

Instructional Plan

Abstract Level

Name of Math Skill/Concept: two digits by one digit multiplication with regrouping using drawings.

Prerequisite Skills Needed:

- Concrete understanding of the multiplication process.
- Multiplication fact families
- Understanding that multiplication is repeated addition
- Grouping of ones and tens
- Multiplying tens
- Multiplying two digit by one digit numbers without regrouping
- Use of place value mats and materials
- Identification of factors and product in a multiplication problem,
- Multiplying two digit by one digit numbers with regrouping using drawings
- Previous experience using the DRAW and FIND strategies

Learning Objective:

1. Solve two digits by one digit multiplication problems with regrouping by using the algorithmic process.

Important Ideas for Implementing This Teaching Plan:

1. **Because students with learning difficulties often have difficulty performing math skills at the abstract level, it is important that explicit links are made between both their concrete and drawing experiences and their abstract level instruction.**
2. This teaching plan is written for the skill of two digits by one digit multiplication with regrouping. Following the same sequence of steps as outlined below, students would have had previous experience with using base ten materials and place value mats to complete multiplication problems involving multiplying tens by 1 digit and 2 digit by 1 digit numbers without regrouping.
3. This teaching plan outlines the steps for teaching two digits by one digit multiplication with regrouping. If additional instruction at the concrete level is needed for problems involving multiplying three digit numbers by one digit or two digit factors, the same sequence of steps as outlined in this plan can be followed. Use story problems to provide context
4. Model estimating products

- 5 Color code numbers according to place value and then fade
6. Use story problems to provide context

Instructional Phase 1: Initial Acquisition of Skill/Concept – Teacher Directed Instruction

Teach Skill/Concept within Authentic Context

Description: Links are made to the contexts used at the representational level. (See Build Meaningful Student Connections). Problem solving is emphasized (See Explicit Teacher Modeling) Meaningful contexts will continue to be used in the form of story situations that have relevance for 9-11 year old students. It is important always to provide story situations that have relevance to your students given their age, cultural backgrounds, and interests.

Build Meaningful Student Connections

Purpose: to assist students to build meaningful connections between what they know about using drawings and solving two digit by one digit multiplication problems with regrouping by using the algorithmic process.

Materials:

Teacher –

- Popsicle box
- Package of napkins
- White board or other visual display
- Markers/chalk
- Poster with mnemonics for DRAW and FIND strategies
- Place value mat, base ten materials
- Example of solving multiplication problem with drawing

Description:

1.) Link to students' prior knowledge of multiplying two digits by one digit numbers with regrouping using drawings.

For Example:

Can everyone see what I have up here? I have a box of Popsicles. Today we are going to plan a multiplication celebration because you all have been working so hard learning multiplication. You are going to help me make sure that I have planned it all out and that I have enough food for everyone. We have used base ten materials (show example) and drawings (show example) to solve multiplication problems. Now we are going to just use numbers.

2.) **I** dentify the skill students will learn: Solve two digits by one digit multiplication problems with regrouping by using the algorithmic process.

For Example:

We have been solving multiplication problems by drawing. Today we are going to learn how to do multiplication problems by just using numbers. We are going to figure out if I have bought enough Popsicles and napkins for our celebration. We are going to use our multiplying skills to figure this out. I want to make sure that each of you has one Popsicle. There are 25 students plus myself so we have 26 in the class. Then I want to make sure that we have enough to give one to each of our principals and our secretaries. That makes 40 people. Each box has 14 popsicles in it. I have bought 3 boxes I am going to have you help me to see if I bought enough boxes.

3.) **P** rovide rationale/meaning for learning how to multiply two digit by one digit numbers with regrouping without drawing.

For Example:

It's good that we can draw to help us find our answers when we multiply, but sometimes we may not want to draw all of those lines, particularly when the numbers get bigger. We can do harder problems quicker if we learn to multiply without using drawings.

Provide Explicit Teacher Modeling

Purpose: to provide students a clear teacher model of how to solve two digits by one digit multiplication problems with regrouping by using the algorithmic process.

Learning Objective 1: Solve two digits by one digit multiplication problems with regrouping by using the algorithmic process.

Materials:

Teacher –

- Visual display board
- Colored markers or chalk
- Sentence strips with “number of groups” and “number of items in each group”
- Poster/display of mnemonics for DRAW and FIND strategy

Description:

A. Break down the skill of solving two digits by one digit multiplication problems with regrouping by using the algorithmic process.

1. Use the DRAW strategy to Discover the sign
 2. Use the DRAW strategy to Read the problem
- Use the FIND strategy to identify factors' place values
3. Use the DRAW strategy and Answer
 - Multiply ones
 - Multiply tens
 4. Use the DRAW strategy and Write the answer

B. Explicitly describe and model how to multiply two digits by one digit multiplication problems with regrouping by using the algorithmic process.

