Working with Cuisenaire Rods

I.   Number Ideas

A.   <u>Number Trains</u>

Have students build all the ways to make a rod of a given color. For example, what are all the ways to build the white rod, the red rod, the purple rod, and so forth. Have students write number sentences for each piece of their train. Look for patterns. Predict how many ways there are to create a rod of length n.

Literature Connections: Read *The King's Chessboard*, *The Rajah's Rice*, and *Two of Everything*. Have students complete the mathematics in the book (a nice way to use calculators). With *Two of Everything* you could have students create a table that shows the number of coins they would have after n times in the pot if they start with 5 coins. After how many times will they have over 1000 coins? What if the pot were a Three Pot? What if you started with 500 coins and had a Half Pot? After how many times would you have less than 50 coins?

B.   <u>Commutative and associative properties</u>

Use the rods to illustrate in a concrete manner the commutative and associative properties. (Another idea is to use human manipulatives for this -- have several students go the front of the room. Have students switch places or switch groupings to illustrate these properties.)

C.   <u>Fraction representation</u>

Arrange the rods in order; there are 10 different colors. Assign the value of 1 to the orange rod. Identify the values of the other rods.

Adjust the value of 1 -- that is redefine which rod is equivalent to 1. Find the values of the other rods.

(Notice that you can work on different denominators with the Cuisenaire rods than with the pattern blocks.)

D.   <u>Fraction operations</u>

Let the orange rod represent 1 unit. Use the rods to develop ideas related to equivalence.

Now consider using the rods to develop rules and procedures for adding and subtracting fractions.

Use the rods to help give meaning to division of fractions similar as discussed in the section on pattern blocks.

E.   <u>Pattern Ideas</u>

Use only the white cubes. Create a pattern that can be extended in a natural way. Build the first, second, and third figures in the pattern. For each, determine the number of white rods needed to build the figure. How many white rods would be needed to build the next figure in the pattern? What about the next? Test your predictions by actually building the figures. Describe a pattern that would make it easy to determine the number of white rods needed to build the 100th figure in the pattern.

Literature connection: Read *Anno's Magic Seeds*. Have students keep track of the patterns in the story and determine the number of seeds that are buried, then produced, and then eaten in any given year.

II.   **Measurement**

A.   <u>Measuring Lengths</u>

The length of one edge of the white rod is 1 centimeter. Find the lengths of the longer edges in the other rods. Use the rods to measure the lengths of objects in the room, such as a table.

B.   <u>Perimeter and area ideas</u>

Because perimeter and area deal with issues in two dimensions and the rods are three-dimensional, it is important that students realize that area and perimeter issues are related to the two-dimensional space covered up by the rods.

Have students build figures using the black, the red, and the dark green rods. Make different figures using the same three rods. Find the perimeter of each figure. Find its area.

C.   Volume

Use the white rod to introduce the concept of volume. Identify the volume of the white rod as 1 cubic unit. Have the students build figures of their own choosing or following a specific pattern you provide. Have them find the volume of each figure by determining the number of cubic units it holds.

D.   Surface Area

Identify the face of one of the white cubes as 1 square unit. Have students build figures using a variety of rods. Have students determine the surface area of the figure as well as its volume.

E.   Formula for the volume of a box

Have students use the white cubes to build boxes (rectangular prisms) of given dimensions. Determine the volume of each. Have students record the data and then look for patterns to develop the formula for finding the volume of a box.

length	width	height	volume
3	4	2	
1	2	4	
3	2	5	

References

Charles, Linda Holden and Micaelia Randolph Brummett. *Connections: Linking Mathematics with Manipulatives.* Sunnyvale, CA: Creative Publications, 1989.

Marilyn Burns Manipulative Videos (Cuisenaire Rods)

Learning with Cuisenaire Rods by Cuisenaire

Addenda books from NCTM (There is one book for each grade K-6, as well as books by strand: *Patterns*, *Making Sense of Data*, *Number Sense and Operations*, *Geometry and Spatial Sense.*)