. Students also work with a variety of patterns and use symbols to describe numerical relationships.

Grade 3
In third grade, students develop their fluency with addition and subtraction, while beginning to understand multiplication and division as repeated addition and subtraction, respectively. Students use standard units of measure for temperature, length, liquid volume, and weight. Students gain a broader understanding of geometry by identifying properties of shapes and line segments. Algebraic sense grows through their understanding of equality and by identifying missing numbers in addition and subtraction expressions and equations.

Grade 4
In fourth grade, students become proficient with multiplication and division of whole numbers, while developing an understanding of fractions and decimals. In measurement, they develop an understanding of area. The concept of probability as chance is developed and fourth graders continue to expand their understanding of statistics using graphing and measures of central tendency. Students refine their estimation skills for computation and measurement and develop an understanding of the relationships between and among two-dimensional (plane) figures. They graph points in the first quadrant on a coordinate plane and extend and duplicate patterns. Students recognize a geometric transformation, such as a reflection (flip) and a translation (slide).

Grade 5
In fifth grade, students become proficient using non-negative rational numbers to solve problems. They apply procedures to measure a variety of geometric figures and collect, display, and analyze data. Students examine the basis of probability, and also the mean. They solve problems involving area and perimeter and further develop algebraic sense through variable expressions and open sentences.

Grade 6
In sixth grade, students begin developing their understanding of negative numbers with the introduction of integers. Students also begin working with other representations of rational numbers. They examine the concept of volume, as well as collect, analyze, display, and interpret data, using a variety of graphical and statistical methods. They find the probability of events and analyze numerical and geometric patterns. Students also develop an understanding of algebraic terms and solve algebraic equations in one variable.

Grade 7
In seventh grade, students complete their development of the rational number system with the inclusion of negative decimals and fractions. Fluency of all operations on non-negative rational numbers is expected of students, as is proficiency with addition and subtraction of all rational numbers. Students understand proportional reasoning and similarity and use these concepts to solve problems. They locate points in any of the four quadrants on a grid and translate linear relationships in table, graph and equation forms. Students extend their understanding of probability into multiple events. Algebraic sense also develops as students solve two-step equations in one variable.

Grade 8
In eighth grade, students are proficient in computation with all rational numbers and use proportions to solve a variety of problems. They understand the need for precision when measuring and use derived units of measure. Students understand the concept of distance and the relationship between distance and the Pythagorean Theorem. They recognize three-dimensional shapes represented in two-dimensional drawings and apply transformations to geometric shapes in the coordinate plane. Eighth graders find probability of compound events and analyze bivariate data sets. They also understand recursive forms of linear and exponential relationships and solve two-step equations and inequalities.

Grades 9–10
In ninth and tenth grades, there may be a number of different course offerings for students. Regardless of the particular title of the course, students will be proficient with operations on rational numbers in all forms and scientific notation representing very large and very small numbers. Students analyze effects of changes in dimension and apply formulas to measurement. They understand both the U.S. and metric systems and are able to convert units within each system. Students use a variety of methods and formulas to find area, volume, the slope of a line, and the distance between points on a coordinate grid. They apply multiple transformations to figures or points, and can apply conditional probability in situations. Students develop equations for linear models. They analyze statistical arguments for accuracy and bias, develop arithmetic and geometric patterns using recursive definitions, and solve multi-step equations and systems of equations in two variables.

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense.

GLE	K	1	2	3	4
Number and numeration					
1.1.1	**Understand the concept of number.** ■ Count to at least 31. ■ Represent a number to at least 10 in different ways (e.g., numerals, spoken words, pictures, physical models). [CU] ■ Show that the last count word names the quantity of the set (cardinality) (i.e., when counting fingers on a hand "one, two, three, four, five," the "five" says how many fingers there are). [CU, MC] ■ Identify the base ten digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. ■ Explain how numbers are used and give examples (e.g., to count, to order). [CU]	**Understand different representations of whole numbers.** ■ Represent a number to at least 100 in different ways (e.g., numerals, pictures, words, physical models) and translate from one representation to another. [CU] ■ Group and regroup objects into 1s and 10s. ■ Count sets of objects less than 100 using a variety of grouping strategies.	**Understand place value in whole numbers.** ■ Group and regroup objects into 1s, 10s, and 100s and explain relationships. [CU] ■ Determine the value of a digit based on its position in a number. ■ Read and write numbers to at least 1,000. [CU]	**Understand the concept of whole numbers.** W ■ Represent a number to at least 10,000 in different ways (e.g., words, numerals, pictures, physical models). [CU] ■ Translate from one representation of a whole number to another in standard, expanded, and word forms. [MC] ■ Generate equivalent representations for a given number by decomposing and composing. [MC] ■ Explain the difference between the natural numbers and the whole numbers. ■ Identify place values of digits of whole number to the hundreds or thousands place using words, pictures, or numbers. ■ Write whole numbers to 999. ■ Decompose whole numbers into components (e.g., 35 is made of 3 tens and 5 ones) using words, numbers, or pictures.	**Understand the concept of decimals (money) and fractions.** W ■ Interpret fractions as parts of a whole object, number, or set (e.g., half of a medium pizza and half of a large pizza are not equal amounts). ■ Symbolically represent parts of a whole or parts of a set with common denominators. [CU] ■ Explain how fractions (denominators of 2, 3, 4, 6, and 8) represent information across the curriculum (e.g., interpreting circle graphs, fraction of states that border an ocean). [CU, MC] ■ Represent decimals (money) in multiple ways (e.g., symbols, physical models). [CU] ■ Explain or show how a fraction can be decomposed into smaller fractions (e.g., $^3/_4 = {^1/_4} + {^1/_4} + {^1/_4}$).
1.1.2	**Understand sequential relationships among whole numbers.** ■ Tell what number comes before or after a given number. ■ Use comparative language (e.g., less than, more than, equal to) to compare numbers to at least 20. [CU] ■ Use a known quantity to at least 10 (benchmark) to compare sets (e.g., sets of counters). ■ Identify the ordinal position of objects at least through tenth (e.g., first, second . . .).	**Understand sequential relationships among whole numbers.** ■ Order three or more numbers to at least 100 from smallest to largest. [RL] ■ Use comparative language (e.g., less than, more than, equal to) to compare numbers to at least 100. [CU] ■ Skip count by 2, 5, and 10. ■ Count forward and backward, from a given number that is less than 100.	**Understand sequential relationships among whole numbers.** ■ Order three or more numbers to at least 1,000 from smallest to largest. [RL] ■ Use comparative language (e.g., less than, more than, equal to) to compare numbers to at least 1,000. [CU]	**Understand the relative values of whole numbers.** W ■ Compare whole number values to at least 10,000 using the symbols for "greater than," "less than," and "equal to." ■ Order three or more numbers to at least 10,000 from smallest to largest. [CU] ■ Compare combined quantities (e.g., 50 + 3 is greater than 40 + 9). [RL]	**Understand the relative values of fractions and decimals (money).** W ■ Model and describe equivalent fractions (e.g., paper folding, geoboards, parallel number lines). [CU] ■ Use a number line to approximate and label halves, thirds, and fourths in relationship to whole units. [CU, MC] ■ Order fractions with like denominators. [RL] ■ Demonstrate and explain equivalent relationships between decimals and fractions (e.g., \$.50 is equal to 1/2 a dollar and 50/100 of a dollar) using models. [CU, MC] ■ Demonstrate or show the order of like-denominator fractions using pictures or objects. [CU]

Component 1.1: Understand and apply concepts and procedures from number sense.

GLE	5	6	7	8	9/10
Number and numeration					
1.1.1	**Understand the concepts of fractions and decimals.** W ■ Represent mixed numbers, improper fractions, and decimals. ■ Create a model when given a symbolic representation or write the fraction when given a model (e.g., number line). [CU] ■ Explain the value of a given digit in a decimal to at least the thousandths place. [CU] ■ Explain how the value of a fraction changes in relationship to the size of the whole (e.g., half a pizza vs. half a cookie). [CU] ■ Use factors and multiples to rename equivalent fractions. [RL] ■ Read and write decimals to at least the thousandth place. [CU] ■ Demonstrate and explain equivalent relationships between decimals and fractions (e.g., $.50 is equal to ½ a dollar and 50/100 of a dollar) using models. [CU, MC] ■ Convert between improper fractions and mixed numbers. [MC]	**Understand the concept of integers as the set of natural numbers (1, 2, 3 …), their opposites (-1, -2, -3 …), and 0.** W ■ Illustrate integer values using models and pictures (e.g., temperature, elevators, net worth/debt, riding a bus or subway). [CU] ■ Apply rules of divisibility to show if a quotient is an integer. [RL] ■ Explain the meaning of integers and give examples. ■ Identify the opposite of a given integer.	**Understand the concept of rational numbers (integers, decimals, fractions).** W ■ Create a model when given a symbolic representation of a rational number. [CU, MC] ■ Write the rational number when given a model (e.g., number line, area model, situation, diagram, picture). [CU, MC] ■ Identify and convert between equivalent forms of rational numbers (e.g., fractions to decimals, percents to fractions). [MC] ■ Identify prime, square, or composite numbers. [CU] ■ Explain the meaning of rational numbers and give examples. [CU]	**Understand the concept of rational numbers including whole number powers and square roots of square numbers.** W ■ Explain the meaning of a whole number exponent. [CU] ■ Read and use exponential notation to represent large numbers (e.g., $2500 = 50^2$). [MC] ■ Identify a square number and find its root. ■ Identify different representations of rational numbers and select the best representation in the situation (e.g., percent for sales discount or sales tax, fraction for probability, and decimals for money, distance [4.35 kilometers], batting averages). ■ Write a squared number.	**Understand and apply scientific notation.** W ■ Read and use scientific and exponential notation. [MC, RL] ■ Identify a real-life situation to match a particular number written in scientific or exponential notation and justify the answer. [MC, RL] ■ Use scientific or exponential notation to simplify a problem. [RL, MC] ■ Illustrate the meaning of scientific notation using pictures, diagrams, or numbers. [CU] ■ Read and translate numbers represented in scientific notation from calculators and other technology, tables, and charts.
1.1.2	**Understand the relative values of non-negative fractions or decimals.** W ■ Compare, order, or illustrate whole numbers, decimals, and fractions (denominators of 2, 3, 4, 5, 6, or 10) using concrete models (e.g., number line or shaded grid) or implementing strategies (e.g., like denominators, benchmarks, conversions). [RL, CU] ■ Determine equivalence among fractions. [RL] ■ Explain why one fraction is greater than, equal to, or less than another fraction. [CU] ■ Explain why one decimal number is greater than, equal to, or less than another decimal number. [CU]	**Understand the relative values of integers and non-negative rational numbers.** W ■ Compare different representations of non-negative rational numbers by implementing strategies (e.g., like denominators, changing to the same form). [RL, CU, MC] ■ Identify equivalence between non-negative integers, fractions, percents, and decimals. [MC] ■ Compare and order integer values and explain which is greater and why (e.g., place the integers on a number line). [CU] ■ Represent and identify integers on a model (e.g., number line, fraction line, or decimal grid). [RL, CU]	**Understand the relative values of rational numbers.** W ■ Compare and order rational numbers using physical models or implementing strategies (e.g., like denominators, changing to the same form). [RL, MC] ■ Locate symbolic representations of rational numbers on a model (e.g., a number line, fraction line, decimal grid, and circle graph). [MC] ■ Explain the value of a given digit in a rational number (e.g., 2.3 is 2 ones and 3 tenths). [CU]	**Understand the relative values of rational numbers including whole number powers and square roots of square numbers.** W ■ Compare and order rational numbers using models or implementing strategies. [RL] ■ Order different representations of rational numbers. [RL] ■ Place symbolic representations of rational numbers on a number line including whole number powers and square roots of square numbers. [CU]	

SP: Solves Problems RL: Reasons Logically CU: Communicates Understanding MC: Makes Connections

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense.

GLE	K	1	2	3	4
Number and numeration					
1.1.3				**Understand and apply the commutative and identity properties of addition on whole numbers.** W ■ Explain or show how the commutative property works with addition and not subtraction using words, numbers, or physical models. [CU] ■ Describe how the identity property works with addition. [CU] ■ Determine whether addition equations are true or false and explain, based on the commutative or identity properties for addition (e.g., 15 + 3 + 5 = 15 + 5 +3). [CU] ■ Identify an equivalent expression using the commutative property. ■ Show how the commutative property works using pictures or objects. [CU]	**Understand and apply the associative property of addition and multiplication and the commutative, identity, and zero properties of multiplication on whole numbers.** W ■ Describe how the commutative property works with multiplication and not division using words, numbers, or physical models. [CU] ■ Describe how the identity property for addition is different from the identity property for multiplication using words, numbers, pictures, or physical models. [CU] ■ Determine whether equations are true or false and explain, based on any of the properties for multiplication (e.g., 4 x (5 x 6) = (4 x 5) x 6). [CU] ■ Determine whether equations are true or false and explain, based on any of the properties (e.g., 14 + (62 + 38) = (14 + 62) + 38). [CU] ■ Demonstrate commutative, associative, or identity properties of addition or multiplication using pictures or objects. [CU]
1.1.4					

Component 1.1: Understand and apply concepts and procedures from number sense.

GLE	5	6	7	8	9/10
Number and numeration					
1.1.3	**Understand and apply the concept of divisibility.** W ■ Apply the concepts of odd and even numbers to check for divisibility, finding factors and multiples. ■ Illustrate prime or composite numbers by creating a physical model (e.g., arrays, area models). [CU] ■ Identify the prime numbers between 1 and 100. ■ Explain why a whole number between 1 and 100 is prime or composite. [CU] ■ Explain a method to find the least common multiple (LCM) and greatest common factor (GCF) of two numbers. [CU] ■ Solve problems related to primes, factors, multiples, and composites in a variety of situations (e.g., find a mystery number, find unit pricing, increase or decrease a recipe, find the portions for a group). [SP] ■ Factor a number into its prime factors. ■ Determine whether one number is a factor of another number.	**Apply properties of addition and multiplication to non-negative rational numbers.** W ■ Illustrate and explain the commutative and associative properties and why they work (e.g., use physical models, pictures). [CU] ■ Use addition and multiplication properties to assist in computations (e.g., 5 • 7 • 6 can be rewritten as 5 • 6 • 7, which is 30 • 7 or 210). ■ Determine whether a solution is accurate based on application of commutative, associative, and identity properties of addition and/or multiplication. [RL]	**Apply properties of addition and multiplication including inverse properties to the rational number system.** W ■ Use the inverse relationships between multiplication and division to simplify computations and solve problems. [SP, RL] ■ Use the inverse properties of addition and multiplication to simplify computations with integers, fractions, and decimals. [SP, RL, MC] ■ Identify the inverse elements when using the additive inverse and the multiplicative inverse properties (e.g., 8 + -8 = 0; 2 x $^{1}/_{2}$ = 1). ■ Use the additive inverse property to solve problems. [RL] ■ Illustrate or explain the additive and multiplicative inverse properties and why they work. [CU]	**Apply properties of addition, multiplication, and the distributive property to the rational number system.** W ■ Illustrate and explain the distributive property of multiplication over addition (e.g., using an area model or picture). [CU] ■ Use the distributive property to simplify expressions including those using integers. [RL] ■ Use the distributive property to factor expressions (e.g., 3 • 9 + 3 = 3 • (9+1)). [RL] ■ Identify the multiplicative inverse of a number.	
1.1.4		**Understand the concepts of ratio and percent.** W ■ Write ratios in part/part and part/whole relationships using objects, pictures, and symbols (e.g., using /, :, or "to" as representations for ratios). [CU] ■ Represent equivalent ratios using objects, pictures, or symbols. [CU] ■ Represent equivalent percentages using objects, pictures, and symbols. [CU] ■ Identify percent as 100 equal-size parts of a set (e.g., 1% of 200 items is 2 items). ■ Explain ratio and percents and give examples of each. [CU]	**Understand the concept of direct proportion.** W ■ Express proportional relationships using objects, pictures, and symbols. [CU] ■ Explain the meaning of a proportion. [CU] ■ Represent a new relationship from a given ratio (e.g., height of a totem pole, maypole). [MC] ■ Represent percentages less than 1% or greater than 100% using objects, pictures, and symbols. [CU] ■ Complete or write a proportion for a given situation. [CU] ■ Solve problems involving proportions (e.g., determine the number and kinds of baked goods to bring to a bake sale based on proportions of different goods sold at previous bake sales). [SP, MC] ■ Use ratios to make predictions about proportions in a future situation. [RL, MC]	**Apply ratio, percent, and direct proportion in situations.** W ■ Solve problems involving ratio and proportion (e.g., similar figures, scale drawings, rates, find unit pricing, increase or decrease a recipe, find the portions for a group converting between different units of measure, or finding medicinal dosages). [SP, MC] ■ Solve problems involving percentages (e.g., percent increase/decrease, tax, commission, discount). [SP, MC] ■ Explain advantages and disadvantages of different representations of ratios or percents in a given situation (e.g., using $^{1}/_{8}$ versus 12 $^{1}/_{2}$%). [CU, MC] ■ Determine an unknown value for a dimension or a number of events or objects using ratio or proportion. ■ Complete a proportion in a situation.	**Apply understanding of direct and inverse proportion to solve problems.** W ■ Explain a method for determining whether a real-world problem involves direct proportion or inverse proportion. [SP, CU, MC] ■ Explain a method for solving a real-world problem involving direct proportion. [CU, MC] ■ Explain a method for solving a real-world problem involving inverse proportion. [CU, MC] ■ Solve problems using direct or inverse models (e.g., similarity, age of car vs. worth). [SP, MC] ■ Explain, illustrate, or describe examples of direct proportion. [CU] ■ Explain, illustrate, or describe examples of inverse proportion. [CU] ■ Use direct or inverse proportion to determine a number of objects or a measurement in a given situation.

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EALR 1

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense.

GLE	K	1	2	3	4
Computation					
1.1.5	**Understand the meaning of addition.** ■ Express stories involving addition (e.g., join) with models, pictures, and symbols. [CU, MC] ■ Use addition in the classroom environment (e.g., tables and chairs in the classroom). [MC]	**Understand the meaning of subtraction.** ■ Express stories involving subtraction (e.g., separate) with models, pictures, and symbols. [CU, MC] ■ Show relationships between addition and subtraction using physical models, diagrams, and acting out problems. [CU]	**Understand the meaning of addition and subtraction and how they relate to one another.** ■ Show relationships between addition and subtraction using physical models, diagrams, and acting out problems. [CU, MC] ■ Model real-life situations involving addition (e.g., Peter has 7 peanut butter cookies and 4 chocolate chip. How many cookies does he have?) and subtraction (e.g., Peter has 11 cookies which is 4 more than Teresa. How many cookies does Teresa have?) using physical models and diagrams from various cultures and acting out problems. [CU]	**Understand the meaning of multiplication and division on whole numbers.** W ■ Illustrate multiplication and division using models and diagrams. [CU] ■ Illustrate and explain the inverse relationship between multiplication and division using physical diagrams, words, and symbols (e.g., arrays, fact families). [CU] ■ Describe and compare strategies to solve problems involving multiplication and division (e.g., alternative algorithms, different strategies, decomposition, properties of multiplication). [CU] ■ Demonstrate the relationship between multiplication and repeated addition. ■ Demonstrate the relationship between division and repeated subtraction.	**Understand the meaning of addition and subtraction on like-denominator fractions.** W ■ Represent addition and subtraction of fractions with like denominators using models (e.g., everyday objects, fraction circles, number lines, geoboards). [CU] ■ Explain the meaning of addition and subtraction of like-denominator fractions. [CU] ■ Represent addition or subtraction of like-denominator fractions that represent sets of objects (e.g., $\frac{1}{4}$ of 24 marbles plus $\frac{1}{4}$ of 24 marbles = $\frac{2}{4}$ of 24 marbles or 12). ■ Demonstrate the meaning of addition or subtraction of like denominators with multiple examples. [CU]
1.1.6		**Understand and apply procedures for addition of whole numbers with fluency.** ■ Use strategies (e.g., count on, count back, doubles) for addition to at least sums to 12. [SP, RL] ■ Recall addition facts through at least sums to 12. ■ Solve problems involving addition using procedures and explaining those procedures. [SP, RL, CU]	**Understand and apply procedures for addition and subtraction of whole numbers with fluency.** ■ Use strategies for addition and subtraction combinations through at least 18. ■ Recall addition and subtraction facts through at least 18. ■ Solve problems involving addition and subtraction with two- or three-digit numbers using a calculator and explaining procedures used. [SP, CU] ■ Make combinations and name total value of coins.	**Apply procedures of addition and subtraction on whole numbers with fluency.** W ■ Describe and compare strategies to solve three-digit addition and subtraction problems (e.g., child-developed algorithms, decomposition). [RL, CU] ■ Use joining, separating, adding-on, and finding the difference to add and subtract. ■ Write and solve multi-step problem situations that involve addition and subtraction. [CU, MC] ■ Use calculators to compute with large numbers (e.g., adding three or more three-digit numbers; subtracting three digit from four digit numbers).	**Apply procedures of multiplication and division on whole numbers with fluency.** W ■ Use a variety of strategies to mentally access multiplication and division facts through 12s. ■ Recall multiplication and division facts through 12s. ■ Record, share, and evaluate algorithms used in computational situations. [CU] ■ Write and solve problem situations with whole numbers using a combination of any two operations. [CU, MC] ■ Interpret remainders of a division problem in a given situation. [RL, MC] ■ Use calculators to compute with large numbers (e.g., multiplying two digits times three digits; dividing three or four digits by two digits without remainders.

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Component 1.1: Understand and apply concepts and procedures from number sense.

GLE	5	6	7	8	9/10
Computation					
1.1.5	**Understand the meaning of addition and subtraction on non-negative decimals and fractions.** W ■ Explain the meaning of adding and subtracting fractions and decimals using words, symbols, or other models (e.g., fractions with denominators of 2, 4, 8 or 2, 3, 6, 12 or 5, 10 — highest LCM of 12). [CU] ■ Create a problem situation involving addition or subtraction of non-negative decimals or fractions. [SP, RL, CU, MC] ■ Represent addition and subtraction of decimals through hundredths using models (e.g., with money). [CU] ■ Create or identify a representation of addition or subtraction of non-negative decimals or fractions. ■ Demonstrate the effect of multiplying a whole number by a decimal number. [CU]	**Understand the meaning of multiplication and division on non-negative rational numbers.** W ■ Explain the meaning of multiplying and dividing non-negative fractions and decimals using words or visual or physical models (e.g., sharing a restaurant bill, cutting a board into equal-sized pieces, drawing a picture of an equation or situation). [CU, MC] ■ Explain why multiplication of fractions can be done by multiplying denominators while addition of fractions requires finding common denominators. [CU] ■ Use technology to demonstrate how multiplication and division with decimals affects place value.	**Understand the meaning of addition and subtraction on integers.** W ■ Explain the meaning of addition and subtraction of integers using real-world models (e.g., reducing debt, temperature increase or decrease, yards gained and lost, movement of a hot-air balloon). [CU, MC] ■ Create a problem situation involving addition or subtraction of integers. [CU, MC] ■ Explain or show the meaning of addition or subtraction of integers. [CU] ■ Use technology to demonstrate addition and subtraction with integers.	**Understand the meaning of operations on rational numbers (including square roots of square numbers and whole number powers).** W ■ Create a problem situation to match a given rational number equation. [CU, MC] ■ Explain the meaning of negative and zero exponents. [CU] ■ Demonstrate or describe the meaning of multiplication and division of integers using words, visual, or physical models. [CU] ■ Create a problem situation involving multiplication or division of integers. [CU, MC] ■ Explain solutions when dividing by fractions (e.g., when dividing by a number between 0 and 1, the result is larger than the dividend). [CU]	
1.1.6	**Apply procedures of addition and subtraction with fluency on non-negative decimals and like-denominator fractions.** W ■ Add and subtract like-denominator fractions (denominators of 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 20, and 100) and non-negative decimals. ■ Explain a strategy for adding fractions. [CU] ■ Write and solve problem situations to find sums or differences of decimals or like-denominator fractions. [CU, MC] ■ Use calculators to multiply or divide with two decimal numbers in the hundredths and/or thousandths place.	**Apply computational procedures with fluency for addition and subtraction on non-negative rational numbers.** W ■ Find the sums or differences of non-negative fractions or decimals. ■ Write and solve real-world problem situations to find sums or differences of decimals or fractions. [CU, MC] ■ Use the least common multiple and the greatest common factor of whole numbers to solve problems with fractions (e.g., to find a common denominator, to add two fractions, or to find the simplified form for a fraction). [MC] ■ Use addition and subtraction to solve real-world problems involving non-negative rational numbers. [SP] ■ Solve multiple-step computations requiring one, two, or more different operations. [MC]	**Apply computational procedures with fluency for multiplication and division on non-negative rational numbers.** W ■ Find the product or quotient using non-negative decimals and fractions with unlike denominators. ■ Apply percentages to solve a problem in a variety of situations (e.g., taxes, discounts, interest). [SP, MC] ■ Use multiplication and division to solve real-world problems involving non-negative rational numbers. [SP] ■ Multiply non-negative decimal numbers to the hundredths place. ■ Divide non-negative decimals numbers to the thousandths place by non-negative decimal numbers to the hundredths place.	**Apply computational procedures with fluency on rational numbers including whole number powers and square roots of square numbers.** W ■ Compute with rational numbers using order of operations. ■ Compute fluently with rational numbers in all forms except exponential. ■ Write and solve problems that involve computation with rational numbers. [CU, MC] ■ Solve problems using rational numbers with whole number powers. [SR] ■ Solve problems using rational numbers with square roots of perfect squares (e.g., given a square garden with an area of nine square meters, how much fence would be needed to encompass a garden twice the size of the original garden). [SR]	**Apply strategies to compute fluently with rational numbers in all forms including whole number exponents.** W ■ Complete multi-step computations using order of operations in situations involving combinations of rational numbers including whole number exponents and square roots of square numbers. [MC] ■ Calculate using order of operations on all forms of rational numbers (e.g., $(3 \bullet 2+5)^2 - 8,\ 2^2 + 3^2$). ■ Use properties to reorder and rearrange expressions to compute more efficiently. [RL]

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Component 1.1: Understand and apply concepts and procedures from number sense.