1.) Discover the sign.

- Cue students to mnemonic for strategy
- Identify features of problem
- Prompt students to estimate
- Verbally and visually link numbers in story context to written problems

For Example:

When we use the DRAW strategy, what is the first thing we need to do? Right, discover the sign. Let's look at our problem. (Point to written problem on board). 14×3 . Well, I can see the sign. It is a multiplication sign. That means that I have to put some groups all together. I have bought 3 boxes of popsicles (point to number). There are 14 popsicles in each box (point to number). I want to see how many popsicles I have all together (point to space for product). The first thing that we are going to figure out is whether I have bought enough popsicles for our celebration. We are going to use our multiplying skills to figure this out. I want to make sure that each of you has one popsicle. There are 25 students plus myself, so we have 26 in the class. Then I want to make sure that we have enough to give one to each of our principals and our secretaries. That makes 40 people (Write number on board and circle/underline it). Do you think we will have enough? Let's see.

2.) Read the problem.

- Cue students to mnemonic
- Model how to identify which number is the factor that represents the number of groups and which is the factor that represents the number of elements in each group.

For Example:

We've discovered that we have a multiplication sign. Now what do we need to do? Right, Read the problem. That means that we will need to figure out which factor tells me how many groups I have. Which number is it? Right!

It is 3, because that tells me that I have 3 boxes of popsicles. Which factor tells me how many popsicles I have in each box? Right again! 14 tells me how many I have in each group.

- Use the FIND strategy to identify the place value of the factors.
 - Cue students to mnemonic
 - Use think alouds and questions to prompt students to strategy steps
 - Color code place value labels

For Example:

We know we need to multiply; now we need to decide where to start multiplying. I am going to use the FIND strategy to help me figure out what to multiply in this problem. Let's see – first I need to Find the columns. Well, I have 4 ones and 1 ten in this factor (point to 14) and I have 3 ones in this factor (point to 3), so I have two columns- a ones column (point to ones on problem) and a tens column (point to tens in problem). Now I am going to insert the t's between my columns. Then I need to name my columns. I am going to write an O over the column for the ones and a T over the column for the tens (color code ones and tens labels). I have set up my problem, so that when I solve it, I can determine (point to mnemonic) the place value of my answer and say it.

3. Use the DRAW strategy and Answer:

- Multiply the ones
 - Model how to multiply the numeral in the ones column of the top factor by the single digit, bottom factor.
 - Cue students to one and tens in sub products.
 - Color code to show differences in place value
 - Point to numbers as you verbally explain the process

For Example:

Look at the problem I have written on the board. 14×3 . I want to multiply 14 by 3. Let's look at 14. Which number is in the ones column? Right the 4. We want to multiply the ones first, so we will multiply 4×3 . (That will tell us how many ones we have from all the groups together. What is 4×3 ? You are correct, it is 12. (Write $4 \times 3 = 12$.) What number shows you how many ones are in 12 (point to 12) Right the 2. (Color code the 2.) What number shows you how many tens are in 12? (Point to 12.) Right the 1 (Color code the 1.) I have multiplied the 4 ones in my top factor by my bottom factor 3, and the answer is 12 (point to problem). We know that we can only have one answer in the ones column (point to ones column of written problem and O label). I am going to put the 2 ones in the ones column of my product (point to problem). Hmm, I still have this one ten (point to 12). I can't put that ten in the ones column (point to column in problem). I am going to show that I have one ten by putting a + 1 at the top of the ten column (illustrate step, color coding the +1 for tens).

- Multiply the tens
 - Model how to multiply the numeral in the tens column of the top factor by the single digit, bottom factor.

- Use think alouds and questions to demonstrate how to add all tens.
- Cue students with color coding

For Example:

I have multiplied my ones, now I need to multiply my tens (point to column). Look at 14. Which number is in the tens column? Right 1. I am going to multiply the 1 by the bottom factor 3 (point to number). What is 1×3 ? Right $1 \times 3 = 3$, but I have a + 1 at the top of my ten column. That means that I need add a ten to my answer. So, I have 1 ten \times 3 (point to numbers of problem) plus one more ten. So, 1×3 is 3 tens, plus 1 more ten is 4 tens. I am going to write a 4 in my tens column.

4.) Use the DRAW strategy and **Write** the answer:

- Demonstrate how to use the FIND strategy to determine place value and say answer
- Model how to label answer.
- Review problem verbally and visually.

