Building Rafts with Rods
Teacher Directions

Overview

Students will work in groups to find the surface area and volume for different size "rafts" that are built with Cuisenaire Rods. Their results will be recorded in a table and then used to identify a pattern to complete the table for the remaining unbuilt rafts. Additionally, students are challenged to develop an explicit formula for the surface are and volume of the *nth* raft. Finally, the students create graphs that represent the data in their table.

Materials

1. Variety of Cuisenaire Rods (each group should be given 10 of one color rod)

2. Table Recording Worksheet (Optional- student may create their own table)

3. Graph paper (this may be regular size and then be projected for sharing or poster size graph paper may be used)

4. Calculators

Teacher Notes

1. Introduce task to students

   - Create all possible one-color rafts for your given Cuisenaire Rod
   - Create a table to represent the surface area and volume for rafts1 through 10, raft 12, raft 25, and raft *n*
   - Create graphs to represent the surface area and volume
   - Write a good mathematical explanation using appropriate mathematics vocabulary (explain what and why)

2. Model the building of a raft and review the meanings of volume and surface area.

3. As students begin to work, ensure that all groups understand the task. Of some groups are having difficulty starting try prompting:

- Can you show me the second raft?
- What is the volume o the second raft? How did you find it?
- What is the surface are of the second raft? How many surfaces will you need to account for?
- What unit How may square centimeters are on the top?

4. Monitor student work- giving students the opportunity to verbalize their thinking and relate their models to the mathematics. Students should strengthen their understanding of the difference between surface are and volume, how to calculate each and the meaning behind the units associated with each.

5. As students begin to look for a pattern, they will likely quickly find it in an *explicit* manner, moving across each row, using the number rods to find the volume. For the surface area students use a *recursive* method, finding the relationship between the surface areas moving vertically down the table. Assist students in finding the explicit rule for surface area.

6. Allow students to determine what kind of graphs they will create.

7. Allow students to study the various graphs. Teacher may introduce terms of linear and slope as relationships among different raft colors are analyzed. Students may be asked to do the following:

- Determine if the graph indicates a linear relationship.
- Show where the information is represented in the table and on the model.

References
Annenberg Media. 1997. Teaching Math: A Video Library,5-8. Boston: Annenberg Media.
http://www.learner.org/channel/courses/teachingmath/grades6_8/session_04/section_01_a.html
Hartweg, Kim.2011. "Representations & Rafts." *Mathematics Teaching in the Middle School* (August):40-47.

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- Create a table to represent the surface area and volume for rafts1 through 10, raft 12, raft 25, and raft *n*

- Create graphs to represent the surface area and volume

- Write a good mathematical explanation using appropriate mathematics vocabulary (explain what and why)

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Group Members _____

Rod Color: _____

# of Rods	Volume	Surface Area