GLE	K	1	2	3	4
Computation					
1.1.7		**Understand and apply strategies and appropriate tools for adding with whole numbers.** ■ Use strategies and appropriate tools from among mental math, paper and pencil, manipulatives, or calculator to compute in a problem situation. [SP, RL] ■ Use counting strategies to combine whole numbers with sums under 12. [SP, RL]	**Understand and apply strategies and appropriate tools for adding and subtracting with whole numbers.** ■ Use mental math strategies to compute (e.g., composing and decomposing numbers, finding combinations that are easy to add or subtract) through 100. [RL] ■ Use calculator, manipulatives, or paper and pencil to solve addition or subtraction problems. ■ Explain methods to mentally group numbers efficiently (e.g., when adding 52 and 59, add the 50's together to get 100, then add 11 more). [CU]	**Understand and apply strategies and tools as appropriate to tasks involving addition and subtraction on whole numbers.** ■ Use appropriate strategies and tools from among mental computation, estimation, calculators, and paper and pencil to compute in a problem situation. [SP, RL] ■ Defend situations in which estimation is sufficient (e.g., grocery shopping or party supplies). [CU] ■ Use mental arithmetic, pencil and paper, or calculator as appropriate to the task involving addition and subtraction of whole numbers.	**Understand and apply strategies and tools as appropriate to tasks involving multiplication and division on whole numbers.** ■ Select and justify appropriate strategies and tools from among mental computation, estimation, calculators, and paper and pencil to compute in a problem situation. [SP, RL] ■ Use estimation strategies appropriately when the exact answer is not necessary. [SP, RL] ■ Identify and justify situations when estimation is not appropriate. [SP, RL, CU, MC] ■ Use mathematical tools as appropriate to the task involving multiplication and division of whole numbers.
Estimation					
1.1.8		**Understand and apply estimation strategies to determine the reasonableness of answers.** ■ Use a known quantity (e.g., chunking) to make reasonable estimates. [RL] ■ Use numbers that are easy to add or subtract to make a reasonable estimate of a sum (e.g., 9 + 8 should be about 20, since 9 is about 10, 8 is about 10, and 10 + 10 is 20). [RL]	**Understand and apply estimation strategies to predict computation results and to determine the reasonableness of answers.** ■ Use estimation strategies (e.g., front-end estimation, clustering) to predict computation results and to determine the reasonableness of answers. [RL] ■ Justify reasonableness of an estimate in addition and subtraction. [CU] ■ Decide whether a given estimate for a sum or difference is reasonable. [RL]	**Understand and apply estimation strategies to determine the reasonableness of answers in situations involving addition and subtraction on whole numbers.** W ■ Identify when an approximation is appropriate. ■ Use estimation to determine the reasonableness of answers in situations. [RL] ■ Describe and justify reasonableness of an estimate in computation. [RL, CU] ■ Use a variety of estimation strategies (e.g., multiples of 10 and 100, rounding, front-end estimation, compatible numbers, clustering). ■ Describe and justify whether an approximation is or is not appropriate. [RL, CU]	**Understand and apply estimation strategies to determine the reasonableness of answers in situations involving multiplication and division on whole numbers.** W ■ Identify when an approximation is appropriate. ■ Use a variety of strategies to approximate sums, differences, products, and quotients. [RL] ■ Use estimation to determine the reasonableness of answers in situations. [RL] ■ Make and explain an appropriate adjustment when an estimate and a solution don't agree. [RL, CU]

Component 1.1: Understand and apply concepts and procedures from number sense.

GLE	5	6	7	8	9/10
Computation					
1.1.7	**Understand and apply strategies and tools as appropriate to tasks involving addition and subtraction of non-negative, like-denominator fractions, or decimals.** ■ Select and justify strategies and appropriate tools from among mental computation, estimation, calculators, manipulatives, and paper and pencil to compute a problem situation. [SP, RL] ■ Use mental arithmetic to add and subtract non-negative decimals and like-denominator fractions.	**Understand and apply strategies and tools to complete tasks involving addition and subtraction on non-negative rational numbers.** ■ Select and justify the selection of appropriate strategies and tools (e.g., mental computation, estimation, calculators, and paper and pencil) to compute in a problem situation. [SP, CU] ■ Describe strategies for mentally solving problems involving fractions and decimals. [CU] ■ Use calculators to add and subtract with decimal numbers with precision to the thousandths place and beyond.	**Understand and apply strategies and tools to complete tasks involving addition and subtraction on integers and the four basic operations on non-negative rational numbers.** ■ Select and justify the selection of appropriate strategies and tools (e.g., mental computation, estimation, calculators, and paper and pencil) to compute in a problem situation. [SP, RL] ■ Convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator. [MC] ■ Use calculators to add and subtract with integers of two or more digits. ■ Use calculators to compute with decimal numbers with precision from the thousandths place and beyond.	**Understand and apply strategies and tools to complete tasks involving computation on rational numbers.** ■ Select and justify appropriate strategies and tools (e.g., mental computation, estimation, calculators, and paper and pencil) to compute in a problem situation. [SP, RL] ■ Describe strategies for mentally solving problems involving integers and exponents. [CU] ■ Use calculators to compute with whole number powers beyond the cubed numbers. ■ Use calculators to compute square roots of perfect squares greater than 100.	
Estimation					
1.1.8	**Understand and apply estimation strategies to determine the reasonableness of answers in situations involving addition and subtraction on non-negative decimals and like-denominator fractions.** W ■ Identify when an approximation is appropriate. ■ Use estimation strategies prior to computation of addition and subtraction of decimals and like-denominator fractions to predict answers. [RL] ■ Use estimation to determine the reasonableness of answers in situations. ■ Determine reasonableness of estimated answers for a given situation. [RL] ■ Demonstrate or explain various strategies used during estimation. [CU]	**Apply estimation strategies to predict or determine the reasonableness of answers in situations involving addition and subtraction on non-negative rational numbers.** W ■ Identify when an approximation is appropriate. [MC] ■ Apply estimation strategies prior to computation on whole numbers, decimals, and fractions to approximate an answer. [RL] ■ Use estimation to verify the reasonableness of calculated results. [RL] ■ Identify appropriate estimated answers for a given situation. ■ Describe various strategies used during estimation involving fractions and decimals. [CU]	**Apply estimation strategies to predict or determine the reasonableness of answers in situations involving addition and subtraction of integers and the four basic operations on non-negative rational numbers.** W ■ Identify when an approximation is appropriate in situations. [MC] ■ Use estimation strategies prior to operations on non-negative rational numbers to approximate an answer. [RL] ■ Justify why estimation would be used rather than an exact computation. [CU] ■ Describe a situation where estimation is sufficient in real-life contexts. [CU, MC] ■ Use estimation to verify the reasonableness of calculated results. [RL] ■ Evaluate the appropriateness of estimation in a situation and support the evaluation. [RL]	**Apply estimation strategies to predict or determine the reasonableness of answers in situations involving computation on rational numbers in any form including whole number powers and square roots of square numbers.** W ■ Identify when an approximation is appropriate. [MC] ■ Explain situations involving rational numbers where estimates are sufficient and others for which exact value is required. [CU] ■ Justify why an estimate would be used rather than an exact answer in a given situation. [CU] ■ Describe various strategies used during estimation involving integers. [CU] ■ Use estimation to predict or to verify the reasonableness of calculated results. [RL]	**Apply estimation strategies to determine the reasonableness of results in situations involving multi-step computations with rational numbers including whole number powers and square and cube roots.** W ■ Identify when an approximation is appropriate. [MC] ■ Explain situations involving real numbers where estimates are sufficient and others for which exact value is required. [CU] ■ Justify why an estimate would be used rather than an exact answer in a given situation. [CU] ■ Describe various strategies used during estimation involving integers, rational numbers. [CU] ■ Use estimation to predict or to verify the reasonableness of calculated results. [RL]

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.2: Understand and apply concepts and procedures from measurement.

GLE	K	1	2	3	4
Attributes, units, and systems					
1.2.1	**Understand and apply appropriate terminology to compare attributes.** ■ Use comparative vocabulary to describe objects (e.g., longer/shorter, heavier/lighter, nearer/further, thicker/thinner, shorter/taller). [CU] ■ Use terms to describe the duration of events (e.g., long time or short time). [CU] ■ Identify and sort objects based on an attribute (e.g., color, shape, texture). [RL]	**Understand and apply attributes to describe and compare objects.** ■ Order three or more objects according to an attribute (e.g., pencil lengths, students' hand span, and thickness of books). [RL] ■ Read a clock with only the hour hand and use approximate language (e.g., almost 7, a little after 7). [CU] ■ Identify coins (penny, nickel, dime, quarter) and state their value. [CU]	**Understand and apply attributes to measure objects and time.** ■ Identify attributes of an object that are measurable (e.g., time, length, distance around, or weight of objects). ■ Compare lengths or distances where direct comparison is not possible (e.g., use a string, paper strip, arm length, or hand span to compare the height and width of a table). [RL, MC] ■ Read a clock to tell time to the half hour.	**Understand how different attributes (length, perimeter, time, money value, weight/mass, and temperature) are used to describe objects.** W ■ Given an object, name the attributes that can be measured. [CU, MC] ■ Explain how length is used to describe objects. [CU] ■ Explain or show how height and weight are different. [CU] ■ Explain or show how clocks measure the passage of time. [CU] ■ Explain how money is used to describe the value of purchased items. [CU]	**Understand the concept of area.** W ■ Demonstrate and explain how area covers a shape and perimeter encloses a shape. [CU, MC] ■ Describe situations where area is the needed measurable attribute (e.g., buying carpet to cover a floor, painting a wall, building fishnets based on fishing ground, calculating needed area for teepees and lodges, amount of area needed for a pow-wow, describing the amount of floor space in a room). [CU, MC] ■ Compare areas of different shapes and sizes. [RL] ■ Use measurements of area to describe objects. [CU]
1.2.2				**Understand the differences between non-standard and standard units of measurement for length and weight/mass in either U.S. or metric systems.** W ■ Identify when two unit measurements are not necessarily equal (e.g., one pace long can represent different lengths). [CU, MC] ■ Determine whether measurement can or cannot be compared based on whether the units are the same or different. ■ Show how length units are shown on rulers, tape measures, and other linear measuring tools. [MC, CU] ■ Show how weight units are shown on a grocery scale. [MC] ■ Explain why people created standard units for length or weight/mass. [CU]	**Understand the differences between length units and area (square) units in U.S. or metric systems.** W ■ Measure perimeter and area for regular and irregular shapes (e.g., use tiles, inches, or grid paper to find perimeter or area of mats, CDs, or skateboards). [SP, RL, MC] ■ Compare and describe area measurements made using different units (e.g., square inches vs. square centimeters). [SP, RL] ■ Describe how the unit chosen to measure linear dimensions can determine the unit used to measure area (e.g., measuring perimeter in centimeters produces an area in square centimeters). [CU]

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Component 1.2: Understand and apply concepts and procedures from measurement.

GLE	5	6	7	8	9/10
Attributes, units, and systems					
1.2.1	**Understand the concept of angle measurement.** W ■ Describe and compare angles in a variety of objects. [CU] ■ Identify angles in the environment. [MC] ■ Classify or sort angles as right, acute, or obtuse. [RL, CU] ■ Identify types of angles in polygons (e.g., right, acute, obtuse). [MC] ■ Explain and provide examples of how angles are formed.	**Understand the concepts of volume and extend the concept of area to surface area of rectangular prisms.** W ■ Compare the relative capacity of two containers and explain the differences (e.g., paper cylinders formed horizontally and vertically and filled with popcorn). [RL] ■ Represent the volume for given rectangular prisms using pictures or models. [CU] ■ Compare the surface area of two different rectangular prisms. ■ Describe and provide examples for surface area measurement (e.g., gift wrapping, painting a room, amount of material needed to build a box). [MC] ■ Explain and give examples of how the area and surface area are related (e.g., surface area is the sums of the areas of all the sides of a rectangular prism). [CU, MC] ■ Describe and compare the use of area and volume (e.g., covering and filling). [CU]	**Analyze how a change in a linear dimension affects other linear measurements (perimeter, circumference) and area measurements.** W ■ Describe the relationships among linear dimensions (e.g., radius of a circle, length of a side or base, changes in the diameter affects the amount of deer hide needed to cover a drum face) and area of the figure (e.g., change the radius or length of a side, and check the change in area; describe that change). [CU] ■ Explain changing one, two, or three dimensions in a rectangular prism and how it affects the surface area and volume; give three examples. ■ Solve problems involving the effects of changes in one dimension on area (e.g., given a garden with certain dimensions, make the area of the garden *x* square units by changing only one dimension of the garden). [SP]	**Analyze how a change in a linear dimension affects volume and surface area of rectangular prisms and right cylinders.** W ■ Compare the impact that a change in one dimension has on volume and surface area in right cylinders and rectangular prisms. [SP, RL] ■ Describe the relationships among linear dimensions, volume, and surface area (e.g., changing the length of a side affects the surface area and volume). [CU] ■ Solve problems involving the effects of changes in one dimension on area (e.g., given a box with certain dimensions, make the volume of the box *y* cubic units by changing only one dimension of the box). [SP]	**Analyze how changes in one or two dimensions of an object affect perimeter, area, surface area, and volume.** W ■ Describe and compare the impact that a change in one or more dimensions has on objects (e.g., how doubling one dimension of a cube affects the surface area and volume). [CU, MC] ■ Describe how changes in the dimensions of objects affect perimeter, area, and volume in real-world situations (e.g., how does the change in the diameter of an oil drum affect the area and volume?). [CU, MC] ■ Solve problems by deriving the changes in two dimensions necessary to obtain a desired surface area and/or volume (e.g., given a box with certain dimensions, make the volume of the box y cubic units by changing two dimensions of the box). [SP] ■ Compare a given change in one or two dimensions on the perimeter, area, surface areas, or volumes of two objects. ■ Determine the change in one dimension given a change in perimeter, area, volume, or surface area.
1.2.2	**Understand degrees (30°, 45°, 60°, 90°, and 180°) as units of measurement for angles.** W ■ Describe an angle in relation to a right angle. [RL] ■ Measure angles to the nearest 5 degrees using a protractor, angle ruler, or other appropriate tool. [RL] ■ Measure angles in assorted polygons and determine the total number of degrees in the polygon. [SP, RL] ■ Explain how degrees are used as measures of angles (e.g., a circle can be divided into 360°). ■ Identify, draw, or demonstrate angles that match or approximate 30°, 45°, 60°, 90°, and 180°. [CU]	**Understand the differences between square and cubic units.** W ■ Identify cubic units to measure volume (e.g., linking cubes, cubic centimeter). ■ Identify and read incremental units for capacity (e.g., milliliters, cups, ounces). ■ Use the appropriate units when describing a situation (e.g., five square meters of carpet, five cubic meters of water). [MC] ■ Explain why volume is measured in cubic units. [CU, MC] ■ Explain how the selected unit of length affects the size of cubic units (e.g., centimeter versus inch). [CU]		**Understand and apply derived units of measurement.** W ■ Explain the concept of a rate. [CU] ■ Explain how division of measurements produces a derived unit of measurement (e.g., miles traveled divided by hours traveled yields the derived unit [miles per hour]). [CU] ■ Find a rate of change in a situation (e.g., increase per year in stamp cost) and label the results. [SP, RL, MC] ■ Use unit analysis to find equivalent rates (e.g., miles per hour to feet per second). [MC] ■ Use rate to determine a measured outcome.	

Component 1.2: Understand and apply concepts and procedures from measurement.

GLE	K	1	2	3	4
Attributes, units, and systems					
1.2.3				**Understand how measurement units of length (U.S.) and capacity (U.S.) are organized into systems.** W ■ Describe the various units of measurement for length and capacity and explain how they are organized. ■ Explain the benefits and appropriate uses of standard units of measurement for length and capacity using our customary (U.S.) system. [CU] ■ Demonstrate or explain how inches are organized into feet and feet are organized into yards. [CU] ■ Demonstrate or explain how cups are organized into pints, pints into quarts, and quarts into gallons. [CU]	**Understand how measurement units of time and weight (U.S.) are organized into systems.** W ■ Know and correctly label the basic units of measurement for time and weight measure in the metric and customary system. [CU] ■ Explain the benefits and appropriate uses of standard units of measurement for area using both customary and metric systems. [CU] ■ Demonstrate or explain how seconds are organized into minutes, minutes into hours, hours into days, days into weeks, and weeks into years. [CU] ■ Demonstrate or explain how months are organized into years. [CU] ■ Demonstrate or explain how ounces are organized into pounds. [CU]
Procedures, precision, and estimation					
1.2.4	**Understand and apply procedures to measure with non-standard units.** ■ Use non-standard units to measure (e.g., paper strips, cubes, beans, hand widths). ■ Explain how to use a non-standard unit to measure a given length (e.g., length of a table, width of a desk). [CU]	**Understand and apply procedures to measure with non-standard or standard units.** ■ Select units appropriate to the object being measured (e.g., measure length of classroom with footprints, not beans) and explain why it was selected. [CU] ■ Use a uniform unit to measure an object (e.g., cubes, paper strips, ruler). ■ Measure a variety of objects using appropriate non-standard tools (e.g., arm length, hand width, lengths of rope). ■ Use a variety of records of time (e.g., calendar, seasonal plants, animal migrations, moon phases, tides, shadows). ■ Use physical models of measuring units to fill, cover, match, or make the desired comparison of the attribute with the unit. [SP, RL] ■ Explain the need for appropriate tools for measurement. [CU]	**Understand and apply procedures to measure with non-standard or standard units.** ■ Select the most appropriate unit to measure the time of a given situation (e.g., would you use minutes or hours to measure brushing your teeth, eating dinner, sleeping?). [MC] ■ Select a tool that can measure the given attribute (e.g., analog clock—time, string—length, balance—weight). ■ Demonstrate measurement procedure (e.g., start at a beginning point, place units end-to-end, not overlapping, and straight line). [CU] ■ Justify the use of one tool over another (e.g., the length of a hand is a better measurement tool for this situation than the length of a small cube). [CU, RL] ■ Explain why, when the unit is smaller, it takes more to measure an item than when the unit is larger (e.g., it takes more small paper clips than large paper clips to measure the same length). [CU]	**Understand and apply systematic procedures to measure length, time, weight, money value, and temperature.** W ■ Identify attribute to measure. ■ Select and use appropriate units (e.g., meters, minutes, pounds, dollars, degrees). ■ Select and use tools that match the unit (e.g., ruler, clock, scales, calculator, thermometer). ■ Count or compute and label measures. ■ Explain and use a method for making change with coins. [CU]. ■ Compare measures of two or more like objects. [RL]	**Understand and apply systematic procedures to determine the area of figures composed of rectangles.** W ■ Select and use appropriate units (e.g., square units). ■ Select and use tools that match the unit (e.g., grid paper, squares). ■ Count or compute and label area measures. ■ Explain and use a method for measuring the area of an irregular shape (e.g., describe an irregular shape in terms of the composition of regular figures). [CU] ■ Solve problems involving area measurement. [SP] ■ Analyze a measurement situation and determine whether measurement has been done correctly. [RL]

Component 1.2: Understand and apply concepts and procedures from measurement.

GLE	5	6	7	8	9/10
Attributes, units, and systems					
1.2.3	**Understand how measurement units of capacity, weight, and length are organized in the metric system.** W ■ Explain and give examples of the metric system standard units for capacity, weight, and length. ■ Demonstrate or explain how grams are organized into kilograms. [CU] ■ Demonstrate or explain how millimeters are organized into centimeters and how centimeters are organized into meters. [CU] ■ Demonstrate or explain how milliliters are organized into liters. [CU]		**Understand how the unit of measure affects the precision of measurement.** W ■ Select the appropriate measurement tool to match the precision needed (e.g., if needing measurement to the nearest 1/16 inch, select a ruler that has 1/32 increments). ■ Explain how the unit selected for a situation can affect the precision of the measurement (e.g., when you have a ruler that has only 1/10 increments, you cannot measure something to the nearest hundredth with confidence of precision). ■ Explain how measurement systems allow for different levels of precision (e.g., millimeters give more precise measurement than centimeters). [CU]	**Understand why different situations require different levels of precision.** W ■ Explain the relationships among units within both the customary and metric system (e.g., kilograms to grams, feet to inches). ■ Justify the use of a unit of measure (e.g., measuring to order fencing requires a different precision than if one is selling land and needs to be precise about borders). [CU, MC] ■ Compare situations for the level of precision needed. [RL] ■ Explain and give examples of situations that require more and less precision. [CU]	**Understand how to convert units of measure within systems (U.S. or metric).** W ■ Understand how to convert units of measure within U.S. or within metric systems to achieve an appropriate level of precision. ■ Convert within a system to a unit size appropriate to a given situation. ■ Convert to a larger unit within a system while maintaining the same level of precision (e.g., represent 532 centimeters as 5.32 meters). ■ Convert to a smaller unit within a system to increase the precision of a derived unit of measurement.
Procedures, precision, and estimation					
1.2.4	**Understand and apply systematic procedures to determine the areas of rectangles and right triangles.** W ■ Select and use appropriate units for measuring area (e.g., square units) or dimensions. ■ Select and use tools that match the unit (e.g., grid paper, squares, ruler). ■ Explain a method for measuring the area of a rectangle or right triangle (e.g., use the formula for the area of a rectangle or triangle, select grid paper). [CU] ■ Use measurements of area to describe and compare rectangles or triangles. ■ Solve problems involving measurement of area in rectangle and triangle (e.g., create a design using triangles and rectangles and determine how much paint is needed to cover the area of each of the shapes). [SP] ■ Analyze a measurement situation and determine whether measurement has been done correctly. [RL]	**Understand and apply systematic procedures to measure volume and capacity for solid shapes.** W ■ Identify the attribute to be measured in the situation (e.g., volume or capacity). ■ Choose the appropriate standard unit for measuring volume or capacity (e.g., cubic inches vs. cubic feet, cups vs. gallons). ■ Select and use tools that match the unit. ■ Count or compute to obtain the volume or capacity and label the measurement. ■ Use volume and capacity to describe and compare figures (e.g., fill containers with cubes to find which has a greater volume). [RL, CU] ■ Measure the capacity of containers using appropriate tools and label (e.g., graduated cylinders, measuring cups, tablespoons). [CU] ■ Evaluate whether measurement has been done correctly. [RL]			

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.2: Understand and apply concepts and procedures from measurement.

GLE	K	1	2	3	4
Procedures, precision, and estimation					
1.2.5					
1.2.6			**Understand how to estimate in measurement situations.** ■ Estimate length and weight using non-standard units. [RL] ■ Use important benchmarks (referents) (e.g., 5 or 10) to make initial and revised estimates. ■ Explain how a benchmark (referent) helps to make a reasonable estimate. [CU]	**Understand and apply strategies to obtain reasonable estimates of length, time, weight, and temperature measurements.** W ■ Identify situations in which estimated measurements are sufficient; estimate length, time, money, weight or temperature. ■ Estimate a measurement using standard or non-standard units (e.g., fingers, arms, paper clips, inches, minutes, or foot lengths). ■ Create and use referents to standard units (e.g., width of pinkie finger is similar to a centimeter). [RL, MC] ■ Use estimation to decide whether standard or non-standard units of measurement have been used in a situation. [RL] ■ Determine when estimation is useful.	**Understand and apply strategies to obtain reasonable estimates of area measurements for irregular figures.** W ■ Identify situations in which estimate measurements are sufficient. ■ Apply a process that can be used to find a reasonable estimate of the area measurement of an irregular shape (e.g., use tiles or pieces of paper to measure leaves, ponds). [SP, RL, CU] ■ Compare areas of irregular shapes with different perimeters (e.g., leaves, ponds). [RL, MC] ■ Explain whether estimation or precision is needed in a given situation. [CU] ■ Determine whether a given measurement is exact or an estimate.

Component 1.2: Understand and apply concepts and procedures from measurement.

GLE	5	6	7	8	9/10
Procedures, precision, and estimation					
1.2.5	**Understand and apply formulas to measure area and perimeter of rectangles and right triangles.** W ■ Explain how to find the perimeter or area of any rectangle using a rule. [CU] ■ Explain and use formulas to find the perimeter or area of a rectangle. [CU] ■ Explain and use a formula to find the area of a right triangle. [CU] ■ Find and compare all possible rectangles or right triangles with whole number dimensions with a given perimeter or area (e.g., a rectangle with an area of 24 square feet could be 1'x24', 2'x12',3'x8', or 4'x6'). [RL, CU] ■ Explain why formulas are used to find area and/or perimeter. [CU]		**Apply formulas to find measurements of circles, triangles, and rectangular prisms.** W ■ Apply formulas to determine missing measurements for circles, rectangular prisms, and triangles. ■ Explain how to use a formula for finding the area and circumference of a circle (e.g, calculate the area needed to cover a drum face). [CU] ■ Find and compare the volumes of rectangular prisms that have a given volume (e.g., if two rectangular prisms have the same volume and one has twice the height of the other, determine how the areas of their bases compare). [RL] ■ Justify the standard formula for finding the area of a right triangle (e.g., 1/2 of a rectangle). [CU] ■ Use given dimensions to determine surface area and volume.	**Understand and apply formulas including the Pythagorean Theorem to right prisms, right cylinders, and triangles.** W ■ Explain how to use a formula for finding the surface area and volume of a solid. [CU] ■ Find missing sides or area of right triangles (e.g., use the Pythagorean Theorem to find any of the missing values). ■ Calculate measures of objects for which no direct information is given (e.g., apply ratio, proportion, and scale to determine the area, surface area, and/or volume of a similar figure or solid). [SP, MC] ■ Compare surface areas of shapes with given volumes (e.g., compare cost of material to make various right cylinder and right prism containers with a given volume). [RL, MC]	**Apply formulas to calculate measurements of right prisms or right circular cylinders.** W ■ Explain how to use a formula for finding the volume of a prism or cylinder. [CU, MC] ■ Use a formula to find the volume of a prism or cylinder. [RL, MC] ■ Use a formula to derive a dimension of a right prism or right cylinder given other measures. ■ Use formulas to describe and compare the surface areas and volumes of two or more right prisms and/or right cylinders. [RL] ■ Use formulas to obtain measurements needed to describe a right cylinder or right prism.
1.2.6	**Understand and apply strategies to obtain reasonable estimates of angles and area measurements for rectangles and triangles.** W ■ Identify situations in which estimated measurements are sufficient. ■ Estimate measures of angles and areas in rectangles and triangles. ■ Estimate a measurement using standard or non-standard units (e.g., tiles, square feet, note cards). ■ Use estimation to justify reasonableness of a measurement (e.g., estimate the area of the classroom by using carpet squares). [RL] ■ Determine whether an angle is closest to 30°, 45°, 60°, 90°, or 180°. ■ Explain or identify an appropriate process for estimating area or angle measurement. [CU]	**Understand and apply strategies to obtain reasonable estimates of volume or capacity.** W ■ Identify situations in which estimated measures are sufficient. ■ Estimate volume or capacity. ■ Use estimation to justify reasonableness of a volume of a rectangular prism. [RL] ■ Estimate a measurement of volume or capacity using standard or non-standard units (e.g., estimate the capacity of a bowl in cups and handfuls). [SP] ■ Use or describe a process to find a reasonable estimate of volume or capacity (e.g., fill a container with rice or popcorn). [CU]	**Understand and apply strategies to obtain reasonable estimates of circle measurements, right triangles, and surface area for rectangular prisms.** W ■ Identify situations in which estimated measures are sufficient. [MC] ■ Estimate circle and triangle measurements. ■ Use common approximations of pi (3.14; 22/7) to calculate the approximate circumference and the area of circles. ■ Use or describe a process to find a reasonable estimate of circle measurements (e.g., wrap a string around it). [RL] ■ Explain why estimation or precise measurement is appropriate in a given situation. [CU]	**Apply strategies to obtain reasonable estimates of volume and surface area measurements for right cylinders, right prisms, and of the lengths of sides of right triangles.** W ■ Estimate volume and surface area for right cylinders and right prisms. ■ Estimate the length of the remaining side of a right triangle given the lengths of two sides. ■ Approximate distance or height in a problem situation using similar triangles or Pythagorean relationships (e.g., height of a flagpole using proportional reasoning, distance across a lake using Pythagorean relationship). [SP] ■ Use or describe a process for finding area of a right triangle.	**Understand and apply strategies to obtain reasonable measurements at an appropriate level of precision.** W ■ Identify situations in which approximate measurements are sufficient. ■ Estimate a reasonable measurement at an appropriate level of precision. [MC] ■ Estimate quantities using derived units of measure (e.g., distance or time using miles per hour, cost using unit cost). [MC] ■ Estimate derived units of measure (e.g., miles/hour, people/year, grams/cubic centimeter). [MC] ■ Apply a process that can be used to find a reasonable estimate for the volume of prisms, pyramids, cylinders, and cones. ■ Estimate volume and surface area for right cylinders and right prisms.