For Example:

Let's look at the problem again. I am going to use the FIND strategy and determine my answer. I have a 4 in the tens column and a 2 in the ones column. I have 4 tens plus 2 ones, so I have 42. 42 is my product. I have 42 what? Right! 42 popsicles. Do I have enough? Well, I needed 40 (point to number on board) and I have 42, so I think I have enough. Let me review what I did. I started with my ones column and multiplied 3×4 . 3×4 is 12. I put the 2 in the ones column and put a + 1 over my tens column. Then I multiplied my tens. 1×3 is 3, plus 1 more ten is 4, so I wrote a 4 in the tens column. 14×3 is 42. I have 42 popsicles. I think I'll have just enough for the celebration. What good planning!

5.) Repeat several times using different number combinations.

Scaffold Instruction

Purpose: Scaffolding at the abstract level of instruction should occur using the same process as scaffolding instruction at the concrete level of instruction (See the description of Scaffolding Instruction for "using concrete objects to solve two digit by one digit multiplication problems with regrouping" in the Concrete Level Instructional Plan). The steps used during Explicit Teacher Modeling should be used as structure for scaffolding your instruction.

HIGH

MEDIUM

LOW

1. Scaffold instruction using a high level of teacher direction/support (*Dependent on the needs of your students, you may want to continue to associate drawings at this level as described under Explicit Teacher

Modeling.) *Move to the next phase of scaffolding only when students demonstrate understanding and ability to respond accurately to your prompts.

2. Scaffold instruction using a medium level of teacher direction/support (*If you associated with drawings while scaffolding using a high level of teacher direction/support, then do not include them during this phase of scaffolding). *Move to the next phase of scaffolding only when students demonstrate understanding and ability to respond accurately to your prompts.

3. Scaffold instruction using a low level of teacher direction/support (*Students should actually solve problems as you prompt during this phase of Scaffolding Instruction.). *Move students to independent practice of the skill only after they demonstrate the ability to perform the skill with limited prompting from you.

Instructional Phase 2: Facilitate Acquisition to Mastery – Student Practice

Purpose: To provide students with multiple practice opportunities to recognize correct solutions to problems for multiplying two digit by one digit numbers with regrouping using the algorithmic process

Receptive/Recognition Level

Learning Objective 1: multiply two digit by one digit numbers with regrouping using algorithmic process.

Structured Cooperative Learning/Instructional Games

Materials:

Teacher -

- Sample of problem sheet

Students -

- **Set of problem sheets that each show a multiplication problem and three choices for answers**

Description:

Activity:

Children will work in groups of 4 or 5 students. Each group will have a set of problem sheets numbered 1-10.

The teacher will choose a problem 1-10. . Each team is to look at the correspondingly numbered problem sheet and decide which of the three given answers is correct. After the teacher rings the bell, one member of each team will come to the board and solve the problem. Teams can earn points for each correct decision.

Cooperative Learning Groups Steps:

- 1.) Provide explicit directions for the cooperative group activity including what you will do, what students will do, and reinforce any behavioral expectations for the game.
- 2.) Arrange students in cooperative groups. Groups should include students of varying skill levels.
- 3.) Assign roles to individual group members and explain them:
 - a. Materials manager (gets the materials)
 - b. Time keeper (makes sure that group stays on task)
 - c. Reporter (reports group's answer)
 - d. Encourager(s) (encourages each person)
- 4.) Distribute materials.
- 5.) Model one example of skill(s).
 - a. Look at problem.
 - b. Look at answer choices
 - c. Decide which is correct answer,
 - d. Make sure that the team agrees with the decision before time is called.
- 6.) Review/model appropriate cooperative group behaviors and expectations.
 - a. Agree or disagree with a teammate's decision.
 - b. Listen while teams are sharing decisions.
 - c. Attend to classmates showing examples on board.
- 7.) Provide opportunity for students to ask questions.
- 8.) Teacher monitors and provides specific corrective feedback & positive reinforcement.
 - a. Circulate around the tables and check on children's responses.
 - b. Make sure that each child receives feedback on his/her decision.
 - c. Ask each child in the class to share his/her decisions at least once either with the entire class or individually with the teacher.

Expressive Level

Purpose: To provide students with multiple practice opportunities to solve problems for multiplying two digits by one digit numbers with regrouping using the algorithmic process.

Learning Objective 1: Multiply two digit by one digit numbers with regrouping using algorithmic process.

Structured Language Experience

Materials:

Teacher –

- Several problems written on board
- Visual display of sample journal entry

Students –

- Math Journal
- Pen/pencil

Description:

Activity:

Teacher will write several problems on board. Students will choose one of the problems, and explain how to solve it in their journal. Teacher will ask selected children or volunteers to share their entries and solve the problem on the board.

