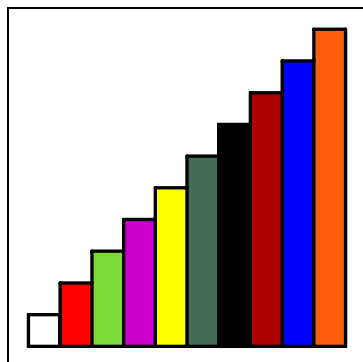


TIPS for Manipulatives

RELATIONAL RODS



What are they?

Relational rods are rectangular solids with related lengths. A set usually contains between 70 and 80 rods. In a set, all rods of the same length are the same colour. The smallest rod is a 1 cm^3 cube. The largest of the 10 rods has a volume of 10 cm^3 , it is ten times as long as the small cube. The lengths of the different coloured rods increase incrementally from the smallest size to the largest size.

How do they help students?

Relational rods help students visualize mathematical concepts. They are primarily used to help students develop understanding of fractions and proportional reasoning. However there are many ways relational rods can be used in all of the mathematics curriculum strands. Since the rods' attributes can be used for length, area and volume, ensure that students understand which attribute is being used in the problem.

How many are recommended?

One set of rods per pair of students is ideal however students can make effective use of the rods in groups of four. Paper versions can be made for home activities. When relational rods are first introduced, allow students time to explore their attributes and the relationships between rods. A transparent set is useful for overhead demonstrations by students and/or teachers. Students can use any square grid paper to record solutions but 1-cm grid paper is particularly useful. Many activities can also be done with trains of 1 to 10 connecting cubes.

What are some sample activities?

1. Build a staircase (see picture). What is the total volume? Determine the volume if there are 100 "steps".
2. Create a structure or design. Hide it from your partner's view then describe it so your partner can build it.
3. How many different ways can you make "trains" that have the same length as one yellow rod? (e.g. 1 purple and 1 white, or 2 reds and 1 white).
4. Describe the relationship between one purple rod and one dark green rod.
5. Jake has 1 white rod and 1 red rod. Taz has 1 orange rod and 1 yellow rod. Make a list of comparisons between their two sets.
6. Jasm has a train of 4 white rods and a train of 2 red rods. She writes the equation $4w = 2r$ to algebraically model what she sees. Explain the connection between the train model and the algebraic model.
7. What does one green rod represent if one red rod represents one-half? (or vice-versa).
8. Terry represents the fraction two-thirds by placing a red rod on top of a light green rod. Use the relational rods and Terry's method to build different models of two-thirds.
9. Use the length of the yellow rod as a unit of measure. Measure the width of this page. Now measure the width of this page using the red rod. Can you determine the answer without actually measuring?
10. Use five different rods and 1-cm grid paper. Place the rods to create a shape that can be cut from the paper. Challenge a classmate to determine how you created the shape. Can other shapes be created using the same rods so that the shapes have the same perimeter? area? Which shape has the greatest perimeter?
11. Create a pattern, Extend the pattern. Develop a rule for the pattern.
12. Create a pattern. Draw a reflection of the pattern.

Are there any recommended websites?

- <http://www.arcytech.org/java/integers/integers.html> - virtual relational rods
- <http://teachertech.rice.edu/Participants/silha/Lessons/cuisen2.html> - fractions with relational rods
- http://www.learner.org/channel/courses/learningmath/number/session8/part_b/ - fractions with relational rods
- http://www.learner.org/channel/courses/teachingmath/grades6_8/session_02/section_02_h.html - communication
- <http://mason.gmu.edu/~mmankus/Handson/crods.htm> - template for making relational rods
- <http://www.nzmaths.co.nz/Measurement/Length/Pythagoras.htm> - pythagorean theorem with relational rods