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.3: Understand and apply concepts and procedures from geometric sense.

GLE	K	1	2	3	4
Properties and relationships					
1.3.1				**Understand the concept of congruence.** W ■ Identify, describe, and compare congruent two-dimensional geometric figures. [RL, CU] ■ Given a variety of figures, determine which figures are congruent. ■ Draw a shape that is congruent to a given two-dimensional shape. [CU] ■ Explain congruence and use an example to demonstrate it. [CU]	**Understand concepts of parallel and perpendicular lines and line symmetry in two-dimensional shapes and figures.** W ■ Identify symmetrical two-dimensional figures and shapes (e.g., quilt blocks, textiles). [CU] ■ Complete a picture or design from a variety of cultures that incorporate a line of symmetry (e.g., basket design, beadwork, quilts, pyramids, nature). ■ Identify and draw a line of symmetry (e.g., folding or using a mirror). [CU] ■ Identify parallel and perpendicular lines in two-dimensional figures and shapes and in the environment. [MC] ■ Describe characteristics of two-dimensional geometric figures using appropriate vocabulary of parallel, perpendicular, symmetric (e.g., the U.S. flag, a stop sign, a yield sign, a race track, a football field). [CU, MC] ■ Explain parallel and perpendicular and give examples to demonstrate them. [CU]

Component 1.3: Understand and apply concepts and procedures from geometric sense.

GLE	5	6	7	8	9/10
Properties and relationships					
1.3.1	**Understand properties of angles and polygons.** W ■ Explain the difference between a regular and irregular polygon. [CU] ■ Identify, sort, classify, or explain the properties of angles, polygons, or circles based on attributes (e.g., triangles [right, equilateral, isosceles, or scalene], angles [acute, right, obtuse, or straight], or quadrilaterals [squares, rectangles, parallelograms, or trapezoids]). [RL, CU] ■ Construct a geometric shape using geometric properties. [MC]	**Understand the characteristics of circles and rectangular prisms.** W ■ Name and sort circles or rectangular prisms according to their attributes (faces, edges, radii, base, parallel faces). [RL] ■ Draw a figure with given characteristics (e.g., the set of points equidistant from a given point). [CU] ■ Identify lines of symmetry in rectangular prisms. ■ Explain lines of symmetry for circles. [CU] ■ Describe the relationship between the diameter and the radius of a circle. [CU]	**Understand the concept of similarity.** W ■ Identify corresponding sides and angles of two similar figures. ■ Determine and justify if two figures are similar using the definition of similarity. [CU, RL] ■ Differentiate between similar and congruent figures, either geometric figures or real-world objects, and justify the conclusion. [RL, MC] ■ Explain how a scale drawing is an example of similarity. [CU]	**Apply understanding of characteristics and relationships among one-dimensional, two-dimensional, and three-dimensional figures to solve problems.** W ■ Identify and label rays, lines, end points, line segments, vertices, and angles. [CU] ■ Match or draw three-dimensional objects from different perspectives using the same properties and relationships (e.g., match to the correct net, draw the top view). [RL] ■ Draw and label with names and symbols, nets of prisms, and cylinders. [RL, CU] ■ Describe everyday objects in terms of their geometric characteristics. [CU] ■ Identify the two-dimensional components of three-dimensional figures.	**Understand the relationship among characteristics of one-dimensional, two-dimensional, and three-dimensional figures.** W ■ Identify and label one- and two-dimensional characteristics (rays, lines, end points, line segments, vertices, and angles) in three-dimensional figures. [CU] ■ Match or draw three-dimensional objects from different perspectives using the same properties and relationships (e.g., match to the correct net, draw the top view). [RL] ■ Draw and label with names and symbols nets of right prisms and right cylinders. [RL, CU] ■ Describe everyday objects in terms of their geometric characteristics. [CU] ■ Describe or classify various shapes based on their characteristics. ■ Make and test conjectures about two-dimensional and three-dimensional shapes and their individual attributes and relationships using physical, symbolic, and technological models (e.g., diagonal of a rectangle or prism is the longest interior segment; what figures make up cross-sections of a given three-dimensional shape?). [SP, RL, CU, MC]

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.3: Understand and apply concepts and procedures from geometric sense.

GLE	K	1	2	3	4
Properties and relationships					
1.3.2	**Know the characteristics of familiar objects.** ■ Describe familiar objects based on characteristics (e.g., big, small, like a box). [CU, MC] ■ Sort objects in their environment by characteristics (e.g., cans, balls, boxes, red, blue). [MC] ■ Describe objects using comparative language (e.g., bigger, taller, shorter, smaller). [CU]	**Understand how to compare figures based on their characteristics.** ■ Describe two-dimensional figures based on their characteristics (e.g., number of sides, number of equal sides). [CU] ■ Identify, compare, and sort two-dimensional figures in their surroundings (e.g., by lengths of sides, general shape). [RL, MC] ■ Describe figures using accurate terminology (e.g., square, rectangle, triangle).	**Understand characteristics of two-dimensional geometric figures.** ■ Sort and describe characteristics of two-dimensional geometric figures (e.g., various polygons). [RL, CU] ■ Draw a two-dimensional shape that matches a set of characteristics (e.g., draw a four-sided shape that has all sides the same length).	**Understand and apply attributes and properties to two-dimensional shapes and figures.** W ■ Use attributes and properties to identify, name, draw, compare, and/or sort two-dimensional shapes and figures. [RL, CU] ■ Draw and label two-dimensional figures given particular attributes (e.g., triangle, rectangle with all sides the same length). [CU] ■ Identify, name, and describe the attributes and properties of polygons. [CU] ■ Given two polygons, explain how they are alike and different in terms of their attributes and properties (e.g., using a Venn diagram). [CU] ■ Give directions so that someone else can duplicate a design involving polygons (e.g., a friend who can't see the design). [CU]	**Apply understanding of congruence to two-dimensional shapes and figures.** W ■ Identify, describe, and compare attributes of congruent figures in multiple orientations. [CU, SP, RL] ■ Build and draw congruent figures. [CU] ■ Identify, name, compare, and sort congruent two-dimensional figures and shapes in multiple orientations. [RL] ■ Solve problems involving congruence (e.g., create a design made out of congruent shapes). [SP]

Component 1.3: Understand and apply concepts and procedures from geometric sense.

GLE	5	6	7	8	9/10
Properties and relationships					
1.3.2	**Apply understanding of the properties of parallel and perpendicular and line symmetry to two-dimensional shapes and figures.** W ■ Identify, name, compare, and sort parallel and perpendicular lines in two-dimensional figures. [SP, RL, CU] ■ Draw and label a design that includes a given set of attributes (e.g., create a design that has only two lines of symmetry; parallel and perpendicular lines). [SP, CU] ■ Sort figures based on characteristics of parallel lines, perpendicular lines, and/or lines of symmetry. ■ Draw figures or shapes that have particular characteristics (e.g., create a figure that has two parallel lines and one line of symmetry). ■ Identify parallel and perpendicular lines and/or lines of symmetry in the environment. ■ Construct a geometric shape using given geometric properties. [CU] ■ Use technology to draw figures with given characteristics. [MC]	**Apply understanding of angles and polygons.** W ■ Identify geometric figures and concepts in nature and art (e.g., triangle in architecture, rhombus in beadwork, culturally relevant textiles, quilts). [MC] ■ Combine polygons to create given two-dimensional figures and represent them on grid paper (e.g., use all pieces of tangrams to create a square). [SP, RL, CU] ■ Create a three-dimensional shape given its net or draw the net of a given three-dimensional shape. [RL] ■ Find the missing measure of an angle using the properties of parallel lines, perpendicular lines, vertical and corresponding angles. ■ Find the missing angle given all but one of the angles of a polygon. [RL]	**Apply understanding of the characteristics of rectangular prisms and circles.** W ■ Identify, describe, compare, and sort figures. ■ Draw rectangular prisms and circles with specified properties (e.g., circumference of an 18-centimeter quadrilateral having equal sides but no right angles; a triangle with no equal sides). [CU] ■ Use the properties of rectangular prisms and circles to solve problems (e.g., determine which of two rectangular prism-shaped boxes will hold the most cans of food at the food drive and explain how the geometric characteristics affect capacity). [SP, RL, CU, MC] ■ Compare two rectangular prisms based on their characteristics (e.g., compare the geometric characteristics of two rectangular prisms with different dimensions and the same volume). [RL]	**Apply understanding of similarity to two-dimensional figures.** W ■ Use properties of similarity to draw, describe, and compare two-dimensional figures. ■ Find the length of a missing side or the measure of a missing angle of one of the figures, given two similar figures. [SP, RL] ■ Create symmetrical, congruent, or similar figures using a variety of tools (e.g., ruler, pattern blocks, geoboards). [RL, CU] ■ Draw a similar shape to a given shape. [RL, CU, MC] ■ Use properties of circles, cylinders, and figures with rotational symmetry to compare figures. [RL, CU] ■ Create a scale drawing and label the scale and the dimensions. (SP, CU, MC).	**Apply understanding of geometric properties and relationships.** W ■ Use geometric properties and relationships to describe, compare, and draw two-dimensional and three-dimensional shapes and figures. ■ Construct geometric figures using a variety of tools and technologies (e.g., angle bisectors, perpendicular bisectors, triangles given specific characteristics). [MC] ■ Draw a plane shape and justify the answer given a set of characteristics. [RL, CU] ■ Use the properties of two-dimensional and three-dimensional shapes to solve mathematical problems (e.g., find the width of a river based on similar triangles; given a set of parallel lines, a transversal, and an angle, find the other angles). [SP, RL, CU, MC] ■ Compare two-dimensional and three-dimensional shapes according to characteristics including faces, edges, and vertices, using actual and virtual modeling. [RL, CU] ■ Use technology to generate two- and three-dimensional models of geometric figures with given geometric characteristics (e.g., generate a two-dimensional animation using pentagons with fixed coordinates for one edge). [RL, SP] ■ Create a three-dimensional scale drawing with particular geometric characteristics. [SP, CU, MC]

EALR 1

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.3: Understand and apply concepts and procedures from geometric sense.

GLE	K	1	2	3	4
Locations and transformations					
1.3.3	**Understand the relative position of objects in the environment.** ■ Describe the location of an object relative to another (e.g., in, out, over, under, behind, above, below, next to, etc.). [CU] ■ Identify where a three-dimensional object is located relative to another given object (e.g., where the eraser is relative to the desk).	**Understand the locations of numbers on a positive number line.** ■ Indicate whether a number is above or below a benchmark number (e.g., greater than or less than 100). ■ Describe the location of a given number between 1 and 100 on a number line. [CU] ■ Identify a point up to 100 on a positive number line.	**Understand the locations of numbers on a positive number line.** ■ Indicate whether a number is above or below a benchmark number (e.g., greater than or less than 1000). ■ Describe the location of a given number between 1 and 1000 on a number line. [CU] ■ Identify a point up to 1000 on a positive number line.	**Understand relative locations including intervals of numbers on a positive number line.** W ■ Given directions for movement on a positive number line, identify the point of final destination using real-world examples (e.g., travel back and forth on a street, temperature variation at different times of the day, dance steps from diverse cultures). [SP, RL, MC] ■ Identify the interval on a given number line (e.g., describe the scale on a graph). [CU] ■ Describe the relative locations of points on a number line with positive coordinates. [CU] ■ Use unit values to describe the location of objects on a number line. ■ Draw points or objects on a number line based on unit values given.	**Apply understanding of the location of points on a coordinate grid in the first quadrant.** W ■ Describe the location in the first quadrant on a coordinate grid in terms of horizontal and vertical position (e.g., to the right and up, longitude and latitude). [CU, MC] ■ Plot a given set of ordered pairs in the first quadrant of a coordinate grid. [CU] ■ Give directions from one location to another using ordered pairs in the first quadrant of a coordinate grid (e.g., given a state map, specify location of landmarks). [CU, MC]
1.3.4					**Understand and apply single transformations using a translation (slide) or reflection (flip).** W ■ Simulate translations and reflections using objects (e.g., pattern blocks, geo blocks). [MC] ■ Record results of a translation or a reflection (e.g., given a polygon on a grid, translate or reflect it and list the new ordered pairs of the vertices). [CU] ■ Identify and draw a single translation (slide) or a single reflection (flip). [CU] ■ Create designs using translations and/or reflections. [SP]

Component 1.3: Understand and apply concepts and procedures from geometric sense.

GLE	5	6	7	8	9/10
Locations and transformations					
1.3.3	**Apply understanding of the location of non-negative rational numbers on a positive number line.** W ■ Use a number line to order fractions or decimals from least to greatest (e.g., not limited to a number line marked from 0 to 1). [SP, RL] ■ Explain what the relative position of numbers on a positive number line means (e.g., to the right means greater than). [CU] ■ Identify the appropriate values of points on an incomplete number line involving fractional or decimal increments (e.g., using a ruler, reading a fuel gauge). [CU]	**Understand the relative location of integers on a number line.** W ■ Show the order of a given set of integers on a number line. [CU] ■ Identify the point of final destination given directions for movement on a number line including positive and negative numbers (vertical or horizontal) (e.g., temperature variation at different times of the day, bank accounts, gain and loss of weight). [MC] ■ Determine the distance between any two integers on a number line. [RL] ■ Describe relative location of points and objects on a number line with both positive and negative numbers. [CU] ■ Identify objects on a number line based on given numeric locations.	**Understand the location of points on a coordinate grid in any of the four quadrants.** W ■ Identify the coordinates of the fourth point to make a rectangle given three points. [RL] ■ Plot and label ordered pairs in any of the four quadrants. [CU] ■ Name the coordinates of a given point in any of the four quadrants. ■ Identify objects or the location of objects on a coordinate grid using coordinates or labels. ■ Use technology to locate objects on a two-dimensional grid. ■ Use ordered pairs to describe the location of objects on a grid.	**Understand and apply procedures to find distance between points in two-dimensional representations.** W ■ Locate a missing vertex given the coordinates of the vertices of a regular polygon. [RL] ■ Apply the Pythagorean Theorem to find the length of a side of a right triangle or distance between two points. ■ Explain a method for finding the missing side of a triangle in a real-world setting (e.g., the height of a totem pole or building). [CU] ■ Describe the relationship of any two or more points on a coordinate grid. [CU] ■ Find the distance between two points on a coordinate grid including lines that are non-parallel with either axis (oblique). [RL, MC]	**Apply understanding of geometric properties and location of points.** W ■ Use coordinates to describe or identify the location of objects on coordinate grids. ■ Describe geometric characteristics of two-dimensional objects using coordinates on a grid. [MC] ■ Describe the location of points that satisfy given conditions (e.g., the set of points equidistant from a given point; a point equidistant from a given set of points). [CU] ■ Represent situations on a coordinate grid or describe the location of points that satisfy given conditions (e.g., locate a gas station to be equidistant from given cities; locate a staking point to maximize the grazing area of a tethered goat). [MC, SP, RL] ■ Use tools and technology to draw objects on a coordinate grid based on given conditions. [CU] ■ Identify, interpret, and use the meaning of slope of a line as a rate of change using physical, symbolic, and technological models. [SP, RL, MC]
1.3.4	**Apply understanding of translations (slides) or reflections (flips) to congruent figures.** W ■ Identify a specific transformation as a translation (slide) or reflection (flip). [CU] ■ Given a shape on a grid, perform and draw at least one transformation (i.e., translation or reflection). [SP, RL] ■ Draw congruent figures and shapes in multiple orientations using a transformation. [SP, RL] ■ Explain a series of transformations in art, architecture, or nature. [CU, MC] ■ Record results of a translation or reflection (e.g., plot a set of ordered pairs on a grid that are vertices of a polygon, translate or reflect it, and list the new ordered pairs). [CU, MC] ■ Create designs using translations and/or reflections. [SP]	**Apply understanding of rotations (turns) to two-dimensional figures.** W ■ Apply rotations (turns) of 90° or 180° to a simple two-dimensional figure. ■ Create a design using (90°, 180°, 270°, 360°) rotations (turns) of a shape. [SP, MC] ■ Show how a shape has been rotated by 90° or 180°. [CU] ■ Describe a rotation so that another person could draw it. [CU] ■ Identify the coordinates of objects that have been rotated 90°, 180°, or 270° on a coordinate grid. ■ Determine whether an object has been translated or rotated on a coordinate grid.	**Understand and apply combinations of translations (slides) and reflections (flips) to two-dimensional figures.** W ■ Identify and explain whether a shape has been translated (slid) or reflected (flipped) with or without a grid. [RL, CU] ■ Use transformations to create congruent figures and shapes in multiple orientations. ■ Find the coordinate pairs for a translation or a reflection across an axis given a shape on a coordinate grid. [RL] ■ Match a shape with its image following one or two transformations (sliding or flipping). [RL] ■ Use combinations of translations and reflections to draw congruent figures. [RL] ■ Use ordered pairs to describe the location of an object on a coordinate grid after a translation and reflection. [CU]	**Understand and apply transformations to figures.** W ■ Identify and explain how a shape has been translated, reflected, or rotated with or without a grid (e.g., location of the North Star, rotate the Big Dipper). [CU] ■ Use transformations (rotations, reflections, and translations) to draw or locate congruent two-dimensional figures. [RL, CU] ■ Find the image of a given shape after a combination of transformations. [RL] ■ Tessellate a plane by using transformations. [RL, MC] ■ Create a design using a combination of two or more transformations with one or two two-dimensional figures. [SP, RL]	**Apply understanding of multiple transformations to figures.** W ■ Apply multiple transformations to create congruent and similar figures in any or all of the four quadrants. ■ Use multiple transformations (combinations of translations, reflections, or rotations) to draw an image. [RL] ■ Use dilation (expansion or contraction) of a given shape to form a similar shape. [RL, CU] ■ Determine the final coordinates of a point after a series of transformations. [RL, CU] ■ Examine figures to determine rotational symmetry about the center of the shape. [RL, MC] ■ Define a set of transformations that would map one onto the other given two similar shapes. [SP, RL] ■ Create a design with or without technology using a combination of two or more transformations with one or two two-dimensional figures. [SP, RL] ■ Use technology to create two- and three-dimensional animations using combinations of transformations. [MC, SP, RL]

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

GLE	K	1	2	3	4
Probability					
1.4.1					**Understand when events are certain or impossible and more likely, less likely, or equally likely.** W ■ Identify the likelihood of events and use the vocabulary of probability (e.g., weather, if homework will be assigned, simple games). [CU, MC] ■ Place events in order of likelihood of occurrence (e.g., use a number line marked from 0 to 1). [SP, RL, MC] ■ Distinguish between events that are certain or uncertain. [RL] ■ Place events in order based on their likelihood of occurrence. [RL] ■ Identify or describe possible and impossible events. ■ Determine what events are more likely, less likely, or equally likely to happen given an area model (e.g., a spinner with different-sized sections).
1.4.2					

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

GLE	5	6	7	8	9/10
Probability					
1.4.1	**Understand the likelihood (chance) of events occurring.** W ■ Predict and test how likely it is that a certain outcome will occur (e.g., regions of a spinner, flip of a coin, toss of dice). [SP, RL] ■ Represent the probability of a single event on a scale of 0 to 1. [MC] ■ Given a fair game, create an advantage for one of the players (e.g., if the game is selecting marbles, include more marbles of one color than the other). [SP, RL] ■ Explain the likelihood of a single event. [CU] ■ Determine whether a game for two people is fair. [RL] ■ Create a game that would make it more or less likely for an event to happen. [SP]	**Understand probability as a ratio between and including 0 and 1.** W ■ Determine whether a real-life event has zero probability, 50% probability, or 100% probability of occurring. [MC] ■ Express probabilities as fractions or decimals between 0 and 1 and percents between 0 and 100. [CU] ■ Translate between representations of probability (e.g., translate a probability of 6 out of 16 to 3/8 or 37.5%). [MC]	**Understand the concepts of complementary, independent, and mutually exclusive events.** W ■ Determine and explain when events are mutually exclusive (e.g., your grade on a test is an A, B, or C). [CU, MC] ■ Determine and explain when events are complementary (e.g., a person awake or asleep, you pass or fail a test, coin throw — heads or tails). [CU, MC] ■ Identify or explain when events are complementary, mutually exclusive, or neither (e.g., spinning a 4 or a 5 but with the possibility of spinning 1, 2, 3, or 6) and explain. [CU]	**Understand the concept of compound events.** W ■ Determine and explain when events are compound. [CU] ■ Explain the difference between compound events involving 'and' and 'or' (e.g., rolling a six and rolling an odd number vs. rolling a six or rolling an odd number). [CU]	**Understand the concept of conditional probability.** W ■ Compare the probabilities of dependent and independent events. [CU, MC] ■ Determine and justify whether the outcome of a first event affects the probability of a later event (e.g., drawing cards from a deck with or without replacement). [CU] ■ Explain the difference between dependent and independent events. [CU] ■ Explain and give examples of compound events. [CU]
1.4.2	**Understand and apply the Fundamental Counting Principle to situations.** W ■ Calculate the number of different combinations of different objects (e.g., three shirts and two pants could be combined in 3 x 2 = 6 ways). ■ Describe a situation that might include three different selections combined (e.g., describe a situation that could be calculated by 10 x 10 x 26 — two digits and a letter of the alphabet). [CU]	**Understand various ways to determine outcomes of events or situations.** W ■ Determine and use the probabilities of the outcome of a single event. ■ Represent or describe all possible outcomes of experiments (e.g., an organized list, a table, a tree diagram, or a sample space). [RL, CU] ■ Calculate probability for an event (e.g., pulling colored or numbered balls from a bag, drawing a card, rolling a six on a number cube, spinning a spinner, etc.). ■ Determine all possible outcomes (sample space) of an experiment or event (e.g., all different choices a person has to wear one top and one skirt from three different tops and two different skirts). [CU]	**Understand and apply the procedures for determining the probabilities of multiple trials.** W ■ Calculate the probabilities of independent or mutually exclusive outcomes or events. ■ Calculate the probability of an event given the probability of its complement. ■ Create a game that has an equal probability for all players to win. [SP, MC] ■ Revise a game with unequal probabilities for all players and make it a fair game. [SP, MC] ■ Determine, interpret, or express probabilities in the form of a fraction, decimal, or percent. [CU, MC] ■ Predict the probability of outcomes of experiments and test the predictions. [RL] ■ Predict the probability of future events based on empirical data. [RL]	**Understand and apply the procedures for comparing theoretical probability and empirical results for independent or compound events.** W ■ Calculate the probability of two independent events occurring simultaneously using various methods (e.g., organized list, tree diagram, counting procedures, and area model). ■ Explain the relationship between theoretical and empirical probability of compound events. [CU] ■ Predict the probability of outcomes of experiments and compare the predictions to empirical results. [RL] ■ Design or create a situation that would produce a given probability (e.g., how many of each colored marble would it take to have a given probability of selecting one particular color?). [SP, MC] ■ Design a game using compound probabilities with equal chances of winning for all players. [SP, MC]	**Apply understanding of dependent and independent events to calculate probabilities.** W ■ Determine probabilities of dependent and independent events. [SP] ■ Generate the outcomes and probability of multiple independent and dependent events using a model or procedure (e.g., tree diagram, area model, counting procedures). ■ Generate the outcomes and probability of events using a counting procedure (e.g., the number of license plates that can be made with three letters and three numbers; winning the lottery). [MC] ■ Explain the relationship between theoretical probability and empirical frequency of dependent events using simulations with and without technology. [CU] ■ Create a simple game based on independent probabilities wherein all players have an equal probability of winning. [MC, SP] ■ Create a simple game based on compound probabilities. [MC, SP] ■ Determine the sample space for independent or dependent events.