Structured Language Experience” Steps:

- 1.) Review directions for completing structured language experience activity and relevant classroom rules.
- 2.) Model how to perform the skill(s) within the context of the activity *before* students begin the activity.
Model how to choose one of the problems. Think about how to solve it. Write the steps to solving it.
Check your work by actually solving it.
- 3.) Provide time for student questions.
- 4.) Signal students to begin.
- 5.) Monitor students as they work. Provide positive reinforcement for both “trying hard,” responding appropriately, and for students using appropriate behavior. Also provide corrective feedback and modeling as needed.

Instructional Phase 3: Evaluation of Student Learning/Performance (Initial Acquisition through Mastery/Maintenance)

Continuous Monitoring & Charting of Student Performance

Purpose: to provide you with continuous data for evaluating student learning and whether your instruction is effective. It also provides students a way to visualize their learning./progress

Materials:

Teacher –

- Appropriate prompts if they will be oral prompts
- Appropriate visual cues when prompting orally

Student –

- Appropriate response sheet/curriculum slice/probe
- Graph/chart

Description:

Steps for Conducting Continuous Monitoring and Charting of Student Performance:

- 1.) Choose whether students should be evaluated at the receptive/recognition level or the expressive level.
- 2.) Choose appropriate criteria to indicate mastery.
- 3.) Provide appropriate number of prompts in an appropriate format (receptive/recognition or expressive) so students can respond.
 - Based on the skill, your students' learning characteristics, and your preference, the curriculum slice or probe could be written in nature (e.g. a sheet with problems; index cards with problems and choices to match), or oral in nature with visual cues (e.g. show problems and have students tell you how to solve the problem) or a combination of written curriculum slices/probes and oral prompts with visual cues (e.g. teacher shows problems and answer choices on overhead and then prompts students to write solution to problem).
- 4.) Distribute to students the curriculum slice/probe/response sheets.
- 5.) Give directions.
- 6.) Conduct evaluation.
- 7.) Count corrects and incorrects/mistakes (you and/or students can do this depending on the type of curriculum slice/probe used – see step #3).
- 8.) You and/or students plot their scores on a suitable graph/chart.). A goal line should be visible on each students' graph/chart that represents the proficiency (near %100 accuracy with two or fewer incorrects/mistakes) and a rate (# of corrects per minute) that will allow them to be successful when using that skill to solve real-life problems and when using the skill for higher level mathematics that require use of that skill.
- 9.) Discuss with children their progress as it relates to the goal line and their previous performance. Prompt them to self-evaluate.
- 10.) Evaluate whether student(s) has mastered the skill at the abstract level using the following guide:
Abstract Level: demonstrates near %100 accuracy (two or fewer incorrects/mistakes) and a rate (# of corrects per minute) that will allow them to be successful when using that skill to solve real-life problems and when using the skill for higher-level mathematics that require use of that skill.
- 11.) Determine whether you need to alter or modify your instruction based on student performance.

Additional Assessment Activity Appropriate For This Math Skill/Concept

Error Pattern Analysis

Purpose: to provide you with additional diagnostic information in order to check student understanding and plan and/or modify instruction accordingly.

Materials:

- Problem sheets

Description:

Have students complete 5-8 problems. As the student works the problems, encourage him/her to talk about what they are doing. Do not cue student in any way. Record all student responses, verbal and written. Review responses and look for patterns. Also look for examples of "exceptions" to an apparent pattern (accurate exceptions may indicate that the student has partial understanding of the procedure or of a basic concept). Common errors for this skill may be the result of non-understanding of place value, inaccurate procedure/sequence of steps, non-understanding of regrouping, or insufficient mastery of basic multiplication facts.

After you have analyzed the problems for possible error patterns, you may want to interview the student using a Flexible Math Interview to gain further insight before planning how to modify or reteach the lesson.

Instructional Phase 4: Maintenance - Periodic Practice to Maintain Student Mastery of Skills

Purpose: to provide periodic student practice activities and teacher directed review of this skill after students have mastered it.

1. Problem of the Day

Materials

- Written display of problem
- Student response cards,

Description:

The teacher will present a problem of the day verbally and by displaying the written problem. Students will solve and turn in their response cards. This should initially be done each day, then 2 times/week, weekly, bi weekly, and then intermittently.

2. Multiplication Bingo

Materials

- Written problems on board
- Calculators
- Laminated Bingo cards with blank spaces
- Bingo counters (beans, chips, paper pieces)

Description:

Students will solve answers to problems on board. They will record their solutions of bingo cards, choosing where to put the answers. The teacher will randomly choose a problem to solve and once solved, any student who has the correction answer covers up a square.