PRACTICE TASK: Breakfast for All

Adapted from K-5 Math Teaching Resources

STANDARDS FOR MATHEMATICAL CONTENT

MCC5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

MCC5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

MCC5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole- number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

STANDARDS FOR MATHEMATICAL PRACTICE

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

BACKGROUND KNOWLEDGE

Students should have had practice figuring the volume of rectangular prisms. In addition, they should be familiar with the terminology "half the size of" and "three times the size of" and be able to determine relative dimensions. They should also be able to determine the correct unit of measure for given item (centimeters/inches or meters/feet/yards)

Common Misconceptions:

Students may believe that in order to make the boxes "half the size" or "three times the size" they need to adjust each dimension (length, width, height) by half or three times. They need to investigate how the total volume is affected by changing the dimensions and determine "half" and "three time" by calculating total volume.

ESSENTIAL QUESTIONS

- Why did you choose the unit of measure you did?
- How did you determine the sizes for the mini-sized box and the super-sized box?

MATERIALS

- Ruler
- Grid paper

GROUPING

Individual/Pairs

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task, students will be designing three different sizes of cereal boxes. They will need to determine the dimensions for the original box and then use the appropriate operations to enlarge or reduce the size of the original box to meet the specifications of the manufacturer.

Comments: You could begin this task by showing several cereal boxes and asking them to estimate the dimensions of the box. They could even measure a cereal box to find out what the appropriate dimensions could be.

Task Directions: Design the packaging for a new breakfast cereal in three different sized boxes. Draw a design for each box. Label the dimensions and calculate the volume of each one.

FORMATIVE ASSESSMENT QUESTIONS

- How do you know what unit of measure to use?
- Is your answer reasonable? How do you know?

DIFFERENTIATION

Extension:

- Have students produce a model of the standard box and create a name for the new cereal and artwork to advertise it.

Intervention:

- Students may work with partners.
- Students may use calculators.

Name _____ Date _____

Breakfast for All

You have been asked to create the packaging for a new kind of cereal. The manufacturer wants three different sized boxes:

1. A standard sized cereal box
2. A mini sized box that is half as tall, half as wide, and half as deep as the standard size
3. A super sized box that is three times as tall, three times as wide and three times as deep as the standard size.

Using grid paper, draw a possible design for each box. Label the dimensions and calculate the volume.

Which box do you think would be the best seller? Write your answer on the lines below and tell why you think so.