SP: Solves Problems RL: Reasons Logically CU: Communicates Understanding MC: Makes Connections

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

GLE	K	1	2	3	4
Statistics					
1.4.3	**Understand how data can be collected and organized.** ■ Use physical objects or pictures to build bar graphs. [CU] ■ Organize objects into groups before counting them. [RL]	**Understand how data can be organized and displayed.** ■ Display results of data collection by making student-invented and conventional displays. [CU] ■ Construct bar graphs with physical materials and record pictorially (e.g., shoes, cats, crops, egg rolls, tacos). [CU] ■ Collect data related to questions and organize the data into useful categories in familiar situations (e.g., how many students like apples? How many students do NOT like apples?).	**Understand the organization of a graph.** ■ Identify title, horizontal and vertical axes, and key. ■ Construct a bar graph that includes a title, key, and single-unit increment. [CU] ■ Name an appropriate title for a display of data. [CU]	**Understand how to use data collection and display methods to obtain desired information.** W ■ Interpret graphs for comparative information (e.g., find the difference in selected data). [RL, CU, MC] ■ Pose questions and gather data relevant to the questions posed. ■ Design a survey; collect and record data in easy-to-use formats (e.g., use tally marks, make a table). [CU] ■ Organize category data into bar graphs with unit scales for ease of interpretation. [RL] ■ Organize data into picture graphs with unit scales for ease of interpretation. [RL] ■ Determine questions needed to gather data about themselves and their classmates.	**Understand and apply data collection methods to obtain the desired information.** W ■ Identify appropriate questions and populations to obtain the desired kind of information. ■ Formulate questions for surveys and collect data. [CU] ■ Decide whether to conduct a survey, use observations, or measure for a given question. [RL] ■ Make a plan to answer a question including how to record and organize data. [RL, CU, MC] ■ Determine which of several questions is most likely to give the desired information. [RL]
1.4.4				**Understand and apply mode to describe a set of data.** W ■ Create and solve a problem situation where mode is meaningful for a set of data. [RL, CU, MC] ■ Explain what the mode represents and how to find it in a given set of data. [CU] ■ Identify the mode for a given set of data	**Understand and apply median and range to describe a set of data.** W ■ Use a variety of strategies to determine median and range from a set of data (e.g., use a graph, pictures, or objects). ■ Calculate the range of a data set. ■ Compare the mode and median from a set of data and determine which measure better describes the average. [RL] ■ Explain what the median represents and how to find it in a set of data. [CU] ■ Explain what the range represents and how to find it in a set of data. [CU] ■ Determine data points that would result in a given median. [RL, SP]

GLE	5	6	7	8	9/10
Statistics					
1.4.3	**Understand how different collection methods or different questions can affect the results.** W ■ Ask the same question using different data collection methods that result in other points of view being supported and explain why the method affected the data. [SP, RL, CU] ■ Explain how different data collection methods affect the nature of the data set with a given question (e.g., phone survey, Internet search, person-to-person survey). [CU, MC] ■ Identify or describe the appropriate sample for a given question. ■ Identify or describe the appropriate population for a given sample	**Analyze how data collection methods affect the data collected.** W ■ Evaluate how a question or data collection method may affect the data. [RL] ■ Determine whether a sampling method will result in a representative sample. ■ Describe a data collection method that will provide an unbiased sample. [CU] ■ Compare data collection methods for a given situation to determine fairness of the method (e.g., compare a phone survey, a web survey, and a personal interview survey). [RL, MC] ■ Identify different ways of selecting a sample (e.g., convenience sampling, response to a survey, random sampling) and explain which method makes a sample more representative for a population. [SP, MC]	**Apply data collection processes to inform, persuade, or answer questions.** W ■ Formulate a question and collect data from a population, describing how the questions, collection method, and sample population affect the results. [CU] ■ Present collected data to support an opinion to inform or persuade an identified audience. [CU, MC] ■ Determine whether given data provides useful information for a situation (e.g., given a set of data, decide whether all of the information provided is necessary). [SP] ■ Determine whether data supports a given opinion and explain the decision. [CU] ■ Identify a sample relevant to a given question and population.	**Analyze how different samples of a population affect the data.** W ■ Identify sources of sampling bias given a situation (e.g., interviewing only girls, only a certain age group, or too few people). [CU, MC] ■ Describe a procedure for selecting an unbiased sample. [CU, MC] ■ Compare the results of a survey given two different sample groups. [RL, CU] ■ Identify the appropriate population for a given research question. ■ Describe how sampling may have affected the resulting data. [CU]	**Apply appropriate methods and technology to collect data or evaluate methods used by others for a given research question.** W ■ Identify sources of bias in data collection questions, samples, and/or methods and describe how such bias can be controlled. [RL, CU] ■ Evaluate methods and technology used to investigate a research question. [CU, MC] ■ Collect data using appropriate methods. ■ Use technology appropriately to collect data. [RL, MC] ■ Identify inappropriate data collection methods that might impact the accuracy of the results of a given situation. [RL, CU] ■ Determine whether the sample for a given study was from a representative sample. ■ Determine whether the methods of data collection used were appropriate for a given question or population. [RL]
1.4.4	**Understand and apply the mean of a set of data.** W ■ Explain how to find the mean of a set of data and explain the significance of the mean. [CU]. ■ Find the mean from a given set of data using objects, pictures, or formulas. ■ Given a problem situation, determine and defend whether mean, median, or mode is the most appropriate measure of average. [SP, RL, CU, MC] ■ Compare the mean, median, and mode for a given set of data. [RL] ■ Find and compare mean for two samples from the same population. [RL]	**Apply measures of central tendency to interpret a set of data.** W ■ Determine when it is appropriate to use mean, median, or mode and why a specific measure provides the most useful information in a given context. [RL, CU] ■ Use mean, median, and mode to explain familiar situations (e.g., the heights of students in the class, the hair color of students in the class). [CU, MC] ■ Find the missing number given a mean for a data set with a missing element (e.g., given a set of homework scores and the desire to earn an average score of 80%, determine what score the student must earn on the next assignment). [SP, RL]	**Understand how variations in data may affect the choice of data analysis techniques used.** W ■ Determine and use range and measures of central tendency to describe a set of data. ■ Describe the effects of extreme values on means in a population. [CU, MC] ■ Explain the difference between median or mean as a measure of central tendency in a given situation (e.g., when an extreme value skews the mean). [RL, CU, MC] ■ Describe how additional data added to data sets may affect the result of measures of central tendency. [SP, CU] ■ Find the range of a set of data. ■ Explain what the range adds to measures of central tendency. [CU]	**Analyze variations in data to determine the effect on the measures of central tendency.** W ■ Identify clusters and outliers and determine how clusters or outliers may affect measures of central tendency. [RL] ■ Alter a set of data so that the median is a more reasonable measure than the mean. [RL, CU, MC] ■ Use and interpret the most appropriate measure of central tendency and the range to describe a given set of data (e.g., the model hourly wage earned by eighth graders is $5.75 per hour and the range is $5.00 to $6.50; therefore, there are very small differences in hourly wages for eighth graders). [RL, CU, MC]	**Understand and apply techniques to find the equation for a reasonable linear model.** W ■ Determine the equation for a reasonable line to describe a set of bivariate data. [RL, MC] ■ Determine the equation of a line that fits the data displayed on a scatter plot. [SP, RL] ■ Use technology to determine the line of best fit for a set of data. [MC] ■ Match an equation with a set of data. [MC] ■ Match an equation with a graphic display. [MC] ■ Create a graph based on the equation for a line.

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

GLE	K	1	2	3	4
Statistics					
1.4.5	**Understand how a display provides information.** ■ Answer questions about graphs (e.g., how many cats? How many dogs?). [CU]	**Understand how a display provides information.** ■ Answer questions about bar graphs or pictographs (e.g., how many dancers, plants, canoes, pets?). [CU]	**Understand how a display provides information about a question.** ■ Conduct a survey for a predetermined question and collect data using tallies, charts, lists, or pictures (e.g., who has animals at home, how many, what type?). [SP, RL] ■ Identify a question that could be answered from a display. ■ Interpret results and draw conclusions from displays (e.g., pictographs, bar graphs) using comparative language (e.g., more, fewer). [CU, MC] ■ Read the labels from each axis of a graph. [CU]	**Understand representations of data from tables, charts, and bar graphs.** W ■ Pose questions that can be answered from a given graph. [CU, MC] ■ Make inferences based on the data or determine if the data can support inferences made. [CU, MC] ■ Read and report on data from tables, charts, and bar graphs. [CU] ■ Explain how types of graphs or the graph construction can support different points of view (e.g., starting the axis numbers at 50 rather than 0). [CU, SP, RL] ■ Create bar graphs including labels for title, both axes, scale units (e.g., 2s, 5s, 10s), and key if needed. [SP, RL, CU, MC] ■ Interpret graphs for comparative information (e.g., find the difference in selected data). [RL, CU, MC]	**Understand representations of data from line plots and pictographs.** W ■ Read data from line plots and pictographs. ■ Describe a trend from a given line plot. [CU, MC] ■ Interpret a pictograph where the scale is other than one unit. [RL] ■ Create two different graphic displays using a set of data. [CU, MC] ■ Read and interpret data from line plots and pictographs. [RL, CU] ■ Use technology to create pictographs. ■ Explain the data in a given table, chart, or graph. [CU] ■ Analyze the completeness and accuracy of data in a graph given a set of data. [RL]
1.4.6					

SP: Solves Problems **RL**: Reasons Logically **CU**: Communicates Understanding **MC**: Makes Connections

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

GLE	5	6	7	8	9/10
Statistics					
1.4.5	**Apply strategies to organize, display, and interpret data.** W ■ Read and interpret data from text, line and bar graphs, histograms, stem-and-leaf plots, and circle graphs, and determine when using each of these is appropriate. ■ Use histograms, pictographs, and stem-and-leaf plots to display data. [CU, MC] ■ Construct assorted graphs that include labels, appropriate scale, and key. [CU] ■ Determine what type of data should be represented on a bar graph, circle graph, histogram, or line graph. [RL] ■ Compare the consistency of results from two different displays that address the same question.	**Understand how to organize, display, and interpret data in text from single line graphs and scatter plots.** W ■ Justify a choice of a graph type for a given situation using information about the type of data. [RL, CU, MC] ■ Read and interpret data from single line graphs and scatter plots, and determine when the use of these graphs is appropriate. [RL, CU] ■ Use an appropriate representation to display data (e.g., table, graphs) given a particular situation and audience. [MC, CU] ■ Make inferences based on a set of data. [RL] ■ Use data from a table, graph, or chart to support an interpretation. [RL, CU] ■ Use technology to generate bar graphs, line graphs, and scatter plots from tables of data. [MC]	**Understand and apply various data display techniques including box-and-whisker plots.** W ■ Read and interpret various data displays. ■ Determine the appropriate representation for given data. [RL, CU] ■ Construct bar graphs, circle graphs, line graphs, box-and-whisker and scatter plots using collected data. [CU, MC] ■ Use scatter plots to describe trends and interpret relationships. [RL, CU] ■ Read and interpret data from box-and-whisker plots and determine when using this type of graph is appropriate. [RL, CU] ■ Describe statistical information given a box-and-whisker plot (e.g., median, range, interquartile range). [CU] ■ Compare different graphical representations of the same data. [RL, MC] ■ Make and justify an inference drawn from a sample. [RL, CU, MC]	**Understand and apply data techniques to interpret bivariate data.** W ■ Interpret graphic and tabular representations of bivariate data. ■ Use a line of best fit to predict a future value of a variable. [RL] ■ Use a line of best fit to interpolate between existing data values. [RL] ■ Draw trend lines with or without technology and make predictions about real-world situations (e.g., population trends, socio-economic trends). [CU, MC, RL] ■ Examine data in a two-column table to interpolate or extrapolate additional values. [RL] ■ Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken (e.g., age groups, regions of the U.S., genders, racial/ethnic distributions). [RL, MC, CU]	**Analyze a linear model to judge its appropriateness for a data set.** W ■ Determine whether a straight line is an appropriate way to describe a trend in a set of bivariate data. [MC, RL] ■ Determine whether the underlying model for a set of data is linear. [RL, MC] ■ Decide and explain whether it is appropriate to extend a given data set following a line of best fit. [RL, MC] ■ Determine whether a linear prediction from a given set of data is appropriate for the data and support the decision with data. [MC]. ■ Determine whether an equation for a line is appropriate for a given set of data and support the judgment with data. [RL, MC] ■ Use technology to generate data to fit a linear model. [SP, MC]
1.4.6		**Evaluate a data set to determine how it can be, or has been, used to support a point of view.** W ■ Compare graphs to data sets (e.g., given unlabeled graphs and data sets, match the appropriate data to a graph). [RL] ■ Judge the appropriateness of inferences made from a set of data and support the judgment. [CU, MC] ■ Identify claims based on statistical data and assess the validity of the claims. [CU, RL] ■ Explain whether the scale on a graph accurately represents the data. [CU] ■ Compare or evaluate two or more interpretations of the same set of data for accuracy.	**Evaluate how different representations of the same set of data can support different points of view.** W ■ Critique the use of data and data displays for univariate data. ■ Judge the reasonableness of conclusions drawn from a set of data and support that position with evidence (e.g., from newspapers, Web sites, opinion polls). [MC, RL] ■ Determine the accuracy and completeness of the data in a table or graph. [RL, CU] ■ Explain how different representations of the same set of data can support different points of view. [RL, CU] ■ Describe how statistics or graphics have been used or misused to support a point of view.	**Evaluate how statistics and graphic displays can be used to support different points of view.** W ■ Critique the use of data and data displays for bivariate data. [RL] ■ Judge the reasonableness of conclusions drawn from a set of data and support that position with evidence (e.g., from newspapers, Web sites, opinion polls). [MC, RL] ■ Determine whether a prediction is reasonable based on a trend line and explain the rationale. [RL] ■ Determine whether claims made about results are based on biased representations of data (e.g., whether a scale has been intentionally used to support a point of view).	**Apply understanding of statistics to make, analyze, or evaluate a statistical argument.** W ■ Identify trends in a set of data in order to make a prediction based on the information. [CU, MC] ■ Justify a prediction or an inference based on a set of data. [CU, MC] ■ State possible factors that may influence a trend but not be reflected in the data (e.g., population growth of deer vs. availability of natural resources or hunting permits). [MC, CU, RL] ■ Use statistics to support different points of view. [RL] ■ Analyze a set of statistics to develop a logical point of view. [RL. CU, MC] ■ Justify or refute claims and supporting arguments based on data. [CU, MC] ■ Determine whether statistics have been used or misused to support a point of view or argument and support the evaluation with data. [RL]

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

GLE	K	1	2	3	4
Patterns, functions, and other relations					
1.5.1	**Know how to recognize patterns.** ■ Identify and extend patterns (e.g., ABAB, green-green-blue, counting). [RL] ■ Create an AB pattern.	**Understand the concept of patterns.** ■ Create and describe a variety of repeating patterns using sounds, objects, and symbols. [CU] ■ Describe and extend a repeating pattern (e.g., ABAC, ABAC; snap, clap, snap, stomp). [CU] ■ Identify the unit in a repeating pattern (e.g., in A-A-B-A-A-B the unit is A-A-B). [RL] ■ Identify and describe numerical patterns in the 100s chart. [CU, RL] ■ Identify geometric patterns in art, textiles, and ceramics.	**Understand how patterns are generated.** ■ Translate a pattern from one representation to another (e.g., snap-clap-stomp translates to ABC). [CU, MC] ■ Identify, extend, create, and explain patterns of addition and subtraction represented in charts and tables. [CU, RL, MC]	**Understand patterns of objects including number patterns with a single addition or subtraction operation.** W ■ Recognize and extend patterns of numbers, figures, and objects using addition and subtraction based on a single arithmetic operation between the terms (e.g., stacking cans in a pyramid, observing textile patterns). ■ Identify, extend, and describe numerical patterns (e.g., skip counting, 100 chart, multiplication table). [RL, CU] ■ Describe the pattern in a number sequence (e.g., Guess My Rule, Function Machine). [CU] ■ Identify the rule for a pattern based on a single operation (e.g., add 3). [RL] ■ Explain what makes a given pattern a pattern. [CU] ■ Complete a pattern by supplying missing elements in the pattern. ■ Compare two patterns to determine whether they are alike or different and explain the decision. [RL, CU]	**Understand patterns of objects including number patterns using addition, subtraction, or multiplication based on a single arithmetic operation.** W ■ Extend or create patterns of numbers, shapes, or objects using addition, subtraction, or multiplication based on a single operation between terms. ■ Extend and represent patterns using words, tables, numbers, and pictures. [RL, CU] ■ Create a number pattern and explain what makes it a pattern. [CU]
1.5.2					**Understand a pattern to develop a rule describing the pattern which may include a single arithmetic operation.** W ■ Use the rule for a pattern which may include a single arithmetic operation to extend or fill in parts of a pattern. ■ Solve a problem that uses a pattern with a single operation. [SP] ■ Model growing patterns using objects and pictures (e.g., a stair step sequence, or a "growing" L shape in which a unit is added to each leg to show 3, 5, 7, 9, . . .). [RL, CU] ■ Describe the rule for a pattern based on one operation (e.g., add 4; multiply by 2). [CU] ■ Analyze a pattern to determine a rule. [RL] ■ Use a rule to generate a pattern.

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

GLE	5	6	7	8	9/10
Patterns, functions, and other relations					
1.5.1	**Understand patterns of objects including relationships between two sets of numbers based on a single arithmetic operation.** W ■ Extend or create patterns of numbers, shapes, or objects based on a single arithmetic operation between the terms. ■ Determine the operation that changes the elements of one set of numbers into the elements of another set of numbers (e.g., if one set is 1,2,3, … and another set is 5,10, 15 … , one rule is to multiply each number in the first set by 5 to get the corresponding number in the second set). [RL] ■ Explain why a given rule fits a pattern based on a single arithmetic operation in the rule. [RL, CU]	**Apply rules for number patterns based on two arithmetic operations.** W ■ Recognize or extend patterns and sequences using operations that alternate between terms. [RL] ■ Create, explain, or extend number patterns involving two related sets of numbers and two operations including addition, subtraction, multiplication, or division. [CU] ■ Use rules for generating number patterns (e.g., Fibonacci sequence, bouncing ball) to model real-life situations. [MC] ■ Use technology to generate patterns based on two arithmetic operations. [SP] ■ Supply missing elements in a pattern based on two operations. ■ Select or create a pattern that is equivalent to a given pattern.	**Apply understanding of linear relationships to analyze patterns, sequences, and situations.** W ■ Identify patterns that are linear relations and provide missing terms. [RL] ■ Describe the relationship between the terms in a sequence and their positions in the sequence. [CU] ■ Identify, extend, or represent patterns and sequences using tables, graphs, or expressions. [RL, MC] ■ Use technology to generate graphic representations of linear relationships. [SP] ■ Make predictions using linear relationships in situations. [RL] ■ Identify a linear relationship that has the same pattern as another linear relationship. ■ Create a representation of a linear relationship given a rule. [MC]	**Apply understanding of linear and non-linear relationships to analyze patterns, sequences, and situations.** W ■ Extend, represent, or create linear and non-linear patterns and sequences using tables and graphs. [RL] ■ Explain the difference between linear and non-linear relationships. [CU] ■ Predict an outcome given a linear relationship (e.g., from a graph of profit projections, predict the profit). [RL] ■ Use technology to generate linear and non-linear relationship. [SP, RL]	**Apply processes that use repeated addition (linear) or repeated multiplication (exponential).** W ■ Recognize, extend, or create a pattern or sequence between sets of numbers and/or linear patterns. [RL, CU, MC] ■ Identify, extend, or create a geometric or arithmetic sequence or pattern. [RL, CU] ■ Translate among equivalent numerical, graphical, and algebraic forms of a linear function. [RL, MC] ■ Make predictions based on a pattern or sequence.
1.5.2	**Apply understanding of a pattern to develop a rule describing the pattern including combinations of two arithmetic operations.** W ■ Use the rule for a pattern which may include a combination of two arithmetic operations to extend a pattern. [SP, RL] ■ Solve a problem that uses a pattern of alternating operations (e.g., a frog climbed up 3 feet each day and then slipped down 1 foot each night, how long did it take the frog to reach the top of a building that is 15 feet high?). [SP] ■ Analyze a pattern to determine a rule with two operations between terms. [RL] ■ Use a rule to generate a pattern.	**Apply understanding of patterns involving two arithmetic operations to develop a rule.** W ■ Describe the rule for a pattern with combinations of two arithmetic operations in the rule. ■ Identify patterns involving combinations of operations in the rule, including exponents (e.g., 2, 5, 11, 23). [RL, MC] ■ Represent a situation with a rule involving a single operation (e.g., presidential elections occur every four years; when will the next three elections occur after a given year?). [CU, MC] ■ Create a pattern involving two operations using a given rule.	**Apply understanding of linear patterns in a table, graph, or situation to develop a rule.** W ■ Describe the rule and/or construct a table to represent a pattern with combinations of two arithmetic operations in the rule. ■ Write an expression or equation with a single variable representing a situation or real-world problem. [CU, MC] ■ Write a story about a situation that represents a given linear equation, expression, or graph. [CU, MC] ■ Describe the rule or construct a table to represent a pattern with combinations of two arithmetic operations in the rule. [RL, CU] ■ Use technology to determine the rule for a linear relationship. [SP, RL]	**Analyze a pattern, table, graph, or situation to develop a rule.** W ■ Use technology to help develop a table or graph from an iterative definition (e.g., the number of cells doubles every hour starting with one cell at noon). [CU, MC] ■ Explain the nature of changes in quantities in linear relationships using graphs, tables, or expressions. [CU, MC] ■ Develop recursive equations that describe linear relations in terms of current and previous values (e.g., start = 7; Current = Previous + 5 would give a set of values (1,7),(2,12), (3,17) …). ■ Use words or algebraic symbols to describe a rule for a linear relationship between two sets of numbers (e.g., given a table, describe a rule). [CU]	**Analyze a pattern, table, graph, or model involving repeated addition (linear) or repeated multiplication (exponential) to write an equation or rule.** W ■ Find the equation of a line in a variety of ways (e.g., from a table, graph, slope-intercept, point-slope, two points). [RL, MC] ■ Generate and use rules for a pattern to make predictions about future events (e.g., population growth, future sales, growth of corn stalks, future value of savings account). [SP, RL, MC] ■ Identify or write an equation or rule to describe a pattern, sequence, and/or a linear function. [RL, CU, MC] ■ Write an equation for a line given a set of information (e.g., two points, point-slope, etc.). [CU, MC] ■ Write a recursive definition of a geometric pattern (e.g., Start and New = Old * Number). [CU, MC] ■ Represent systems of equations and inequalities graphically. [RL, MC] ■ Write a story that represents a given linear equation or expression. [CU, MC] ■ Write an expression, equation, or inequality with two variables representing a linear model of a real-world problem. [CU, MC]

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

GLE	K	1	2	3	4
Symbols and representations					
1.5.3	**Understand the concepts of equality and inequality.** ■ Use physical objects to model language (e.g., same, different, equal, not equal, more, less). [CU] ■ Model/act out story problems to solve whole number equations and inequalities (e.g., there are three kids; two have three crayons and one has two crayons. How can you make it so all kids have the same number of crayons?). [CU, MC]	**Understand the meaning of symbols and labels used to represent equality in situations.** ■ Demonstrate equality by recording number sentences with balance using the "=" symbol (e.g., 9 = 4 + 5, 4 + 5 = 2 + 7, 9 = 9). [CU] ■ Complete open sentences showing equalities (e.g., 5 = ____). ■ Explain, using pictures or words, the meaning of equality. [CU] ■ Give an example of equality in real life (e.g., on the first turn, Juan scored 4 points; on the second turn, he scored 5 points. On the first turn, Ivana scored 2 points; on the second turn, she scored 7 points. After two turns, they are tied with the same number of points.). [MC]	**Understand the meaning of symbols and labels used to represent situations.** ■ Use number sentences with symbols and labels to represent real-world problems involving addition and subtraction. [MC] ■ Give an example of inequality in real life (e.g., on the first turn, Juan scored 6 points; on the second turn, he scored 8 points. On the first turn, Ivana scored 9 points; on the second turn, she scored 7 points. After two turns, Juan's points are less than Ivana's points.). [CU, MC]	**Apply understanding of the concept of mathematical equality.** W ■ Write an equation or expression for a given situation (e.g., there are 23 dogs at a kennel, if 15 are present, how many are absent?). [SP, RL, CU] ■ Explain equality and the use of "=" in equations. [CU] ■ Compare expressions to determine whether they are equal (e.g., 3 + 4 and 2 + 5). [RL] ■ Write a situation that represents a given equation involving addition or subtraction. [CU, MC] ■ Identify a situation that represents a given equation involving addition or subtraction. [CU, MC]	**Apply understanding of the concept of mathematical inequality.** W ■ Compare multiplication or division expressions using the symbols >, <, and = (e.g., 5 x 3 > 3 x 2). [RL] ■ Select operational and relational symbols to make a multiplication or division number sentence true (e.g., 4 _ 3 = 12; 5 x 12 _ 64). ■ Explain inequality and the use of ">" or "<" in inequalities. [CU] ■ Identify or write a situation that represents it given an expression or equation using < or >. [CU, MC]
1.5.4				**Understand and apply operational and relational symbols and notations to write equations involving addition and subtraction.** W ■ Write and explain mathematical statements (e.g., 7 + ❑ = 8 or ❑ +8 = 10). [CU] ■ Identify and use mathematical symbols and notations in reading and writing expressions and equations involving addition and subtraction. ■ Write an equation for a given situation (e.g., there are 23 children in a class; if 15 are present, how many are absent?). [CU]	**Understand and apply operational and relational symbols and notations to write expressions and equations involving multiplication and division.** W ■ Identify and use mathematical symbols and notations in reading and writing expressions and equations. ■ Write a situation that represents a given equation involving multiplication or division. [CU, MC] ■ Write an equation that represents a given situation involving multiplication or division. [CU, MC]

SP: Solves Problems **RL**: Reasons Logically **CU**: Communicates Understanding **MC**: Makes Connections

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

GLE	5	6	7	8	9/10
Symbols and representations					
1.5.3	**Apply understanding of the concept of mathematical inequality.** W ■ Express relationships between quantities using " ≠, ≤, or ≥". ■ Given a number sentence using ≠, ≤, or ≥, identify or write a situation that represents it. [CU, MC] ■ Given a real-world situation, use =, ≠, ≤, or ≥ to describe quantities. [RL, MC] ■ Explain inequality and the use of "≠", "≤", or "≥". [CU]	**Apply understanding of equalities and inequalities to interpret and represent relationships between quantities.** W ■ Express relationships between quantities (decimals, percents, and integers) using =, ≠, <, >, ≤, and ≥. [CU] ■ Match a given situation to the correct inequality or equality. [MC] ■ Express relationships between non-negative rational numbers using symbols. ■ Write an inequality with a single variable to match a particular situation. [RL, CU]	**Understand relationships between quantities using squares and square roots.** W ■ Represent relationships between quantities using exponents (squares) and radicals (roots). [CU] ■ Simplify square roots of square numbers (e.g., the square root of 9 is 3). [RL] ■ Demonstrate understanding of square roots with physical models and examples. [CU] ■ Use exponents (squares) and radicals (square roots) to represent relationships (e.g., finding the area of a square with a side of 5 could be represented by 5^2). [CU]	**Understand relationships between quantities including whole number exponents, square roots, and absolute value.** W ■ Represent relationships between quantities using exponents (squares) and radicals (roots). [CU] ■ Explain the placement of numbers including square roots and exponents on a number line. [CU] ■ Model or describe a real-life situation using absolute value (e.g., the taxi-cab distance from one point to another can be represented by the sum of two absolute values). [CU, MC] ■ Use relational symbols to express relationships between rational numbers including percents, square roots, absolute value, and exponents. [CU]	
1.5.4	**Understand how to represent situations involving one operation or two alternating arithmetic operations.** W ■ Translate a situation involving one arithmetic operation into algebraic form using equations, tables, and graphs. [CU, MC] ■ Translate a situation involving two alternating arithmetic operations into algebraic form using equations, tables, and graphs (e.g., a snail crawls up 3 feet each day and slides back 2 feet each night). [CU, MC] ■ Identify or describe a situation involving one arithmetic operation that may be modeled by a graph. [CU] ■ Identify or describe a situation involving two alternating arithmetic operations that may be modeled by a graph (e.g., a snail crawls up 3 feet each day and slides back 2 feet each night). [CU]	**Apply understanding of tables, graphs, expressions, equations, or inequalities to represent situations involving two arithmetic operations.** W ■ Translate a situation involving multiple arithmetic operations into algebraic form using equations, tables, and graphs. [RL, CU, MC] ■ Identify or describe a situation involving two arithmetic operations that matches a given graph. [CU, MC] ■ Represent an equation, expression, or inequality using a variable in place of an unknown number. [CU] ■ Represent or evaluate algebraic expressions involving a single variable. [RL, CU] ■ Represent an equation or expression using a variable in place of an unknown number. [RL, CU] ■ Identify a situation that corresponds to a given equation or expression.	**Apply understanding of equations, tables, and graphs to represent situations involving linear relationships.** W ■ Represent linear relationships through expressions, equations, tables, and graphs of situations involving non-negative rational numbers. ■ Graph data to demonstrate relationships in familiar contexts (e.g., conversions, perimeter, area, volume, and scaling). [CU, MC] ■ Develop a situation that corresponds to a given equation or expression. [CU, MC] ■ Create a table or graph given a description of, or an equation for, a situation involving a linear relationship. [CU, MC] ■ Describe a situation involving a linear or non-linear relationship that matches a given graph (e.g., time-distance, time-height). [CU, MC] ■ Explain the meaning of a variable in a formula, expression, or equation. [CU]	**Apply understanding of concepts of algebra to represent situations involving single-variable relationships.** W ■ Represent variable quantities through expressions, linear equations, inequalities, tables, and graphs of situations. [CU] ■ Write an expression, equation, or inequality with a single variable representing a situation or real-world problem. [SP, RL, MC] ■ Identify and use variables to read and write relationships involving rational numbers. ■ Model a given description or situation involving relationships with a graph or table. [CU, MC] ■ Describe a situation involving relationships that matches a given graph. [CU, MC] ■ Create a table or graph given a description of, or an expression for, a situation involving a linear or non-linear relationship. [CU, MC]	**Apply understanding of equations, tables, or graphs to represent situations involving relationships that can be written as repeated addition (linear) or repeated multiplication (exponential).** W ■ Represent variable quantities through expressions, equations, inequalities, graphs, and tables to represent linear situations involving whole number powers and square and cube roots. [CU, MC] ■ Identify and use variable quantities to read and write expressions and equations to represent situations that can be described using repeated addition (e.g., models that are linear in nature). [CU, MC] ■ Identify and use variable quantities to read and write expressions and equations to represent situations that can be described using repeated multiplication (e.g., models that are exponential such as savings accounts and early stages of population growth). [CU, MC] ■ Recognize and write equations in recursive form for additive models (e.g., starting value, New = Old + some number). [CU, MC] ■ Recognize and write equations in recursive form for multiplicative models (e.g., starting value, New = Old x some number). [CU, MC] ■ Select an expression or equation to represent a given real world situation. [MC]

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

GLE	K	1	2	3	4
Evaluating and solving					
1.5.5					**Understand and apply a variety of strategies to evaluate expressions with addition, subtraction, or multiplication.** W ■ Substitute a numeric value for a symbol in expressions or equations (e.g., if ❑ = 7, find ❑ x 3; if *w* = 12 and *l* = 36, what is *w* x *l* ?).
1.5.6			**Understand and apply strategies to solve for the unknown using addition and subtraction.** ■ Solve equations with an "unknown" (e.g., 6 + ❑ = 11; 11 = ❑ +6). [RL] ■ Justify the selection of a particular value for an unknown quantity in a real world situation (e.g., two girls had 10 cookies. If Kwame had 6, how many did Ellie have? Explain). [RL, MC]	**Understand and apply strategies to solve equations that include addition or subtraction.** W ■ Solve problems involving equality (e.g., 5 + 3 = ❑ + 2). [SP, RL] ■ Solve equations with addition and subtraction using manipulatives, pictures, and symbols. [SP, RL, CU] ■ Describe a strategy used to solve an equation with addition or subtraction. [CU]	**Understand and apply strategies to solve equations that include multiplication.** W ■ Solve missing factor equations (e.g., ❑ x 3 = 12). [SP, RL] ■ Describe and compare strategies used to solve an equation with multiplication. [SP, RL, CU]

SP: Solves Problems **RL**: Reasons Logically **CU**: Communicates Understanding **MC**: Makes Connections

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

GLE	5	6	7	8	9/10
Evaluating and solving					
1.5.5	**Understand and apply a variety of strategies to evaluate expressions with division.** W ■ Evaluate expressions with division using manipulatives, pictures, and symbols. ■ Substitute a symbol for a numeric value in an expression (e.g., ✸ = 4, find 20 ÷ ✸; if ★ = 12 and ▼ = 36, what is ▼ ÷ ★?). [SP, RL]	**Understand and apply procedures to evaluate expressions and formulas.** W ■ Evaluate simple expressions and formulas using pictures and/or symbols. [RL] ■ Represent and evaluate algebraic expressions involving a single variable. [RL, CU] ■ Evaluate an expression by substituting non-negative values for variables (e.g., find the value of $3y+2$ when $y=3$). [RL, MC] ■ Determine the expression that represents a given situation. [MC, CU] ■ Describe a situation that fits with a given expression. [RL, MC, CU]	**Understand and apply procedures to evaluate expressions and formulas considering order of operations.** W ■ Substitute non-negative rational values for variables in order to evaluate expressions and formulas (e.g., length x width when length = 3 and width = 4) ■ Explain the simplification of expressions and equations using order of operations. [CU] ■ Evaluate expressions and formulas considering order of operations. [RL] ■ Determine the expression that represents a given situation. [MC, CU] ■ Describe a situation that fits with a given expression. [RL, MC, CU] ■ Write expressions or equations for a situation.	**Understand and apply the procedures for simplifying single-variable expressions.** W ■ Simplify expressions and evaluate formulas involving integers. [RL, MC] ■ Match expressions to equivalent simplified expressions. [MC] ■ Explain a simplification of an expression involving integers. [CU] ■ Simplify expressions by combining like terms. ■ Simplify expressions using mathematical properties (distributive, commutative, associative, etc.). [RL] ■ Determine the expression that represents a given situation. [MC, CU] ■ Describe a situation that fits with a given expression. [RL, MC, CU]	**Apply procedures to simplify expressions.** W ■ Simplify expressions and evaluate formulas involving exponents. ■ Justify a simplification of an expression involving exponents. [RL, CU] ■ Use multiple mathematical strategies and properties to simplify expressions.
1.5.6	**Understand and apply strategies to solve equations that include division.** W ■ Solve for a missing value in an equation involving division (e.g., 12 ÷ ❑ = 3). [SP, RL] ■ Describe and compare strategies used to solve an equation with multiplication or division. [SP, RL, CU]	**Understand and apply a variety of strategies to solve one-step equations.** W ■ Solve one-step equations using pictures and symbols. ■ Solve one-step single variable equations using any strategy (e.g., what number goes in the mystery box?). ■ Solve real-world situations involving single variable equations. [CU, MC] ■ Explain a strategy for solving a single variable equation. [CU] ■ Write and solve one-step single variable equations for a given situation. [MC]	**Understand and apply a variety of strategies to solve two-step equations with one variable.** W ■ Explain and justify the solution to a problem in a given context. [RL, CU, MC] ■ Solve two-step equations with one variable on only one side of the equal sign (e.g., $2x+4=12$).	**Understand and apply a variety of strategies to solve multi-step equations and one-step inequalities with one variable.** W ■ Solve multi-step equations and one-step inequalities with one variable. ■ Solve single variable equations involving parentheses, like terms, or variables on both sides of the equal sign. ■ Solve one-step inequalities (e.g., $2x<6$, $x+4>10$). ■ Solve real-world situations involving single variable equations and proportional relationships and verify that the solution is reasonable for the problem. [SP, RL, CU]	**Apply procedures to solve equations and systems of equations.** W ■ Rearrange formulas to solve for a particular variable (e.g., given $A=.5bh$, solve for h). [MC, CU] ■ Solve real-world situations involving linear relationships and verify that the solution makes sense in relation to the problem. [SP, RL, CU, MC] ■ Find the solution to a system of linear equations using tables, graphs, and symbols. [CU, MC] ■ Interpret solutions of systems of equations. [CU, MC] ■ Solve multi-step equations. [SP, RL] ■ Use systems of equations to analyze and solve real-life problems. [SP, CU, MC] ■ Determine when two linear options yield the same outcome (e.g., given two different investment or profit options, determine when both options will yield the same result). ■ Use systems of equations to determine the most advantageous outcome given a situation (e.g., given two investment options, determine under what conditions each will yield the best result). [MC, SP]

EALR 2

EALR 2: The student uses mathematics to define and solve problems.

Component 2.1: Understand problems.

GLE	K	1	2	3	4
	Example: A classroom needs a playground ball for each student in the class. The class has fewer playground balls than are needed.	**Example:** A classroom is presenting a play and everyone has invited two guests. Enough chairs are needed to seat all the guests. There are some chairs in the classroom.	**Example:** A classroom is planning an all-day skating party on Thursday. Each student must pay for admission ($2), a box lunch ($3), and skate rental ($2). The teacher needs a total amount to reserve the rink.	**Example:** Miguel's reading class has set a goal to increase nightly reading to at least 30 minutes. He is taking a survey of his nine classmates to determine about how many minutes they read each night to see if they have met the goal. Miguel likes to read books by Matt Christopher.	**Example:** Jamal and his sister, Aleesha, want to buy a pet. Their mother said she will help by paying for the ongoing cost of food if they can save the money to buy the pet and all the needed equipment and food to get started. They have $17.83 saved already and most of that money is in quarters. They are reading pet store ads to see what the costs would be if they bought a mouse, a hamster, or a guinea pig.
2.1.1	**Understand how to define a problem in a familiar situation with teacher guidance.** ■ State information presented in teacher-led discussion to determine if there is a problem that needs an answer (e.g., a classroom activity requires a playground ball for each student. There are some balls available in the classroom). ■ State the problem in own words (e.g., are there enough playground balls? If not, how do we get enough for the class?). ■ Generate questions that would need to be answered in order to solve the problem (e.g., how many balls are in the classroom? How many more do we need?). ■ Identify known and unknown information with teacher guidance (e.g., known — the number of students in the class, and the number of balls needed; unknown — the number of additional playground balls needed). [1.1.5]	**Understand how to define a problem in a familiar situation with teacher guidance.** ■ State information presented in a teacher-led discussion to determine if there is a problem (e.g., a classroom is having a play and each student invited two guests. Chairs are needed for the guests. There are some chairs available in the classroom). ■ State the problem in own words (e.g., there aren't enough chairs for the guests. How many more chairs do we need?). ■ Generate questions that would need to be answered in order to solve the problem (e.g., how many guests are attending? How many more chairs do we need?). ■ Identify known and unknown information with teacher guidance (e.g., known — number of students, number of guests invited, number of chairs in classroom; unknown — number of guests attending, number of chairs needed). [1.1.5]	**Understand how to define a problem in a familiar situation.** ■ State or record information presented in situation (e.g., the classroom is planning a skating party on Thursday. Each student must pay for admission, lunch, and skates. The teacher needs to know the total cost in order to reserve the rink). ■ Explain the problem, verbally or in writing, in own words (e.g., how much will the skating party cost?). ■ Generate questions that would need to be answered in order to solve problem (e.g., what is the cost of a ticket and skate rental for the skating rink? What is the cost of food? What is the cost for each student? What will a skating party cost?). [1.4.4] ■ Identify known and unknown information (e.g., known — the cost of admission, skates, lunch, and the number of students going; unknown — cost for each student and total cost). ■ Identify extraneous information (e.g., the party is planned for Thursday).	**Analyze a situation to define a problem.** W ■ Use strategies/approaches to examine the situation and determine if there is a problem to solve (e.g., ask questions, or paraphrase information provided: Miguel is taking a survey to determine about how many minutes students read on school nights. The class goal is at least 30 minutes each night). ■ Determine the problem using information from investigation (e.g., has the class met its reading goal for the week?). ■ Generate questions that would need to be answered in order to solve the problem (e.g., about how many minutes did each person read? Can we estimate or do we need an exact number? What is the difference between the goal and the minutes read?). ■ Identify known and unknown information (e.g., known—who the students are, the class goal [30 minutes x 5 nights x 10 students is 1500 total minutes]; unknown—the number of minutes each student read, if the class reached the goal). ■ Identify information that is needed and not needed to solve the problem (e.g., needed—the class goal; not needed—Miguel likes Matt Christopher books).	**Analyze a situation to define a problem.** W ■ Use strategies/approaches to examine the situation and determine if there is a problem to solve (e.g., ask questions, make lists, or paraphrase information provided in ads: two kids want to buy a pet. They have some money but they need to find out if they can afford a mouse, hamster, or guinea pig and the equipment and food for it). ■ Determine the problem using information from investigation (e.g., do Jamal and Aleesha have enough money?). ■ Generate questions that would need to be answered in order to solve the problem (e.g., how much will each animal cost? How much is equipment and food for each animal?). ■ Identify known and unknown information (e.g., known—how much money Jamal and Aleesha have; unknown—all the costs for each animal). ■ Identify information that is needed or not needed (e.g., needed—all costs related to purchasing the animals, the amount that the kids have saved; not needed—the money is in quarters).

Component 2.1: Understand problems.

GLE	5	6	7	8	9/10
	Example: Mrs. Allen's class won a pizza party sponsored by the PTA for best school attendance. There are 30 students in the class. Ten pizzas arrived but they were cut in three different ways. Three pizzas were cut in eighths, three were cut in fourths, and four were cut in halves. Mrs. Allen wouldn't let the students start eating until she was sure everyone received equal shares.	**Example:** A gardener living in Yakima has 100 feet of fencing material. Find the dimensions of the largest rectangular area that he could enclose using all of the fencing material.	**Example:** On the playground, Juan made 13 free throws out of 18 tries. If Bonita shoots 25 free throws, what is the lowest number she has to make in order to have a better free throw percentage than Juan?	**Example:** The following information was provided to a group of students. They were asked to interpret this information for someone who has a speed of 19 feet per second and also for someone who takes 5 steps per second. How would you answer these questions? Speed (ft/s) — Steps per second 15.86 — 3.05 16.88 — 3.12 17.50 — 3.17 18.62 — 3.25 19.97 — 3.36 21.06 — 3.46 22.11 — 3.55	**Example:** The following are the times (in seconds) of the Olympics in the given years. Using this information, is it reasonable to believe that the women will run as fast as the men in this event? Justify your answer using this data: Year — Men's — Women's 1948 — 10.3 — 11.9 1952 — 10.4 — 11.5 1956 — 10.5 — 11.5 1960 — 10.2 — 11.0 1964 — 10.0 — 11.4 1968 — 9.95 — 11.0 1972 — 10.14 — 11.07 1976 — 10.06 — 11.08 1980 — 10.25 — 11.06 1984 — 9.99 — 10.97 1988 — 9.92 — 10.54 1992 — 9.96 — 10.82 1996 — 9.84 — 10.94 2000 — 9.87 — 10.75
2.1.1	**Analyze a situation to define a problem.** W ■ Use strategies/approaches to examine the situation and determine if there is a problem to solve (e.g., draw pictures, ask questions, or paraphrase information provided: 30 students in a class have ten pizzas to divide fairly. Three are sliced in eighths, three are sliced in fourths and four are sliced in halves). ■ Generate questions that would need to be answered in order to solve the problem (e.g., how should the pizzas be sliced? Can we use the slices that have already been made? How many pieces is each student's fair share?). ■ Identify known and unknown information (known—number of students, number of pizzas to share,the ways in which the pizzas have been sliced; unknown—size of each slice, number of equal slices, number of pieces per student). ■ Identify information that is needed or not needed (e.g., needed—number of students, number of pizzas, how pieces have already been cut; not needed—reason for the pizza party).	**Analyze a situation to define a problem.** W ■ Use strategies to become informed about the situation (e.g., listing information, asking questions). ■ Summarize the situation (e.g., there is 100 feet of fencing and we want to enclose as much land, in the shape of a rectangle, as possible). ■ Determine whether enough information is given to find a solution (e.g., list what is needed to find the area of a rectangle and compare to the list of known things). ■ Determine whether information is missing or extraneous (e.g., compare the list of known things to the list of needed things to see if there are things that are not needed). ■ Define the problem (e.g., find the rectangle with largest area with a perimeter of 100 feet).	**Analyze a situation to define a problem.** W ■ Use strategies to become informed about the situation (e.g., listing information, asking questions). ■ Summarize the situation (e.g., two people are shooting free throws, one shot 18, the other 25; we are trying to find the percentage made for each). ■ Determine whether enough information is given to find a solution (e.g., list what is needed to find the percentage of free throws made). ■ Determine whether information is missing or extraneous (e.g., compare the list of known things to the list of needed things to see if there are things that are not needed — names, location). ■ Define the problem (e.g., find the smallest number of free throws Bonita needs to make out of 25 attempts in order to top Juan's percentage).	**Analyze a situation to define a problem.** W ■ Use strategies to become informed about the situation (e.g., listing information, asking questions). ■ Summarize the problem (e.g., we have information about the relationship between the number of steps per second and the speed in feet per second; we wish to find approximate speed or stride rates). ■ Determine whether enough information is given to find a solution (e.g., list what is needed to find the relationship between stride rate and speed; list known and unknown information). ■ Determine whether information is missing or extraneous (e.g., compare the list of known things to the list of needed things to see if there are things that are not needed — names, location). ■ Define the problem (e.g., find the relationship between the steps per second and speed).	**Analyze a situation to define a problem.** W ■ Use strategies to become informed about the situation (e.g., listing information; examine the table for patterns; create a scatter plot to look for patterns; asking questions). ■ Summarize the problem (e.g., there are Olympic winning times over the past 50 years; both men's and women's times are decreasing; will there come a time when women run faster than men). ■ Determine whether enough information is given to find a solution (e.g., list what is needed to be found; extend the pattern to see if women's times will be less). ■ Determine whether information is missing or extraneous (e.g., compare the list of known things to the list of needed things to see if there are things that are not needed). ■ Define the problem (e.g., if the pattern continues in the same fashion, will women run faster than men and, if so, when will that occur).

EALR 2: The student uses mathematics to define and solve problems.

Component 2.2: Apply strategies to construct solutions.

GLE	K	1	2	3	4
2.2.1	**Understand how to create a plan to solve a problem with teacher guidance.** ■ Gather and organize categorical data (e.g., in a teacher-led activity, create a two-column chart — one column for student names, and tally marks in the other to represent which students are assigned a ball). [1.4.3]	**Understand how to create a plan to solve a problem with teacher guidance.** ■ Gather and organize categorical data (e.g., in a teacher-guided activity, create a two-column chart — one column for student names and the other to record the number of guests attending the play). [1.4.3]	**Understand how to create a plan to solve a problem.** ■ Gather and organize relevant information (e.g., create a four-column chart with student names in one column and the other three for costs related to the party — admission, skates, lunch; draw a seating chart and write in costs by each student).	**Apply strategies, concepts, and procedures to devise a plan to solve the problem.** W ■ Gather and organize data and information (e.g., create a survey to find out about how many minutes students are watching TV; organize data on a two-column chart). ■ Determine what strategy will be used to solve the problem (e.g., estimate minutes read per night per week from data gathered).	**Apply strategies, concepts, and procedures to devise a plan to solve the problem.** W ■ Gather and organize data (e.g., determine how to break information into categories such as cost of animal, cost of cage, cost of food, cost of bedding, cost of equipment in order to create a table). ■ Determine what tools should be used to construct a solution (e.g., paper and pencil, calculator, mental math, physical models such as play money).
2.2.2	**Apply mathematical tools to solve the problem with teacher guidance.** ■ Use appropriate tools to find a solution (e.g., draw pictures, use chart to count how many empty spaces there are for the playground balls). [1.1.1, 1.1.5] ■ Recognize when an approach is unproductive and try a new approach.	**Apply mathematical tools to solve the problem with teacher guidance.** ■ Use strategies (chart to count, skip count, cluster, or physical models). [1.1.1, 1.1.5] ■ Use appropriate tools from among mental math, paper and pencil, manipulatives, or calculator (e.g., to determine the total number of guests attending and the total number of chairs needed for the class play). [1.1.7] ■ Recognize when an approach is unproductive and try a new approach.	**Apply mathematical tools to solve the problem.** ■ Use estimation strategies (e.g., front-end estimation, clustering) to predict computation results. [1.1.8] ■ Use appropriate tools from among mental math, paper and pencil, manipulative, or calculator (e.g., to determine the total cost of the skating party). [1.1.7] ■ Recognize when an approach is unproductive and try a new approach.	**Apply mathematical tools to solve the problem.** W ■ Use strategies to solve problems (e.g., use number estimation — if one student reads 45 minutes [around 50] one night and if the same student reads 18 [around 20] minutes the next night, that is about 70 minutes). ■ Use appropriate tools to estimate solution (e.g., mental math or paper and pencil). ■ Recognize when an approach is unproductive and try a new approach.	**Apply mathematical tools to solve the problem.** W ■ Use strategies to solve problems (e.g., column addition, play money to determine costs, and subtraction to determine how much money is needed if they don't have enough). ■ Use appropriate tools to solve problems (e.g., paper and pencil, calculator, or physical models, play money). ■ Recognize when an approach is unproductive and try a new approach.

Component 2.2: Apply strategies to construct solutions.

GLE	5	6	7	8	9/10
2.2.1	**Apply strategies, concepts, and procedures to devise a plan to solve the problem.** W ■ Gather and organize the necessary information or data from the problem (e.g., draw pictures, create a chart or table, or use models to organize information). ■ Determine what tools should be used to construct a solution (e.g., paper and pencil, pictures, physical models).	**Apply strategies, concepts, and procedures to devise a plan to solve the problem.** W ■ Organize relevant information from multiple sources to devise a plan (e.g., create a list of known and unknown information; create a table of values for length, width, and area of rectangles with perimeter of 100). ■ Select and apply appropriate mathematical tools for a situation (e.g., guess and check, creating tables of values [with or without technology], examine relationships between sides of a rectangle and area).	**Apply strategies, concepts, and procedures to devise a plan to solve the problem.** W ■ Organize relevant information from multiple sources (e.g., describe how to calculate percents, set limits on the number that Bonita could make). ■ Select and apply appropriate mathematical tools for a situation (e.g., guess and check, calculate Juan's percentage and create a table of values [with or without technology] for Bonita's percentage).	**Apply strategies, concepts, and procedures to devise a plan to solve the problem.** W ■ Organize relevant information from multiple sources. ■ Select and apply appropriate mathematical tools for a situation (e.g., plot steps per second vs. speed; check to see if model is linear; calculate successive differences or quotients to see if a pattern emerges; find an equation for a line that approximates the relationship or extend the pattern to approximate the speed at 5 steps per second).	**Apply strategies, concepts, and procedures to devise a plan to solve the problem.** W ■ Organize relevant information from multiple sources (e.g., create a list of known and unknown information; create a scatter plot of men's and women's times vs. time on the same coordinate axis to analyze the patterns). ■ Select and apply appropriate mathematical tools to devise a strategy in a situation (e.g., if the data, in either tabular or graphical form, suggest a linear relationship, plan to find a linear equation for each set of data; solve those equations simultaneously [or use technology to find the intersection of the two lines] to answer the question). If the data pattern suggests a non-linear model, plan to project what the pattern is and extend that pattern.
2.2.2	**Apply mathematical tools to solve the problem.** W ■ Use strategies to solve problems (e.g., draw pictures, use physical models). ■ Use appropriate tools to solve problems (e.g., paper and pencil, mental math, manipulatives). ■ Recognize when an approach is unproductive and try a new approach.	**Apply mathematical tools to solve the problem.** W ■ Implement the plan devised to solve the problem (e.g., in a table of values of lengths, widths, and areas find the one that shows the largest area; check smaller increments to see if this is the largest that works). ■ Identify when an approach is unproductive and modify or try a new approach (e.g., while guess and check may give some sense of a neighborhood of values, it is less efficient than a more organized method). ■ Check the solution to see if it works (e.g., if the solution gives a perimeter that is not 100, it makes no sense in the given problem).	**Apply mathematical tools to solve the problem.** W ■ Implement the plan devised to solve the problem or answer the question posed (e.g., in a table of values of percentages for Bonita's possible results and percentages, find the range of values that yield a percentage larger than Juan's; find the smallest of those and use that number). ■ Identify when an approach is unproductive and modify or try a new approach (e.g., if a result is larger than 25, return to see if the percentage computation is accurate and if it is computed correctly). ■ Check the solution to see if it works (e.g., if the solution is larger than 25, it makes no sense in the given problem).	**Apply mathematical tools to solve the problem.** W ■ Implement the plan devised to solve the problem or answer the question posed (e.g., in a table of values of lengths, widths, and areas find the one that shows the largest area; check smaller increments to see if this is the largest that works). ■ Identify when an approach is unproductive and modify or try a new approach (e.g., if an additive model didn't work, try a multiplicative model). ■ Check the solution to see if it works (e.g., if the solution for a speed of 19 feet per second is 5 steps per second, perhaps the assumption of linearity was incorrect).	**Apply mathematical tools to solve the problem.** W ■ Implement the plan devised to solve the problem (e.g., solve the set of simultaneous equations to arrive at a time where the two times are the same). ■ Use mathematics to solve the problem (e.g., use algebra to write equations for the two linear models, solve the system of equations using either symbols or technology). ■ Identify when an approach is unproductive and modify or try a new approach (e.g., if the result does not make sense in the context, return to the plan to see if something has gone wrong and adjust accordingly). ■ Check the solution to see if it works (e.g., the solution may be a partial year [i.e., 2003.6]; decide how to deal with this and also if the year is reasonable [i.e., 1925 does not make sense given the context]).

Component 3.1: Analyze information.

GLE	K	1	2	3	4
	Example: A classroom needs a playground ball for each student in the class. The class has fewer playground balls than are needed.	**Example:** A classroom is presenting a play and everyone has invited two guests. Enough chairs are needed to seat all the guests. There are some chairs in the classroom.	**Example:** A classroom is planning an all-day skating party on Thursday. Each student must pay for admission ($2), a box lunch ($3), and skate rental ($2). The teacher needs a total amount to reserve the rink.	**Example:** Miguel's reading class has set a goal to increase nightly reading to at least 30 minutes. He is taking a survey of his nine classmates to determine about how many minutes they read each night to see if they have met the goal. Miguel likes to read books by Matt Christopher.	**Example:** Jamal and his sister, Aleesha, want to buy a pet. Their mother said she will help by paying for the ongoing cost of food if they can save the money to buy the pet and all the needed equipment and food to get started. They have $18.73 saved already and most of that money is in quarters. They are reading pet store ads to see what the costs would be if they bought a mouse, a hamster, or a guinea pig.
3.1.1	**Understand how to compare information presented in familiar situations with teacher guidance.** ■ Restate understanding of the situation (e.g., each student requires a playground ball; there are not enough in the classroom).	**Understand how to compare information presented in familiar situations.** ■ Restate understanding of the situation (e.g., each guest attending the play will require a chair; there are not enough in the classroom).	**Understand how to compare information presented in familiar situations.** ■ Explain understanding of a situation, verbally or in writing (e.g., there are costs for admission, skates, lunch for the party; we need to know what it will cost for all of us so our teacher can reserve the rink). ■ Estimate how much money will be needed for all 25 students to attend.	**Analyze information presented in familiar situations.** W ■ Break down results from data to determine about how many minutes per night students are reading in order to estimate whether the class has met 30 minutes each night goal.	**Analyze information presented in familiar situations.** W ■ Break down the research information in order to explain or paraphrase it (e.g., each animal has costs related to cage, bedding, food which must be calculated in order to see if the kids have enough money to buy an animal).

GLE	5	6	7	8	9/10
	Example: Mrs. Allen's class won a pizza party sponsored by the PTA for best school attendance. There are 26 students in the class. Ten pizzas arrived but they were cut in three different ways. Three pizzas were cut in eighths, three were cut in fourths, and four were cut in halves. Mrs. Allen wouldn't let the students start eating until she was sure everyone received equal shares.				
3.1.1	**Analyze information in familiar situations.** W ■ Break down the research information in order to explain or paraphrase it (e.g., 26 students need to share ten pizzas equally. The pizzas are already sliced, but not evenly. Using eighths, determine how the pizza can be cut and shared equally).	**Analyze information from a variety of sources to interpret and compare information.** W ■ Identify claims based on statistical data and evaluate the validity of the claims. [1.4.5] ■ Read and interpret data from single line graphs and scatter plots and determine when the use of these graphs is appropriate. [1.4.5] ■ Use volume and capacity to describe and compare figures (e.g., fill containers with cubes to find which has a greater volume). [1.2.4]	**Analyze information from a variety of sources to interpret and compare information.** W ■ Explain and compare conclusions reached from data (e.g., from newspapers, web sites, opinion polls). [1.4.6] ■ Use graphs to describe trends, compare, and interpret relationships from data (e.g., from newspapers, web sites, opinion polls). [1.4.5]	**Analyze information from a variety of sources to interpret and compare information.** W ■ Predict the probability of outcomes of experiments and compare the prediction to empirical results. [1.4.2] ■ Predict an outcome given a linear relationship and a particular input (e.g., from a graph of profit projections, predict the profit in 2005). [1.5.1]	**Synthesize information from multiple sources in order to answer questions.** W ■ Use the properties of two-dimensional and three-dimensional figures to solve mathematical problems (e.g., find the width of a river based on similar triangles; given a set of parallel lines, a transversal, and an angle, find the other angles).

Component 3.2: Make predictions, inferences, conjectures, and draw conclusions.

GLE	K	1	2	3	4
	Example: A classroom needs a playground ball for each student in the class. The class has fewer playground balls than are needed.	**Example:** A classroom is presenting a play and everyone has invited two guests. Enough chairs are needed to seat all the guests. There are some chairs in the classroom.	**Example:** A classroom is planning an all-day skating party on Thursday. Each student must pay for admission ($2), a box lunch ($3), and skate rental ($2). The teacher needs a total amount to reserve the rink.	**Example:** Miguel's reading class has set a goal to increase nightly reading to at least 30 minutes. He is taking a survey of his nine classmates to determine about how many minutes they read each night to see if they have met the goal. Miguel likes to read books by Matt Christopher.	**Example:** Jamal and his sister, Aleesha, want to buy a pet. Their mother said she will help by paying for the ongoing cost of food if they can save the money to buy the pet and all the needed equipment and food to get started. They have $18.73 saved already and most of that money is in quarters. They are reading pet store ads to see what the costs would be if they bought a mouse, a hamster, or a guinea pig.
3.2.1	**Understand how to make a reasonable prediction based on the information given in a familiar situation.** ■ Predict a numerical solution for a problem (e.g., guess how many more playground balls are needed).	**Understand how to make a reasonable prediction based on prior knowledge and the information given in a familiar situation.** ■ Predict a numerical solution for a problem (e.g., predict how many more chairs will be needed). ■ Use known information to make a reasonable prediction (e.g., if two numbers are each less than 10, the sum will be less than 20). ■ Make an inference based on information provided (e.g., the boys in class did a better job convincing their guests to attend because there are more guests coming for the boys than the girls).	**Understand how to make a reasonable prediction based on prior knowledge and the information given in a familiar situation.** ■ Predict a numerical solution for a problem (e.g., predict how much it will cost for the class to attend the skating party). ■ Use known information to make a reasonable prediction (e.g., if most students in one class like red apples, then most students in another class will like red apples). ■ Make an inference based on information provided (e.g., when you skate at the rink with a big group it costs less for each person than when you go with a friend).	**Apply prediction and inference skills.** W ■ Make a reasonable prediction based on prior knowledge and investigation of situation (e.g., after collecting survey data and before estimation, predict whether the class will meet its goal). ■ Defend prediction with evidence from the situation. ■ Make inferences (conjectures) using information from the situation to support the inference (e.g., the class probably did not make the reading goal because the community softball league has started up and most kids are involved in the evenings).	**Apply prediction and inference skills.** W ■ Make a reasonable prediction based on prior knowledge and investigation of situation (e.g., after reading the pet store ads, predict whether the kids will be able to buy a pet). ■ Defend prediction with evidence from the situation. ■ Make inferences (conjectures) using information from the situation or data to support the inference (e.g., guinea pig equipment/food is more expensive because the animal is larger and requires a bigger cage and pellets).

Component 3.2: Make predictions, inferences, conjectures, and draw conclusions.

GLE	5	6	7	8	9/10
	Example: Mrs. Allen's class won a pizza party sponsored by the PTA for best school attendance. There are 26 students in the class. Ten pizzas arrived but they were cut in three different ways. Three pizzas were cut in eighths, three were cut in fourths, and four were cut in halves. Mrs. Allen wouldn't let the students start eating until she was sure everyone received equal shares.				
3.2.1	**Apply prediction and inference skills.** W ■ Make a reasonable prediction based on prior knowledge and investigation of situation (e.g., using mental math, predict how many pieces each student will receive). ■ Defend prediction with evidence from the situation. ■ Make inferences (conjectures) using information from the situation or data to support the inference (e.g., all the pizzas were the same size when whole).	**Apply prediction and inference skills to make or evaluate conjectures.** W ■ Identify claims based on statistical data and evaluate the validity of the claims. [1.4.5] ■ Predict a future element in a relation (e.g., find the fifteenth term in a pattern). [1.5.1]	**Apply prediction and inference skills to make or evaluate conjectures.** W ■ Predict the probability of future events based on empirical data. [1.4.2] ■ Predict the probability of outcomes of experiments and test the predictions. [1.4.2]	**Apply prediction and inference skills to make or evaluate conjectures.** W ■ Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken (e.g., age groups, regions of the U.S., genders, racial/ethnic distribution). [1.4.6]	**Apply skill of conjecturing and analyze conjectures by formulating a proof or constructing a counter example.** W ■ Make and test conjectures about two-dimensional and three-dimensional figures and their individual attributes and relationships using physical, symbolic, and technological models (e.g., diagonal of a rectangle or prism is the longest interior segment; what figures make up cross-sections of a given three-dimensional shape). [1.3.1]

EALR 3: The student uses mathematical reasoning.

Component 3.2: Make predictions, inferences, conjectures, and draw conclusions.

GLE	K	1	2	3	4
3.2.2		**Understand how to draw conclusions based on prior knowledge and the information given in a familiar situation.** ■ Draw conclusions from displays using comparative language (e.g., more students have two guests coming, or fewer students have only one guest coming) and provide examples from displays to support conclusions.	**Understand how to draw conclusions based on prior knowledge and the information given in a familiar situation.** ■ Draw conclusions from displays using comparative language (e.g., greater than, less than). ■ Provide data to justify conclusions. ■ Provide examples from displays to support conclusions.	**Apply the skills of drawing conclusions and support the conclusions using evidence.** W ■ Draw conclusions from displays, texts, or oral discussions and justify those conclusions with logical reasoning or other evidence.	**Apply the skills of drawing conclusions and support the conclusions using evidence.** W ■ Draw conclusions from displays, texts, or oral discussions and justify those conclusions with logical reasoning or other evidence.
3.2.3		**Analyze procedures used to solve problems in familiar situations with teacher guidance.** ■ Justify the importance of counting in a situation rather than making a guess at a number of items for a specific purpose (e.g., counting the number of chairs needed for the play rather than guessing).	**Analyze procedures used to solve problems in familiar situations.** ■ Justify the use of a chart or table to collect and organize information used to solve a problem (e.g., the two- or four-column chart helped to keep track of the information). ■ Justify the use of one mathematical tool over another (e.g., is a calculator or 100's chart a better tool in this situation?).	**Analyze procedures used to solve problems in familiar situations.** W ■ Describe and compare estimation strategies used (e.g., front end estimation vs. using compatible numbers). [1.1.8]	**Analyze procedures used to solve problems in familiar situations.** W ■ Describe and compare data organization methods (e.g., charts used for organizing costs for each animal). [1.4.3]

Component 3.2: Make predictions, inferences, conjectures, and draw conclusions.

GLE	5	6	7	8	9/10
3.2.2	**Apply the skills of drawing conclusions and support the conclusions using evidence.** W ■ Draw conclusions from displays, texts, or oral discussions and justify those conclusions with logical reasoning or other evidence.	**Apply the skills of drawing conclusions and support those conclusions using evidence.** W ■ Draw conclusions from displays, texts, or oral discussions and justify those conclusions with logical reasoning or other evidence (e.g., read a newspaper article or ad; draw a conclusion and support that conclusion with evidence from the article or elsewhere).	**Apply the skills of drawing conclusions and support those conclusions using evidence.** W ■ Draw conclusions from displays, texts, or oral discussions and justify those conclusions with logical reasoning or other evidence (e.g., read a newspaper article that includes data, draw a conclusion, and support that conclusion with evidence from the article or elsewhere).	**Apply the skills of drawing conclusions and support those conclusions using evidence.** W ■ Draw conclusions from displays, texts, or oral discussions and justify those conclusions with logical reasoning or other evidence (e.g., read an editorial or ad, draw a conclusion and support that conclusion with evidence in the article or elsewhere).	**Analyze information to draw conclusions and support them using inductive and deductive reasoning.** W ■ Compare and describe the volume of cylinders, cones, and prisms when an attribute is changed (e.g., the area of the base, the height of solid). [1.2.4] ■ Draw a plane shape of a given set of characteristics and justify the answer. [1.3.2] ■ Identify trends in a set of data in order to make a prediction based on the information. [1.4.6] ■ Use statistics to support different points of view. [1.4.6]
3.2.3	**Analyze procedures used to solve problems in familiar situations.** W ■ Describe and compare strategies and tools used (e.g., drawing pizzas, fraction wheels or strips, paper and pencil calculations).	**Analyze procedures and results in various situations.** W ■ Represent and interpret all possible outcomes of experiments (e.g., an organized list, a table, a tree diagram, or a sample space). [1.4.2]	**Analyze procedures and results in various situations.** W ■ Describe how additional data added to data sets may affect the computations of measures of central tendency in various situations. [1.4.4]	**Analyze procedures and results in various situations.** W ■ Critique conclusions drawn from a set of data and support with evidence (e.g., from magazines, newspapers, web sites, opinion polls). [1.4.6]	**Analyze procedures to determine appropriateness of claims and arguments.** W ■ Examine claims and supporting arguments based on data and make needed revisions. [1.4.6]

Component 3.3: Verify results.

GLE	K	1	2	3	4
	Example: A classroom needs a playground ball for each student in the class. The class has fewer playground balls than are needed.	**Example:** A classroom is presenting a play and everyone has invited two guests. Enough chairs are needed to seat all the guests. There are some chairs in the classroom.	**Example:** A classroom is planning an all-day skating party on Thursday. Each student must pay for admission ($2), a box lunch ($3), and skate rental ($2). The teacher needs a total amount to reserve the rink.	**Example:** Miguel's reading class has set a goal to increase nightly reading to at least 30 minutes. He is taking a survey of his nine classmates to determine about how many minutes they read each night to see if they have met the goal. Miguel likes to read books by Matt Christopher.	**Example:** Jamal and his sister, Aleesha, want to buy a pet. Their mother said she will help by paying for the ongoing cost of food if they can save the money to buy the pet and all the needed equipment and food to get started. They have $18.73 saved already and most of that money is in quarters. They are reading pet store ads to see what the costs would be if they bought a mouse, a hamster, or a guinea pig.
3.3.1	**Understand how to justify results using evidence.** ■ Use tools (e.g., tally marks, physical models, words) to check for reasonableness of an answer (e.g., line up students, pass out the playground balls to students to see how many students do not receive one). ■ Check reasonableness of an estimation by acting it out, using pictures, or physical models.	**Understand how to justify results using evidence.** ■ Check reasonableness of results by using pictures, physical models, or acting it out (e.g., students raise one hand for one guest attending and two hands if two guests are attending).	**Understand how to justify results using evidence.** ■ Check for reasonableness of results by using a calculator for repeated addition (e.g., to determine the total cost of the skating party).	**Understand how to justify results using evidence.** W ■ Check for reasonableness of results by using a different strategy or tool to solve the problem (e.g., use front end estimation to determine about how many minutes students were reading each night). ■ Justify whether estimation is appropriate for the situation.	**Understand how to justify results using evidence.** W ■ Check for reasonableness of results by using a different strategy or tool to solve the problem (e.g., use front end estimation to determine about how much each animal will cost). ■ Provide examples to support results.
3.3.2		**Understand how to validate thinking about numerical, measurement, geometric, or statistical ideas by using models, known facts, patterns, or relationships.** ■ Explain why a strategy or tool was used in solving a problem (e.g., why a two-column chart was helpful to gather the information needed about the number of guests attending the play).	**Understand how to validate thinking about numerical, measurement, geometric, or statistical ideas by using models, known facts, patterns, or relationships.** ■ Explain why a strategy or tool was used in solving a problem (e.g., why a seating chart was helpful to determine total cost of skating).	**Understand how to validate thinking about numerical, measurement, geometric, or statistical ideas by using models, known facts, patterns, or relationships.** W ■ Explain how comparisons can be used to draw a conclusion (e.g., the class won't have met the reading goal because fewer students read less than more this week and didn't make the goal last week).	**Understand how to validate thinking about numerical, measurement, geometric, or statistical ideas by using models, known facts, patterns, or relationships.** W ■ Explain the meaning of a decimal using physical models. [1.1.5] ■ Explain what the relative position of numbers on a positive number line means (e.g., to the right means greater than). [1.3.3]

GLE	5	6	7	8	9/10
	Example: Mrs. Allen's class won a pizza party sponsored by the PTA for best school attendance. There are 26 students in the class. Ten pizzas arrived but they were cut in three different ways. Three pizzas were cut in eighths, three were cut in fourths, and four were cut in halves. Mrs. Allen wouldn't let the students start eating until she was sure everyone received equal shares.				
3.3.1	**Understand how to justify results using evidence.** W ■ Check for reasonableness of results by using a different strategy or tool to solve the problem (e.g., compare the results from students who used physical models vs. those who used computation). ■ Provide examples to support results.	**Analyze procedures and information used to justify results using evidence.** W ■ Find and compare rectangular prisms that have a given volume (e.g., if two rectangular prisms have the same volume and one has twice the height of the other, determine how the areas of their bases compare). [1.2.5] ■ Apply estimation strategies prior to computation of whole numbers, decimals, and fractions to determine reasonableness of answers. [1.1.8] ■ Identify different ways of selecting a sample (e.g., convenience sampling, response to a survey, random sampling) and which method makes a sample more representative for a population. [1.4.3]	**Analyze procedures and information used to justify results using evidence.** W ■ Justify the reasonableness of an estimate. [1.2.6] ■ Apply a process that can be used to find a reasonable estimate of circle measurements (e.g., wrap a string around the circle). [1.2.6] ■ Apply estimation strategies prior to computing addition and subtraction of integers and operations on non-negative rational numbers to determine reasonableness of answers. [1.1.8]	**Analyze procedures and information used to justify results using evidence.** W ■ Use estimation to predict or to verify the reasonableness of calculated results. [1.1.8]	**Analyze results using inductive and deductive reasoning.** W ■ Compare and contrast similar two-dimensional figures and shapes using properties of two-dimensional figures and shapes. [1.3.2] ■ Find a reasonable estimate for the volume of prisms, pyramids, cylinders, and cones. [1.2.6]
3.3.2	**Understand how to validate thinking about numerical, measurement, geometric, or statistical ideas by using models, known facts, patterns, or relationships.** W ■ Explain how the value of a fraction changes in relationship to the size of the whole (e.g., half a pizza vs. half a cookie). [1.1.1] ■ Create three-dimensional shapes from two-dimensional figures (e.g., cylinder from two circles and a rectangle) and explain the relationship. [1.3.2]	**Analyze thinking and mathematical ideas using models, known facts, patterns, relationships, or counter examples.** W ■ Identify claims based on statistical data and evaluate the validity of the claims. [1.4.5]	**Analyze thinking and mathematical ideas using models, known facts, patterns, relationships, or counter examples.** W ■ Explain how different representations of the same set of data can support different points of view. [1.4.6]	**Analyze thinking and mathematical ideas using models, known facts, patterns, relationships, or counter examples.** W ■ Explain why a given rational number is greater than or less than another rational number. [1.1.2]	**Analyze thinking and mathematical ideas using models, known facts, patterns, relationships, counter examples, or proportional reasoning.** W ■ Examine a set of data, research other sources to see if the data is consistent, find articles written to see if the data makes sense, to develop a logical point of view and to support that view. [1.4.6]

EALR 4: The student communicates knowledge and understanding in both everyday and mathematical language.

Component 4.1: Gather information.

GLE	K	1	2	3	4
4.1.1		**Understand how to develop and follow a simple plan for collecting information for a given purpose.** ■ Determine what information is needed and how to collect it for a given purpose (e.g., to help explain something, to find out if something is needed) and who the information is for (e.g., for the classroom, for the adults at home, for the librarian). ■ Develop and follow a plan to gather data about an event (e.g., how many students will attend the Saturday Movie Afternoon at school?).	**Understand how to develop and follow a simple plan for collecting information for a given purpose.** ■ Determine what information is needed and how to collect it for a given purpose (e.g., to help explain something, to find out if something is needed) and who the information is for (e.g., for the classroom, for the adults at home, for the cafeteria, for the principal). ■ Develop and follow a plan to gather information about supplies needed for a project (e.g., how many pieces of paper will be needed to create a pattern design for each of the kindergarten windows?).	**Understand how to follow a plan for collecting information for a given purpose.** W ■ Determine how to collect information for a specific purpose or audience (e.g., to convince a parent or other adult, to demonstrate a need for change, to provide information). ■ Develop and follow a plan based on the kind of information needed, the purpose, and the audience (e.g., survey, gather data from a chart or graph, read in a text to gather information).	**Understand how to develop and follow a plan for collecting information for a given purpose.** W ■ Determine how to collect information for a specific purpose or audience (e.g., to convince a parent or other adult, to demonstrate a need for change, to provide information). ■ Develop and follow a plan based on the kind of information needed, the purpose, and the audience (e.g., survey, gather data from a chart or graph, read in a text to gather information).
4.1.2		**Understand how to extract information for a given purpose from one or two different sources.** ■ Follow simple written directions for creating an art project using a model (e.g., requiring cutting and folding geometric shapes). ■ Generate questions that could be answered using informational text (e.g., TV ads, books, menus, cereal boxes).	**Understand how to extract information for a given purpose from one or two different sources.** ■ Decide what information would be important to learn about the students in the second grade after reading an informational text (e.g., health article) in class (e.g., how many students eat a nutritious breakfast). Determine what questions to ask in a survey. Graph the results.	**Understand how to extract information for a given purpose from one or two different sources using reading, listening, and observation.** W ■ Read and report on data from tables, charts, and bar graphs. [1.4.5] ■ Read directions for movement on a positive number line, identify the point of final destination using real-world examples (e.g., travel back and forth on a street, temperature variations during the day). [1.3.3]	**Understand how to extract information for a given purpose from one or two different sources using reading, listening, and observation.** W ■ Listen and observe to simulate translations and reflections using objects (e.g., pattern blocks, geo blocks). [1.3.4] ■ Read and follow directions using a coordinate grid (e.g., on a city street map). [1.3.3]

Component 4.1: Gather information.

GLE	5	6	7	8	9/10
4.1.1	**Understand how to develop and follow a plan for collecting information for a given purpose.** W ■ Determine how to collect information for a specific purpose or audience (e.g., to convince a parent or other adult, to demonstrate a need for change, to provide information). ■ Develop and follow a plan based on the kind of information needed, the purpose, and the audience (e.g., survey, gather data from a chart or graph, read in a text to gather information). ■ Ask the same question using different data collection methods that result in other points of view being supported. [1.4.3] ■ Explain how different data collection methods affect the nature of the data set with a given question (e.g., phone survey, person-to-person survey, nternet search). [1.4.3]	**Apply a planning process to collect information for a given purpose.** W ■ Use mean, median, and mode to explain familiar situations (e.g., the heights of students in the class; the hair color of students in the class). [1.4.4] ■ Decide on information needed to create a report on a mathematical topic (e.g., compare the predicted rainfall in a given period with the actual rainfall).	**Apply a planning process to collect information for a given purpose.** W ■ Formulate a question and collect data from a population considering how the questions, collection method, and sample population affect the results. [1.4.3]	**Apply a planning process to collect information for a given purpose.** W ■ Describe a procedure for selecting an unbiased sample. [1.4.3]	**Understand how to develop or apply an efficient system for collecting mathematical information for a given purpose.** W ■ Collect data efficiently on the outcomes of first events and later events to determine and justify how the first event affects the probability of later events (e.g., drawing cards from a deck with or without replacement). [1.4.1]
4.1.2	**Understand how to extract information for a given purpose from one or two different sources using reading, listening, and observation.** W ■ After reading a text, generate questions and develop a survey (e.g., to determine how many students agree or disagree with the author). ■ Identify and use data from text passages, histograms, stem-and-leaf plots, and circle graphs. [1.4.5]	**Understand how to extract information from multiple sources using reading, listening, and observation.** W ■ Use mean, median, and mode to explain situations (e.g., the heights of students in the class; hair color of students in the class; favorite movie of students in the class; most watched movie in a specific time frame). [1.1.4]	**Understand how to extract information from multiple sources using reading, listening, and observation.** W ■ Create a table or graph given a description of, or an equation for, a situation involving a linear or non-linear relationship. [1.5.4]	**Synthesize information from multiple sources using reading, listening, and observation.** W ■ Compare the results of a survey given two different sample groups. [1.4.3] ■ Model the relationship with a table or graph given a description of, or an equation for, a situation involving an inequality or linear relationship. [1.5.4]	**Synthesize mathematical information for a given purpose from multiple, self-selected sources.** W ■ State possible factors that may influence a trend but not be reflected in the data (e.g., population growth of deer vs. availability of natural resources or hunting permits). [1.4.6]

Component 4.2: Organize, represent, and share information.

GLE	K	1	2	3	4
4.2.1	**Understand how to organize information to communicate to a given audience with teacher guidance.** ■ Use a two-column chart to organize data (e.g., one column for student names and tally marks in the other to represent which students are assigned a ball) for the classroom with teacher guidance. ■ Use physical objects or pictures to build bar graphs to answer a question generated by the class (e.g., how many of each kind of pet do we own?).	**Understand how to organize information to communicate to a given audience with teacher guidance.** ■ Organize and display data on a chart to communicate a solution for the given audience (e.g., use a two- or three-column chart to display the number of guests per student attending a class play and, if there is a chair for each guest, inform the custodian as to how many more chairs are needed). ■ Display results of data collection by making student-invented and conventional displays (e.g., hair color, eye color, teeth missing).	**Understand how to organize information to communicate to a given audience.** ■ Organize and display data on a chart to communicate a solution to a specific audience (e.g., use a chart to display individual costs and total cost for the skating party for parents and PTA). ■ Construct a bar graph with a title, key, and single unit increment to display survey results (e.g., the number of brothers and sisters of students in the class).	**Understand how to organize information for a given purpose.** W ■ Create a display to represent information from survey results (e.g., the approximate number of minutes read and whether or not the goal was met). ■ Create bar graphs including labels for title, both axes, scale units (e.g., 2's, 5's, 10's), and key if needed. [1.4.2] ■ Create and solve a problem situation where mode is meaningful for a set of data. [1.4.4] ■ Display information to be shared.	**Understand how to organize information for a given purpose.** W ■ Organize information on a chart and create a summary of the results to inform a specific audience (e.g., chart all related costs for the purchase of each pet; write a summary explaining the results and the kids' possible decisions based on the results). ■ Construct assorted line and pictographs that include labels, a scale that is not one, and a key. [1.4.5] ■ Create a chart or display to represent equivalent fractions. [1.1.2]
4.2.2	**Understand how to communicate or represent ideas or information using mathematical language or notation.** ■ Explain or represent ideas using mathematical language from: – Number sense (e.g., numbers 1 to 10) [1.1.1]; – Measurement (e.g., compare objects to describe relative size) [1.2.1]; – Geometric sense (e.g., name objects based on their characteristics — I have four equal sides; what am I?) [1.3.1]; – Algebraic sense (e.g., create a pattern such as AB). [1.5.1]	**Understand how to communicate or represent ideas or information using mathematical language or notation.** ■ Explain or represent ideas using mathematical language from: – Number sense (e.g., numbers to at least 100) [1.1.1]; – Measurement (e.g., order three or more objects according to an attribute and identify the chosen attribute) [1.2.1]; – Geometric sense (e.g., name and describe two-dimensional figures based on their characteristics) [1.3.1]; – Statistics (e.g., construct bar graphs with physical materials) [1.4.3]; – Algebraic sense (e.g., explain the meaning of equality). [1.5.3]	**Understand how to communicate or represent ideas or information using mathematical language or notation.** ■ Explain or represent ideas using mathematical language from: – Number sense (e.g., numbers to at least 1000) [1.1.1]; – Measurement (e.g., identify attributes of an object that are measurable — time, length, distance around, capacity, area or weight of objects) [1.2.1]; – Geometric sense (e.g., describe characteristics of two-dimensional geometric figures, various polygons) [1.3.1]; – Statistics (e.g., construct bar graph using a single increment scale) [1.4.3]; – Algebraic sense (e.g., explain and use the symbols $<$ and $>$ to express relationships). [1.5.3]	**Understand how to communicate or represent ideas using mathematical language or notation.** W ■ Translate from one representation of a whole number to another in standard, expanded, and word forms. [1.1.1] ■ Name attributes of an object that can be measured. [1.2.4] ■ Identify, describe, and compare congruent two-dimensional geometric shapes. [1.3.1] ■ Make a survey and collect data (e.g., use tally marks, make a table). [1.4.3] ■ Identify and use appropriate symbols and notation in reading and writing simple expressions and equations involving addition and subtraction. [1.5.4]	**Understand how to communicate or represent ideas using mathematical language or notation.** W ■ Symbolically represent parts of a whole or parts of a set with common denominators. [1.1.1] ■ Use measurements of area to describe and compare objects. [1.2.1] ■ Describe a location in the first quadrant on a coordinate grid in terms of horizontal and vertical position (e.g., to the right and up, longitude and latitude). [1.3.3] ■ Describe a trend from a given line plot. [1.4.5] ■ Describe the rule for a pattern with a single arithmetic operation in the rule. [1.5.2]

Component 4.2: Organize, represent, and share information.

GLE	5	6	7	8	9/10
4.2.1	**Understand how to organize information for a given purpose.** W ■ Determine the best method for organizing and representing information for a specific purpose (e.g., a physical model or a calculation to inform the teacher how many pieces of pizza each student should receive). ■ Represent and interpret all possible outcomes of experiments (e.g., an organized list, a table, a tree diagram, or a sample space). [1.4.2] ■ Construct assorted graphs including histograms, pictographs, and stem-and-leaf plots that include labels, appropriate scale, and key. [1.4.5]	**Apply organizational skills for a given purpose.** W ■ Show the order of the set of integers on a number line with both positive and negative numbers (e.g., organize the given birth years of the following Arabic kings on a number line). [1.3.3]	**Apply organizational skills for a given purpose.** W ■ Identify, determine, interpret, or express probabilities in the form of a fraction, decimal, or percent. [1.4.2]	**Apply organizational skills for a given purpose.** W ■ Design and conduct a simulation, with and without technology, to determine the probability of an event occurring. [1.4.2]	**Analyze mathematical information to organize, clarify, and refine an argument.** W ■ Develop an argument to support a given point of view and set of statistics. [1.4.6]
4.2.2	**Understand how to communicate or represent ideas using mathematical language or notation.** W ■ Explain the value of a given digit in a decimal to at least the thousandths place. [1.1.1] ■ Describe a procedure for measuring an angle. ■ Describe relationships between angle measures (e.g., two 30° angles have the same total measure as one 60° angle). [1.2.2] ■ Draw and label a design that includes a given set of attributes. [1.3.2] ■ Explain how to find the mean of a set of data and explain the significance of the mean. [1.4.4] ■ Given an expression or equation, identify or write a situation that represents it. [1.5.3]	**Apply communication skills to clearly and effectively express or present ideas and situations using mathematical language or notation.** W ■ Articulate various strategies used during estimation involving fractions and decimals. [1.1.8] ■ Clearly explain, describe, or represent mathematical information in a pictorial, tabular, graphical, two- or three-dimensional drawing, or other form as appropriate for the mathematical information (e.g., time, distance, categories), audience, and/or purpose, such as to perform or persuade, with notation and labels as needed. ■ Use an appropriate representation to display data (e.g., table, graphs) given a particular situation and audience. [1.4.5]	**Apply communication skills to clearly and effectively express or present ideas and situations using mathematical language or notation.** W ■ Identify data that may represent sampling errors and explain why the sample (and the display) might be biased. [1.4.4] ■ Explain when estimation might be used rather than computation. [1.1.8] ■ Clearly explain, describe, or represent mathematical information in a pictorial, tabular, graphical, two- or three-dimensional drawing, or other form as appropriate for the mathematical information (e.g., time, distance, categories), audience, and/or purpose such as to perform or persuade with notation and labels as needed.	**Apply communication skills to clearly and effectively express or present ideas and situations using mathematical language or notation.** W ■ Articulate various strategies used during estimation involving integers. [1.1.8] ■ Clearly explain, describe, or represent mathematical information in a pictorial, tabular, graphical, two- or three-dimensional drawing, or other form as appropriate for the mathematical information (e.g., time, distance, categories), audience, and/or purpose, such as to perform or persuade, with notation and labels as needed. ■ Explain situations involving real numbers where estimates are sufficient and others for which exact value is required. [1.1.8]	**Understand how to express ideas and situations using mathematical language and notation.** W ■ Explain how division of measurements produces a derived unit of measurement (e.g., miles traveled divided by hours traveled yields the derived unit [miles per hour]). [1.2.2] ■ Describe the location of points that satisfy given conditions (e.g., the set of points equidistant from a given point; a point equidistant from a given set of points). [1.3.3] ■ Describe and compare the impact that a change in one or more dimensions has on objects (e.g., doubling the edge of a cube affects the surface area). [1.2.1] ■ Explain the relationship between theoretical probability and empirical frequency of dependent events using simulations with and without technology. [1.4.2]

EALR 5: The student understands how mathematical ideas connect within mathematics, to other subject areas, and to real-life situations.

Component 5.1: Relate concepts and procedures within mathematics.

GLE	K	1	2	3	4
5.1.1	**Understand how to use concepts and procedures from any two of the content components from EALR 1 in a given problem or situation.** ■ Organize data collections (e.g., bar graph, sorted groups) and compare data using comparative language. [1.1.2, 1.4.3] ■ Sort objects based on chosen attribute and create a simple AB pattern using the sorted objects. [1.3.2, 1.5.1]	**Understand how to use concepts and procedures from any two of the content components from EALR 1 in a given problem or situation.** ■ Interpret results and draw conclusions from student-made displays using comparative language (e.g., more, fewer). [1.4.4, 3.2.2] ■ Measure objects using non-standard tools and place resulting numbers in order from shortest (smallest) to longest (largest). [1.2.3, 1.1.2]	**Understand how to use concepts and procedures from any two of the content components from EALR 1 in a given problem or situation.** ■ Conduct a survey for a predetermined question, collect data, and use addition and subtraction procedures to compute the results of the survey. [1.4.4, 1.1.6] ■ Interpret a bar graph for comparative information (e.g., how many more than, less than) and draw conclusions about the data. [1.4.5, 3.2.2]	**Understand how to use concepts and procedures from any two of the content components in a given problem or situation.** W ■ Conduct a survey for a question, collect data, and use three-digit addition and subtraction to compute the results of the survey. [1.1.6, 1.4.4] ■ Explain and use a method for making change with coins. [1.1.1, 1.2.4]	**Understand how to use concepts and procedures from any two of the content components in a given problem or situation.** W ■ Conduct a survey for a question; collect data, and use multiplication and/or division to compute the results of the survey. [1.1.6, 1.4.4] ■ Identify, describe, and compare attributes of congruent shapes in multiple orientations. [1.3.2]
5.1.2	**Understand how to recognize and create equivalent mathematical models and representations in familiar situations.** ■ Identify different representations of a number to 20 (e.g., numerals, pictures, physical models). [1.1.1] ■ Express stories involving addition (e.g., join) with models, pictures, and symbols. [1.1.5]	**Understand how to recognize and create equivalent mathematical models and representations in familiar situations.** ■ Identify different representations of a number to at least 100 (e.g., numerals, pictures, physical models). [1.1.1] ■ Express stories involving subtraction (e.g., separate) with models, pictures, and symbols. [1.1.5]	**Understand how to recognize and create equivalent mathematical models and representations in familiar situations.** ■ Represent addition and subtraction situations with physical models, diagrams, and acting out problems. [1.1.5] ■ Identify different representations of a pattern (e.g., snap-clap-stomp translates to ABC). [1.5.1]	**Understand how to recognize equivalent mathematical models and representations in familiar situations.** W ■ Translate from one representation of a whole number to another in standard, expanded, and word forms. [1.1.1] ■ Compare strategies to solve problems involving multiplication and division (e.g., alternative algorithms, use of properties of multiplication). [1.1.5] ■ Use the inverse relationship between multiplication and division using physical diagrams, words, and symbols (e.g., arrays, fact families). [1.1.5]	**Understand how to recognize equivalent mathematical models and representations in familiar situations.** W ■ Demonstrate and explain equivalent relationships between decimals and fractions (e.g., $.50 is equal to $^1/_2$ a dollar and 50/100 dollar) using models. [1.1.2] ■ Interpret remainders of a division problem in a given situation (e.g., remainder 3 or 3/5). [1.1.6] ■ Represent addition and subtraction of decimals through hundredths using models (e.g., base ten blocks, fraction circles with decimal ring, money). [1.1.6]

Component 5.1: Relate concepts and procedures within mathematics.

GLE	5	6	7	8	9/10
5.1.1	**Understand how to use concepts and procedures from any two of the content components in a given problem or situation.** W ■ Explain why angle measure does not change when the size of the circle or length of the sides of the angle change. [1.2.3] ■ Interpret skew, clusters, and gaps in given one-variable data displays. [1.4.5] ■ Translate a situation involving one arithmetic operation into algebraic form using equations, tables, and graphs. ■ Judge the appropriateness of inferences made from a set of data and support the judgment. [1.4.6]	**Apply concepts and procedures from a variety of mathematical areas in a given problem or situation.** W ■ Translate a situation involving multiple arithmetic operations into algebraic form using equation, table, and graphs. [1.5.4] ■ Given a set of data, compare various representations (e.g., table, graph, rule) for a given situation. [1.4.5]	**Apply concepts and procedures from a variety of mathematical areas in a given problem or situation.** W ■ Write the rational number when given a model (e.g., number line, area model, situation, diagram, picture). [1.1.1] ■ Given a set of data, compare various representations (e.g., box-and-whisker, bar, circle graph) for a given situation. [1.4.5]	**Apply concepts and procedures from a variety of mathematical areas in a given problem or situation.** W ■ Solve problems involving ratio and proportion (e.g., similar figures, scale drawings, rates, find unit pricing, increase or decrease a recipe, find the portions for a group converting between different units of measure, or finding medicinal dosages). [1.1.4] ■ Find the area of a circle given the coordinates of the center and a point on the circle. [1.3.3]	**Apply multiple mathematical concepts and procedures in a given problem or situation.** W ■ Estimate derived units of measure (e.g., miles per hour, people/year, grams/cubic centimeters). [1.2.6] ■ Determine the final coordinates of a point after a series of transformations. [1.3.4]
5.1.2	**Understand how to recognize equivalent mathematical models and representations in familiar situations.** W ■ Use factors and multiples to rename equivalent fractions. [1.1.1] ■ Determine equivalence among fractions. [1.1.2] ■ Graphically represent the same data in two different ways.	**Apply different mathematical models and representations to the same situation.** W ■ Represent equivalent ratios or given percentages using objects, pictures, and symbols. [1.1.4] ■ Match a graph with a data set. [1.5.4]	**Apply different mathematical models and representations to the same situation.** W ■ Explain how different representations of the same set of data can support different points of view. [1.4.6] ■ Match a situation with a data set or graph. [1.5.4]	**Apply different mathematical models and representations to the same situation.** W ■ Create a problem situation to match a given rational number equation. [1.1.5] ■ Match a situation with a data set or graph. [1.5.4]	**Understand how to use different mathematical models and representations in the same situation.** W ■ Identify, interpret, and use the meaning of slope of a line as a rate of change using concrete, symbolic, and technological models. [1.2.2] ■ Construct one-dimensional, two-dimensional, and three-dimensional geometric figures using a variety of tools and technologies (e.g., angle bisectors, perpendicular bisectors, triangles given specific characteristics). [1.3.2] ■ Find the equation of a line in a variety of ways (e.g., from a table, graph, slope-intercept, point-slope, two points). [1.5.1] ■ Find the solution to a system of linear equations using tables, graphs and symbols. [1.5.6]

EALR 5: The student understands how mathematical ideas connect within mathematics, to other subject areas, and to real-life situations.

Component 5.2: Relate mathematical concepts procedures to other disciplines.

GLE	K	1	2	3	4
5.2.1	**Apply and analyze the use of mathematical patterns and ideas in familiar situations in other disciplines.** ■ Describe how math is used in science when a number of objects are needed for an experiment or measurement is used to illustrate change. ■ Identify patterns in a piece of artwork.	**Apply and analyze the use of mathematical patterns and ideas in familiar situations in other disciplines.** ■ Use the characteristics of two-dimensional shapes in art projects and recognize the use of geometric shapes in artwork. ■ Use a clock to determine when it is time for recess or lunch time. ■ Explain how math is used whenever we use money for a purchase.	**Apply and analyze the use of mathematical patterns and ideas in familiar situations in other disciplines.** ■ Collect and display data based on a science experiment (e.g., plant growth, magnetism). ■ Identify patterns used in the design of common objects (e.g., skateboards, clothing). ■ Describe how estimation can be used to know about how much something costs.	**Apply mathematical patterns and ideas in familiar situations in other disciplines.** ■ Given an object, identify geometric attributes that can be measured. ■ Interpret graphs for comparative information. [1.4.3] ■ Pose questions and gather data about self and surroundings. [1.4.3] ■ Make inferences based on data or determine if the data can support inferences made. [1.4.5]	**Apply mathematical patterns and ideas in familiar situations in other disciplines.** ■ Read and interpret data from line plots and pictographs. [1.4.5] ■ Make a plan to answer a question including how to record and organize data. [1.4.3] ■ Use estimation strategies appropriately when the exact answer is not necessary. [1.1.7]
5.2.2		**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the contributions of women, men, and people from different cultures (e.g., look at symbols used for numbering in the Mayan culture).	**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the contributions of women, men, and people from different cultures (e.g., examine design and patterns on tapestry from various African cultures).	**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the contributions to the development of mathematics by women, men, and various cultures (e.g., complete a mathematically based project that researches the history of 0).	**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the contributions to the development of mathematics by women, men, and various cultures (e.g., what is the history of fractions?).

Component 5.2: Relate mathematical concepts procedures to other disciplines.

GLE	5	6	7	8	9/10
5.2.1	**Apply mathematical patterns and ideas in familiar situations in other disciplines.** ■ Find the mean from a given set of data using objects, pictures, or formulas. ■ Interpret skew, clusters, and gaps in given one-variable data displays. ■ Use estimation strategies and identify the reasonableness of answers. [1.1.8]	**Analyze mathematical patterns and ideas to extend mathematical thinking and modeling to other disciplines.** ■ Identify geometric figures and concepts in nature and art (e.g., triangle in architecture, rhombus in beadwork). [1.3.2] ■ Show the order of the set of integers on a number line with both positive and negative numbers (e.g., organize and graph on a number line the given birth years of the given Arabic kings). [1.3.3] ■ Read a micrometer to the nearest hundredth of an inch or centimeter, depending on the tool. [1.2.4] ■ Create a physical activity plan that results in 2500 calories expended over the week. ■ Calculate the ratio of various parts of an artwork (length of eyes to ears). ■ Discuss the difference between $^3/_4$ time and $^6/_8$ time and how it relates to a model.	**Analyze mathematical patterns and ideas to extend mathematical thinking and modeling to other disciplines.** ■ Evaluate and explain conclusions of plant growth drawn from data (e.g., from magazines, newspapers, web sites). [1.4.6] ■ Write a story about a situation that represents a given linear equation, expression, or graph. [1.5.2] ■ Determine the target heart zone for participation in aerobic activities. ■ Chart a one-week physical activity log based on calories expended/minute of activity. ■ Determine adjustments needed to achieve a healthy level of fitness. ■ Create a perspective drawing using vanishing point. ■ Mix paint in the correct proportions to create a particular color.	**Analyze mathematical patterns and ideas to extend mathematical thinking and modeling to other disciplines.** ■ Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken (e.g., age groups, regions of the U.S., genders, racial/ethnic distribution). [1.4.6] ■ Check to see if a corner is square using the Pythagorean Theorem. [1.2.5] ■ Calculate the one-repetition maximum for strength training of one muscle group. ■ Monitor/track a diet and evaluate the relationship to physical performance (e.g., does it meet daily nutritional requirements/energy for various populations and energy requirements based on lifestyle, safe-work practices, and leisure activities).	**Analyze mathematical patterns and ideas to extend mathematical thinking and modeling in other disciplines.** ■ Justify a prediction or an inference based on a set of data. [1.4.6] ■ Create a physical activity plan that results in a specified number of calories over a specified time. [PE]
5.2.2	**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the contributions to the development of mathematics by women, men, and various cultures (e.g., what is the history of probability theory?).	**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the contributions of a variety of people to the development of mathematics (e.g., research the concept of the golden ratio).	**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the contributions of a variety of people to the development of mathematics (e.g., research and report on the history of pi).	**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the contributions of a variety of people to the development of mathematics (e.g., research the history of the Pythagorean Theorem).	**Know the contributions of individuals and cultures to the development of mathematics.** ■ Recognize the mathematical contribution of a person or culture (e.g., create a report or presentation that highlights a mathematical contribution related to current mathematical study).

Component 5.3: Relate mathematical concepts and procedures to real-world situations.

GLE	K	1	2	3	4
5.3.1	**Understand how mathematics is used in everyday life.** ■ Generate examples of mathematics in everyday life: – counting (e.g., the number of people ahead of us in a line); – sorting things (e.g., grouping socks by color in order to match them up); – comparing things (e.g., who has the biggest piece of cake for dessert, or who is tallest/shortest in the family); – pointing out patterns (e.g., in clothing, fence posts, designs on buildings). ■ Identify objects based on a description of their geometric attributes (e.g., buildings have sides; some windows are shaped like a rectangle). ■ Describe the location of objects relative to each other (e.g., in, out, over, under, school bus stops next to each other).	**Understand how mathematics is used in everyday life.** ■ Generate examples of mathematics in everyday life: – counting (e.g., the pennies in the penny jar); – comparing measurements (e.g., standing up against the mark on the wall to check for growth); – building things (e.g., a snowman with three spheres, a dog house made of a box with a triangular roof); – playing games (e.g., when counting spaces on a board or knowing money is needed). ■ Describe familiar two-dimensional shapes based on their geometric characteristics (e.g., sharp corners, sides of different lengths). ■ Identify and sort two-dimensional shapes in their surroundings. ■ Skip count by 5s or 10s (e.g., with nickels or dimes).	**Understand how mathematics is used in everyday life.** ■ Generate examples of mathematics in everyday life: – counting (e.g., tallies to keep score during a game); – comparing lengths or distances where direct comparison is not possible (e.g., using a string or paper strip to compare the height and width of a desk to see if it fits in the room); – drawing geometric shapes (e.g., using a ruler to create shapes with equal sides). ■ Select the most appropriate unit to measure a given time (e.g., would you use minutes or hours to measure brushing your teeth, eating dinner, sleeping?); ■ Estimate the cost of two items knowing the approximate cost of one (e.g., one game costs about $8).	**Understand that mathematics is used in daily life and extensively outside the classroom.** ■ Write and solve multi-step situations that involve addition and subtraction. [1.1.6] ■ Use referents to standard units (e.g., width of pinkie finger is similar to a centimeter). [1.2.6] ■ Identify the point of final destination using real-world examples given directions for movement on a positive number line (e.g., travel back and forth on a street, temperature variation at different times of the day, climbing up and down stairs). [1.3.3] ■ Pose questions and gather data about self and surroundings. [1.4.2] ■ Create and solve a problem situation where mode is meaningful for a set of data. [1.4.4] ■ Make inferences on data from a real-world context, then use the context to determine if the inference is valid. [1.4.5]	**Understand that mathematics is used in daily life and extensively outside the classroom.** ■ Describe situations where area is the needed measurable attribute (e.g., the pricing of buying carpet, painting a wall, picking largest bedroom). [1.2.1] ■ Measure perimeter and area for regular and irregular shapes (e.g., use tiles, inches, or grid paper to find perimeter or area of blankets, CDs, skateboards). [1.2.2] ■ Identify situations in which estimated measurements are sufficient and use estimation to obtain reasonable measurements. [1.2.6] ■ Identify parallel and perpendicular lines in two-dimensional shapes and figures and in the environment. [1.3.1] ■ Identify the likelihood of events and use the vocabulary of probability (e.g., weather, simple games, if homework will be assigned). [1.4.1]
5.3.2					

SP: Solves Problems **RL**: Reasons Logically **CU**: Communicates Understanding **MC**: Makes Connections

Component 5.3: Relate mathematical concepts and procedures to real-world situations.

GLE	5	6	7	8	9/10
5.3.1	**Understand that mathematics is used in daily life and extensively outside the classroom.** ■ Identify angles in the environment (e.g., in architecture, furniture, nature). [1.2.1] ■ Identify types of angles in polygons on a plane and in the environment. [1.2.1] ■ Solve problems involving angle measurements in real-life situations (e.g., determine if a piece of tile will fit in a corner by measuring the angle). [1.2.3] ■ Determine whether a situation needs a precise measurement or an estimated measurement. [1.2.6] ■ Explain a series of transformations in art, architecture, or nature. [1.3.4]	**Understand that mathematics is used in daily life and extensively outside the classroom.** ■ Write and solve real-world problem situations to find sums or differences of decimals or fractions (e.g., explain how to find the change received from a $50.00 bill when a given amount of CD's and tapes with prices are bought). [1.1.6] ■ Calculate the ratio of bicycle gears.	**Understand that mathematics is used in daily life and extensively outside the classroom.** ■ Describe a situation where estimation is sufficient in real-life contexts. [1.1.8] ■ Use properties of polygons and circles to solve real-world problems (e.g., find the amount of fencing needed for a pasture). [1.3.2] ■ Compare the unit prices of various soft drinks.	**Understand that mathematics is used in daily life and extensively outside the classroom.** ■ Use estimation to predict or to verify the reasonableness of calculated results. [1.1.8] ■ Evaluate conclusions drawn from a set of data and support with evidence (e.g., from newspapers, web sites, opinion polls). [1.4.6] ■ Analyze data from a newspaper article to see if the conclusions are reasonable. ■ Research how coding and decoding has played a part in history.	**Understand situations in which mathematics can be used to solve problems with local, national, or international implications.** ■ Explain a method for determining whether a real world problem involves direct proportion or inverse proportion. [1.1.4] ■ Describe how changes in the dimensions of objects affect perimeter, area, and volume in real-world situations (e.g., how does the change in the diameter of an oil drum affect the area and volume). [1.2.1] ■ Represent situations on a coordinate grid or describe the location of points that satisfy given conditions (e.g., locate a gas station to be equidistant from given cities; locate a staking point to maximize the grazing area of a tethered goat). [1.3.3]
5.3.2		**Understand that mathematics is used within many occupations or careers.** ■ Explain or describe the mathematics necessary to get and perform in a particular job (e.g., complete a project that researches how mathematics is used in careers or occupations of interest). ■ Identify where in a particular career mathematics is used (e.g., police work — looking for patterns in fingerprints or crimes).	**Understand that mathematics is used within many occupations or careers.** ■ Explain how mathematics is used in careers or occupations of interest (e.g., complete a mathematically based project).	**Understand that mathematics is used within many occupations or careers.** ■ Explain how mathematics is used in careers or occupations of interest (e.g., complete a mathematically based project).	**Understand the mathematical knowledge and training requirements for occupational/career areas of interest.** ■ Select a career and research the mathematics necessary to get the job and the mathematics used in the job.

Glossary of Mathematics Terms

This is an abbreviated glossary. For the complete glossary, visit the website at: www.wednet.edu/mathglossary.

Absolute value: the numerical value of a number without regard to its sign; the distance of the number from 0 to the number line (e.g., the absolute value of 3 is 3, of –9 is 9, and of 0 is 0). The absolute value of –5 is written as | –5 | = 5.

Acute angle: an angle which measures less than 90 degrees and greater than 0 degrees

Acute triangle: a triangle with three acute angles

Algorithm: a step-by-step method for computing (e.g., the addition algorithm that describes how to find the sum when regrouping, or the long division algorithm)

Angle: two rays that share an end-point; named according to the number of degrees of its measure

Area: The *area* of a flat, or plane, figure is the number of unit squares that can be contained within it. The unit square is usually some standard unit, such as a square meter, a square foot, or a square inch.

Arithmetic sequence: a list of numbers in which the difference between any two adjacent numbers is the same. The first number in the list is called the initial value. The list 1, 3, 5, 7 … is an arithmetic sequence because the difference between any two adjacent numbers is 2. That difference is called the common difference.

Associative property of addition: The sum stays the same when the grouping of addends is changed (e.g., $(a + b) + c = a + (b + c)$ or $(30 + 4) + 20 = 30 + (4 + 20)$).

Associative property of multiplication: The product stays the same when the grouping of factors is changed (e.g., $(a \times b) \times c = a \times (b \times c)$ or $(2 \times 3) \times 4 = 2 \times (3 \times 4)$).

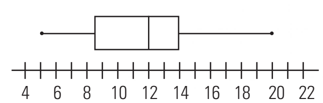
Attributes: a characteristic or distinctive feature

Average: a measure of central tendency; generally, *average* will imply arithmetic average, which could be the *mean*, *median*, or *mode*.

Axes: perpendicular lines used as reference lines in a coordinate system or graph; traditionally, the horizontal axis represents the *independent* variable and the vertical axis the *dependent* variable.

Bivariate data: data involving two variables, such as height and weight, or amount of smoking and a measure of health; often graphed in a scatter plot

Box-and-whisker plot: a graph which displays the following five points from a data set: the minimum value, the lower quartile (25^{th} percentile), the median, the upper quartile (75^{th} percentile), and the maximum value. The rectangle represents the middle 50% of the data, the vertical line in the rectangle represents the median, and the whiskers at both ends represent the remainder of the data. The end-points on the whisker represent the smallest and largest values. In the example following, the median is 12, the 25^{th} percentile is around 8.5, the 75^{th} percentile is 14, the largest value is 20 and the smallest is 5.



Capacity: the volume of material or liquid that can be poured into a container

Cardinal number: a number that designates how many objects, or the number of units in the set; answers the question, "how many …?" (e.g., there are 28 students in the room; the cardinality or cardinal number is 28)

Central tendency: a single number that describes all the numbers in a set. The usual measures that are used are mean, median, or mode (e.g., for the set of numbers 95, 86, and 83, the mean is 89).

Cluster: in terms of statistics, a relatively large number of data that is closely grouped around a particular value

Coefficient: the numerical part of an algebraic term (e.g., 2 and 3 are coefficients in $2x + 3xy$)

Combination: a group of objects, numbers, or events; changing the order does not create a new combination (1, 2, 3 is the same combination as 3, 1, 2).

Composing numbers: the process of putting numbers together. When used here, it is implying that students look for numbers that could be combined easily to assist with calculation or understanding (e.g., 7 and 3, 24 and 26).

Composite number: an integer greater than 1 which has whole number factors other than itself and 1 (e.g., 10 is a composite number because it has the factors of 2 and 5, in addition to 1 and 10)

Compound event: an event that consists of two or more simple events (e.g., consider the event of rolling a six on a number cube and flipping a coin with a result of tails)

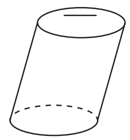
Conditional probability: the probability that an event will occur given that another event has already occurred

Congruent figures: figures that have the same shape and size

Conjecture: inference or judgment based on inconclusive or incomplete evidence; guesswork

Coordinates: an ordered pair of numbers that identify a point on a coordinate plane

Cylinder: a solid figure with two circular or elliptical bases that are congruent and parallel to each other



Decomposing numbers: the process of separating numbers into their components. This is normally done to enhance understanding or to simplify calculations (e.g., 123 can be thought of as 1 one-hundred, 2 tens, and 3 ones. 28 + 32 could be decomposed to 20 + 30 + 8 + 2).

Dependent event: an event whose probability is determined by the outcome of another event

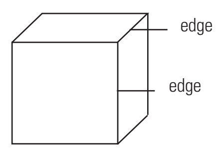
Derived unit of measure: a measurement determined by finding the ratio of other measurements (e.g., density is determined by dividing the mass of quantity by its volume; speed by dividing distance covered by time elapsed)

Direct proportion: Proportionality indicates that two quantities or variables are related in a linear manner. If one quantity doubles in size, so does the other; if one of the variables diminishes to $^1/_{10}$ of its former value, so does the other.

Divisible: One integer is divisible by another non-zero integer if the quotient is an integer with a remainder of zero (e.g., 12 is divisible by 3 because 12 ÷ 3 is an integer, namely 4).

Domain: set of all values of the independent variable of a given function, usually the x-values on a coordinate plane

Edge: the line segment formed by the intersection of two faces of a three-dimensional figure; a cube has 12 edges.



Empirical frequency: the number of times in an experiment that a particular event occurs

Empirical results: the results of an experiment or simulation

Equation: a number or algebraic sentence which shows equality between two sets of values (e.g., $4 + 8 = 6 + 6$ or $x + 4 = 8$)

Event: any subset of the sample space. In rolling a number cube, the event of rolling a "3" is a singleton event because it contains only one outcome. The event of rolling an "even number" contains three outcomes.

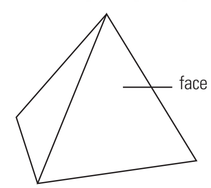
Expanded form: a number written in component parts showing the cumulative place values of each digit in the number (e.g., 546 = 500 + 40 + 6)

Experimental probability: the ratio of the number of times an event occurs to the number of trials

Expression: a variable combination of variables, numbers, and symbols that represent a mathematical relationship

Extrapolate: to estimate or approximate a value beyond a given set of data

Face: a flat surface, or side, of a solid figure



Flip: the effect of a flip is a reflection (see **reflection**)

Fluency: In number sense, fluency is defined by efficiency, accuracy, and flexibility.

Fundamental counting principal: If one event has *m* possible outcomes and a second independent event has *n* possible outcomes, then there are *m* x *n* total possible outcomes for the two events together.

Geometric sequence: a sequence of numbers, called terms, in which each successive term is determined by multiplying the previous term by a common factor (e.g., 1, 2, 4, 8, 16 … is a geometric sequence with a first term of 1 and a common factor of 2)

Histogram: a bar graph that shows the frequency distribution for a set of data; the graph is noted for the labels of the bars being given in intervals and for no spaces between successive bars.

Identity property of addition: Adding zero to a number gives a sum identical to the given number.

Identity property of multiplication: Multiplying a number by 1 gives a product identical to the given number.

Impossible event: an event that cannot happen or an event with a probability of 0

Independent events: two events whose outcomes have no effect on one another (e.g., the second flip of a coin is independent of the first flip of a coin)

Indirect measurement: a measurement determined without the direct application of measurement tools (e.g., finding a measure by the use of the Pythagorean Theorem, by similarity, or through ratios or scale factors)

Infer: to draw a conclusion from facts or evidence

Interpolate: to estimate or approximate a value between two given values

Inverse property of multiplication: Each non-zero real number x has a multiplicative inverse, denoted by $^1/_x$, such that their product is 1 (e.g., $^1/_3$ is the multiplicative inverse of 3).

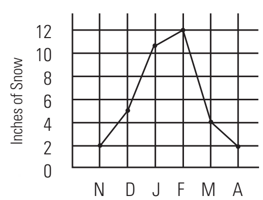
Irrational number: a number that cannot be written in a fraction form

Irregular polygon: a polygon whose interior angles are not equal and/or sides are not equal in length

Line of best fit: a line drawn on a scatter plot to estimate the relationship between two sets of data

Line graph: a graph that uses a line to show that something is increasing, decreasing, or staying the same over time

Amount of Snowfall by Month

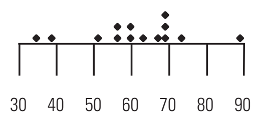


Line of symmetry: a line on which a figure can be folded into two parts that are congruent mirror images of each other

Line plots: A line plot, sometimes called a dot plot, starts with a line that represents the variable you are interested in, and the values of the variable are labels on the line; each observation is marked as a point above the line.

Example of a line plot:

Line Plot for Quality Ratings for Natural Peanut Butter



Linear or linear relationship: any data set or information that could be reasonably modeled with a line

Linear equation: an equation whose graph on a coordinate grid is a line and that can be written in the form $y = mx + b$

Linear inequality: an inequality whose graph on a coordinate grid is bounded by a line and that can be written in the form $y\ (\geq, <, >, or \leq)\ mx + b$

Mean: In the case of this document, *mean* implies arithmetic mean which is a measure of tendency found by summing all members in a set of data and dividing the number by members of the set. The arithmetic mean is often called the average (e.g., if there are three classes: $A = 24$ children, $B = 25$ children, and $C = 23$ children, the classes would be balanced by moving one student from class B to class C, thus making each class the same size (24). This number would indicate the average class size). Arithmetically, it is obtained by adding all data points together and dividing the sum by the number of points ($24 + 25 + 23 = 72$; $72 \div 3 = 24$).

Measures of central tendency (see **average**): mean, median, mode

Median: the number in the middle of a set of data arranged in order from least to greatest or from greatest to least, or the average of the two middle terms if there is an even number of terms (e.g., *For the data:* 6, 14, 23, 46, 69, 72, 94 –> the median is 46 (the middle number) *For the data:* 6, 14, 23, 69, 72, 94 –> the median is also 46 (the average of the two middle numbers in the list))

Mode: the item that occurs most frequently in a set of data. There may be one, more than one, or no mode (e.g., the mode in {1, 3, 4, 5, 5, 7, 9} is 5).

Mutually exclusive: Two events are mutually exclusive if it is not possible for both of them to occur (e.g., if a die is rolled, the event "getting a 1" and the event "getting a 2" are mutually exclusive since it is not possible for the die to be both a one and a two on the same roll).

Non-linear: a data set or function that, when plotted, does not have the characteristics of a line

Non-standard units of measure: measurement units that are not commonly accepted as standard but are applied uniformly when measuring (e.g., paperclips, pencils, cubes)

Number line: a line that shows numbers ordered by magnitude from left to right or bottom to top; an arrowhead at each end indicates that the line continues endlessly in both directions; points are marked to subdivide the line into intervals that correspond to indicated numbers.

Number sentence: two or more expressions separated by a relational symbol (=, >, <, ≤, ≥); the relational symbol can be thought of as the verb in the sentence (e.g., $7 + 7 = 8 + 6$; $14 < 92$; $56 + 4 > 59$).

Open-ended problem: a problem with different possible solution paths and which may have different solutions depending on the route taken

Order of operations: In simplifying an expression involving a number of operations, perform the operations in the following order:

1. complete all operations inside parentheses first;
2. calculate powers and roots and in the order they occur from left to right;
3. calculate all multiplications and divisions — left to right;
4. calculate all additions and subtractions — left to right (e.g., $7 + 3 \times 8 = 31$ [multiply 3 x 8 before adding 7]).

Ordered pair: two numbers for which their order is important when used to locate points on a coordinate graph; the first element indicates distance along the *x*-axis (horizontal) and the second indicates distance along the *y*-axis (vertical).

Ordinal number: a number that designates the position of an object in order; *first, second*, and *third* are examples of ordinal numbers (e.g., eraser is the SECOND element in the set (pencil, eraser, desk, chalkboard, book, file, paper); *Z* is the TWENTY-SIXTH element in the set (a, b, c, d … z)).

Outcome: one of the possible results in a probability situation or activity

Outlier: a number in a set of data that is much larger or smaller than most of the other numbers in the set

Parallel lines: lines that lie in the same plane and never intersect

Parallelogram: a quadrilateral with opposite sides parallel

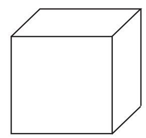
Perpendicular lines: lines that lie on the same plane that intersect to form right angles (90 degrees)

Pi (π): the Greek letter (π) that in mathematics represents the ratio of the circumference to the diameter of a circle; the value of pi is approximately 3.14159.

Pictograph: graph that uses pictures or symbols to represent similar data

Place value: the value of a digit as determined by its place in a number (e.g., in the number 135, the 3 means $3 \bullet 10$ or 30; in the number 356, the 3 means $3 \bullet 100$ or 300)

Polyhedron: a solid figure, the sides of which are polygons



Power: a term of the form x^n resulting from repeated multiplication of a factor (e.g., 16 or 2^4 is the fourth power of 2, since 2 has been used as a factor four times)

Precision: an indication of how finely a measurement is made; related to the unit of measurement and the calibration of the tool (e.g., was the measurement made using a ruler marked in increments of $^1/_4$ of an inch or in increments of $^1/_{16}$ of an inch)

Prime number: a whole number greater than 1 having exactly two whole number factors, itself and 1 (e.g., 7 is prime since its only whole number factors are 1 and 7)

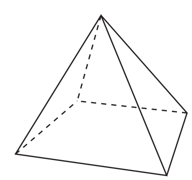
Prism: a three-dimensional figure that has two congruent and parallel faces that are polygons and the remaining faces are parallelograms

Probability: the numerical measure of the chance that a particular event will occur, depending on the possible events; the probability of an event is always between 0 and 1, with 0 meaning that there is no chance of occurrence and 1 meaning a certainty of occurrence.

Proportion: an equation showing that two ratios are equivalent (e.g., $^2/_3 = {^6/_9}$)

Proportional: constituting a proportion; having the same, or a constant, ratio; as, proportional quantities

Pyramid: a solid whose base is a polygon and whose faces are triangles that meet at a common point (vertex)



Pythagorean Theorem: In any right triangle having a hypotenuse of length *c* and two legs of lengths *a* and *b*, $a^2 + b^2 = c^2$.

Random sample: a sample in which every person, object, or event in the population has the same chance of being selected for the sample

Range (functional): the set of all values of the dependent variable of a given function, usually the *y*-value on a coordinate plane

Range (statistical): the absolute value of the difference between the largest and smallest values in a set of data (e.g., the range of {2, 4, 6, 7, 9, 13} is 13 – 2 or 11)

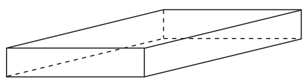
Rate: a ratio comparing two quantities measured in different units where one is measured in time (e.g., miles per hour and heartbeats per minute are rates)

Ratio: a comparison of two numbers using division (e.g., the ratio of two to five is 2:5)

Reasonable: within likely bounds; sensible (e.g., a reasonable estimate is close to the actual answer; an answer of 2 $^1/_2$ cans is not reasonable, while 2 cans or 3 cans is reasonable)

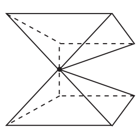
Reciprocal: the multiplicative inverse of a non-zero number (e.g., the reciprocal of *x* is given by $^1/_x$)

Rectangular prism: a polyhedron with six rectangular faces (e.g., the figure shown is a rectangular prism)



Reflection: a transformation of a figure by reflecting it over a line, creating a mirror image of the figure; the effect of a flip is a reflection.

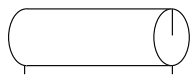
Reflection on a point: a transformation of a figure by reflecting each of its points through a fixed point, called the center of the reflection, creating an image of the original figure across the center



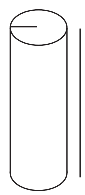
Regular polygon: a polygon with all sides having the same length and all angles having the same measure

Right angle: an angle whose measure is 90 degrees

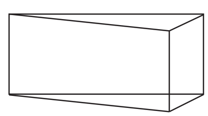
Right circular cylinder: a cylinder whose bases are circles and the centers of whose sections form a line perpendicular to the bases



Right cylinder: a cylinder with centers of whose sections form a line perpendicular to the bases



Right prism: a prism which has bases aligned one directly above the other



Right triangle: a triangle having one right angle

Rotation: a transformation of the points in a plane resulting from turning a figure about a specified point a fixed number of degrees or fractional portion of a turn either clockwise or counterclockwise

Sample space: a set of all possible outcomes to a specified event

Scale: sequenced collinear marks usually at regular intervals or else representing equal steps that are used as a reference in making measurements

Scale factor: a ratio that compares two sets of measurements such as the size of a model to the actual size of the object being modeled

Scatter plot: a graph of points (x, y), one for each item being measured, on a coordinate plane; the two coordinates of a point represent their observed, paired values (e.g., the ordered pairs may relate temperature to time of day).

Scientific notation: a number expressed in the form of $a \times 10^n$ where $1 \leq a < 10$ and n is an integer (e.g., 342.15 can be written in scientific notation as 3.4215×10^2)

Sequence: a set of numbers arranged in a special order or pattern

Similar figures: having the same shape but not necessarily the same size (congruent corresponding angles and proportional corresponding sides)

Similarity: characteristic of similar figures

Simulation (probability): using an experiment based on a real-life situation to answer a question (e.g., toss a coin to simulate true-false; heads = true, tails = false)

Single variable equation: an equation with one variable (e.g., $3x + 2 = 8$)

Single variable expression: an expression with one variable (e.g., $3x + 2$)

Single variable inequality: an inequality with a single variable (e.g., $3x + 2 > 8$)

Skip count: counting by groups as in skip count by 2s, 5s, or 10s; can be thought of as a precursor to multiplication

Slide translation: The effect of a slide is a translation.

Slope: the ratio of the change in vertical to the change horizontal between two points on a line (e.g., the slope of a line through (3,4) and (9,5) is $\frac{5-4}{9-3}$ or $\frac{1}{6}$)

Solid: a geometric figure with three dimensions

Square number: an integer that is a perfect square of another integer (e.g., 49 is the square of 7: that is, the product of a number multiplied by itself)

Square root: one of two equal factors of a given number (e.g., 7 is the square root of 49 because $7 \bullet 7 = 49$)

Standard form: a number written with one digit for each place value (e.g., the standard form for five hundred forty-six is 546; the standard form for three thousand six is 3,006)

Standard units of measure: units of measure commonly used, generally classified in the U.S. customary system or metric system (e.g., feet, meters, acres, gallons, liters)

Stem-and-leaf plot: a method of organizing data from least to greatest using the digits of the greatest place value to group data

Example: Ages of Adults in the Park

Data set				*Stem*	*Leaves*
23	25	29	29	2	3 5 9 9
36	38	39	39	3	6 8 9 9
52	54	55	55	5	2 4 5 5

Successive events: events that follow one another in a compound probability setting

Surface area: the sum of the areas of all the faces of a three-dimensional object

Symmetrical: having a line, plane, or point of symmetry such that for each point on the figure, there is a corresponding point that is the reflection of that point (see **line of symmetry**)

System of equations: two or more equations in terms of the same variables; the solution of a system is a set of values for the unknowns (variables) that satisfies all the equations simultaneously.

Tessellate: to form or arrange polygons in a checkered or mosaic pattern

Theoretical probability: a measure of the likelihood that an event will occur; is equal to the ratio of favorable outcomes to the number of possible outcomes (e.g., knowing that there are six possible outcomes for rolling a fair number cube, one can assign the probability of $^1/_6$ to each of the possible outcomes)

Transformation (geometric): a change in position of a figure using a translation, reflection, rotation, or a combination of these mappings

Translation: a transformation of a figure by moving it without turning or flipping it in any direction; the effect of a slide is a translation.

Trapezoid: a quadrilateral that has two parallel sides

Trend: the general direction or tendency of a set of data

Univariate data: data that measures a single characteristic

Variability of data: Range, average deviation, standard deviation, and spread are all ways to describe the variability of data.

Variation (direct): a relationship between two variables that can be expressed in the form $y = kx$ where $k \neq 0$. $y = kx$ can be read as "y varies directly with respect to x."

Variation (inverse): a relationship between two variables that can be expressed in the $y = \frac{k}{x}$ where $k \neq 0$ $y = \frac{k}{x}$ can be read as "y varies inversely with respect to x."

Vertex: a point at which two lines meet to form an angle, where edges of a polygon or polyhedron intersect, or the point opposite the base in a pyramid or cone

Vertices: plural of vertex

Zero property of addition: Adding zero to a number gives a sum identical to the original number; zero is the identity element of addition (see **identity property**) (e.g., 4 + 0 = 4; 56.89 + 0 = 56.89).

Zero property of multiplication: The product of any number and zero is zero (e.g., 4 x 0 = 0; 0 x 456.7 = 0).

Cognitive Demand

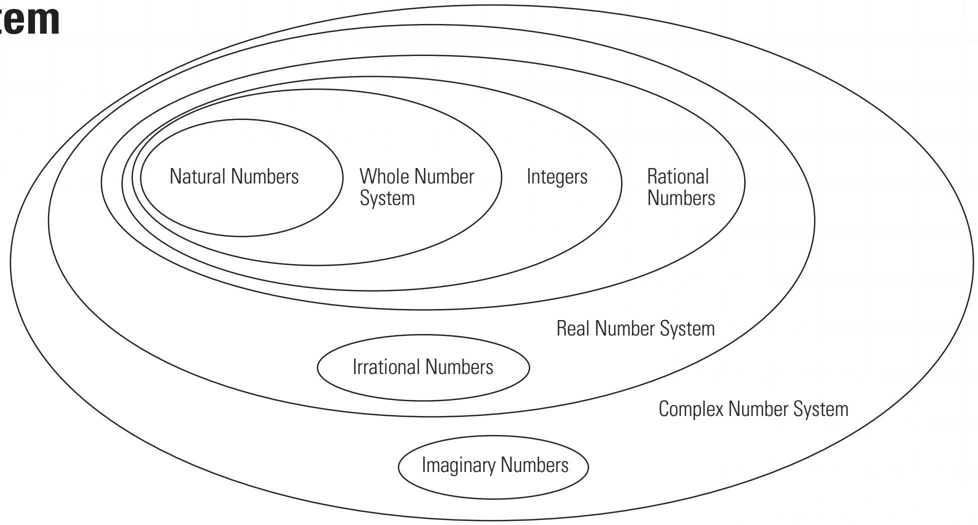
Adapted from Bloom's Taxonomy of the Cognitive Domain

Cognitive Demand	Performance Terms
Knowledge: Recall — Remember previously learned materials. *Evidence of Learning* ■ Recognize the contributions of women, men, and people from a variety of cultures to the development of mathematics. (Grade 4: 5.2.2) ■ Recall addition and subtraction facts to at least 18. (Grade 2: 1.1.6) ■ State methods and procedures.	■ Match ■ Define ■ Repeat ■ Memorize ■ Label/Name ■ Outline/Format ■ Recount ■ Record ■ Recognize ■ Identify ■ Sort ■ List ■ State
Comprehension: Understand — Grasp the meaning of material: translate, interpret, extrapolate. *Evidence of Learning* ■ Identify the ordinal position of objects through at least tenth. (Grade K: 1.1.2) ■ Create a table or graph given a description of, or an equation for, a situation involving a linear or non-linear relationship. (Grade 7: 4.1.2) ■ Illustrate integer values using models and pictures. (Grade 6: 1.1.1)	■ Locate ■ Identify ■ Restate ■ Paraphrase ■ Describe ■ Summarize ■ Cite ■ Document/Support ■ Infer ■ Predict ■ Illustrate ■ Show ■ Express ■ Explain
Application: Generalize — Use learned material in new situations. *Evidence of Learning* ■ Use counting strategies to combine numbers under 20. (Grade 1: 1.1.7) ■ Solve equations with an unknown. (Grade 2: 1.5.5) ■ Calculate measures of objects for which no direct information is given. (Grade 8: 1.2.5)	■ Select ■ Use ■ Manipulate ■ Organize ■ Imagine ■ Test ■ Demonstrate ■ Solve ■ Dramatize ■ Frame

Cognitive Demand	Performance Terms
Analysis: Breakdown — Break down material into its component parts so that it may be more easily understood. *Evidence of Learning* ■ Break down a situation in order to paraphrase it. (Grade 5: 3.1.1) ■ Determine if enough information is given to find a solution. (Grade 7: 2.2.1) ■ Determine whether the underlying model for a set of data is linear. (Grade 9–10: 1.4.5) ■ Justify the use of a chart or table to collect and organize information used to solve a problem (e.g., the two- or four-column chart helped to keep track of the information). (Grade 2: 3.2.3)	■ Examine ■ Classify ■ Research ■ Debate/Defend ■ Map ■ Characterize ■ Compare/Contrast ■ Conclude/Draw Conclusions ■ Refute ■ Similarities/Differences ■ Distinguish/Differentiate ■ Relate to ■ Outline ■ Generalize
Synthesis: Compose — Put material together to form a new whole. *Evidence of Learning* ■ Propose possible factors that may influence a trend but not be reflected in the data. (Grade 9–10: 4.1.2) ■ Use the properties of two-dimensional and three-dimensional figures to solve mathematical problems (e.g., find the width of a river based on similar triangles; given a set of parallel lines, a transversal, and an angle, find the other angles). (Grade 9–10: 3.1.1) ■ Examine a set of data, research other sources to see if the data is consistent, find articles written to see if the data makes sense, to develop a logical point of view and to support that view. (Grade 9–10: 3.3.2)	■ Propose ■ Plan ■ Compose ■ Formulate ■ Design ■ Construct ■ Imagine/Speculate ■ Create ■ Invent ■ Integrate
Evaluation: Judge — Judge according to a set of criteria stated by the evaluator. *Evidence of Learning* ■ Judge the appropriateness of inferences made from a set of data and support the judgment. (Grade 6: 1.4.6) ■ Judge conclusions drawn from a set of data and support with evidence. (Grade 8: 3.2.2) ■ Determine the accuracy and completeness of the data in a table or graph. (Grade 7: 1.4.6)	■ Evaluate ■ Judge ■ Weigh ■ Consider ■ Appraise ■ Recommend ■ Select the Best/Tell Why ■ Critique/Criticize ■ Choose/Justify Choice ■ Scale

The Construction of Our Number System

The diagram to the right illustrates the organization of our number system. Each oval represents a set of numbers. One oval contained in another indicates that all of the numbers in the set are included in the numbers of the larger oval's set (e.g., the whole numbers include the natural numbers). Oval size does not represent the relative number of numbers in each of the sets.



The table below lists, describes, and gives examples of each of the sets of numbers included in the diagram.

Set	Description	Examples	Expected Introduction Grade
Natural numbers	Counting numbers.	$\{1, 2, 3, \ldots\}$	PreK
Whole numbers	All counting numbers and 0.	$\{0, 1, 2, 3, \ldots\}$	1st grade
Integers	All whole numbers and their opposites.	$\{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$	6th grade
Rational numbers	All numbers that can be written as a ratio (fraction) of an integer over a natural number.	$\frac{3}{4}, -300.73, 123, -1\frac{7}{8}, \ldots$	4th grade — positives 7th grade — negatives
Irrational numbers	All numbers that can't be written as a ratio of an integer over a natural number.	$\sqrt{2}, \sqrt[3]{17}, \pi$	9th grade
Real number system	All rational and irrational numbers.	Any numbers from the types above.	10th grade
Imaginary numbers	All numbers whose square is negative; or the square root of a negative number; any number that can be written in the form a + b*i*, where *a* and *b* are real numbers and *i* represents $\sqrt{-1}$.	$\sqrt{-6}, 4\sqrt{-47}, 3+2i$	11th grade
Complex numbers	All real and imaginary numbers.	Any number from the types above.	11th grade

Appendix

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Mathematics Drafting Team

Bob McIntosh, Facilitator
Mathematics Program Specialist
OSPI (2000–2003)

Katy Absten
Olympic Educational Service
District 114

Debbie Blodgett
Mount Adams School District

Rebecca Campeau
Clover Park School District and
St. Martin's College

Laurel Carpino
Zillah School District

Kimberly Dennis
Spokane School District

Adrienne Donaldson
Evergreen School District

Darci Downs
Highline School District

Jeff Hanegan
Cheney School District

Trina Hendrickson
North Thurston School District

Patricia Herzig
Bremerton School District

Linda Krumins
Seattle School District

Katherine Lum
Camas School District

Patricia Noble
Mathematics Consultant

Sue Seiber
Issaquah School District

Karen Strain
White Salmon Valley School District

Robin Washam
Puget Sound Educational
Service District 121

James (Stormy) Weathers
Medical Lake School District

Clayton Williams
Peninsula School District

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Dr. John Dossey
Distinguished University Professor
of Mathematics
Illinois State University
NCTM President 1986–1988

Dr. Mary Lindquist
Vice Chair, Mathematics Expert
Group PISA
NCTM President 1992–1994

External Consultants

Barbara Chamberlain
Assessment Consultant

Karen Cockburn
Spokane School District

William Kring
Evergreen School District

Dr. Virginia Stimpson
University of Washington

Sandy Christie
Yakima School District

Dr. Elham Kazemi
University of Washington

Anita Lenges
Seattle Public Schools

Bias and Fairness Review Committee

Dr. Thelma Jackson, Facilitator
Consultant, Olympia

Ben Kodama
Multi-Ethnic Think Tank

Madalyn Mincks
Wenatehee, WA

Ramon E. Tobias
Toppenish High School

Miebeth Bustillo
Tacoma School District

Anita K. Lenges
University of Washington

Dr. Robert Plumb
Heritage College

Dr. Martina Whelshula
Gonzaga University

Dr. Alma Dansby
Federal Way School District

Ray Lorton
Chief Leschi School

Dr. James B. Smith
Auburn School District

Norma Zavala
Seattle School District

OSPI Staff

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Steve DePaul
Math Helping Corps

Kathy Dornhecker
Mathematics Assessment Specialist

Robert Hodgman
Mathematics Assessment Specialist

Bev Neitzel
Mathematics Assessment Manager

Dr. Catherine Taylor
Assessment Director

EALR Review Panel

Barbara Clausen, Facilitator
Education Consultant

Dr. Verna Adams
Washington State University

Cheryl Brown
Central Kitsap School District

Dr. Steven Chestnut
Moses Lake School District

Dr. Magda Costantino
The Evergreen State College

Ruta Fanning
Higher Education Coordinating Board

Dr. Jane Gutting
Educational Service District 105

Judy Hartmann
The Governor's Office

Phyllis Keiley-Tyler
Consultant

Mary Kenfield
Washington State Parent Teacher Association

Ben Kodama
Multi-Ethnic Think Tank

Karen Madsen
Everett School District

Cheryl Mayo
Yakima School District

Bill Moore
Office of State Board for Community and Technical Colleges

Mary Moore
Richland School District

Steve Mullin
Washington Roundtable

Cheryl Ricevuto
Shoreline School District

Sandra Sheldon
Ellensburg School District

Warren Smith
State Board of Education

Lorna Spear
Spokane School District

Dr. Willie Stone
Pasco School District

Mike Stromme
Vancouver School District

Jennifer Vranek
Partnership for Learning

Gary Wall
Northwest Educational Service District 189

Curriculum Advisory and Review Committee

Patti Anderson
Franklin Pierce School District

Lisa Bjork
Seattle Pacific University

Cheryl Brown
Central Kitsap School District

Janie Buckman
Wenatchee School District

Kathy Budge
Educational Service District 113

Linda Dobbs
Northwest Educational Service District 189

Deannie Dunbar
Sunnyside School District

Pat Erwin
Tacoma School District

Kathy Everidge
Vancouver School District

Barbara Gray
Federal Way School District

Ralph Headlee
Medical Lake School District

Dr. Joan Kingrey
Gonzaga University

Tanis Knight
Camas School District

Carolyn Lint
North Thurston School District

Dr. Fran Mester
Monroe School District

Madalyn Mincks
Wenatchee, WA

Dr. Sharon Mowry
Whitworth College

Dr. Janell Newman
Central Kitsap School District

Dolorita (Rita) Reandeau
South Kitsap School District

Gail Robbins
Northshore School District

Dr. Yvonne Ryans
Marysville School District

Sandra Sheldon
Ellensburg School District

Karin Short
Spokane School District

Nancy Skerritt
Tahoma School District

Kimberlee Spaetig
Snohomish School District

Dr. Carolyn Stella
Yakima Valley Technical Skills Center

Dan Steward
Chehalis School District

Dr. Steve Webb
Lake Stevens School District

Office of Superintendent of Public Instruction
Old Capitol Building, P.O. Box 47200, Olympia, WA 98504-7200
www.k12.wa.us
OSPI Document Number 04-0006

Office of Superintendent of Public Instruction
Old Capitol Building
P.O. Box 47200
Olympia, WA 98504-7200
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