

Measuring Volume and Surface Area - Real Life Examples

STRAND: Measurement and Geometry

STRAND CONCEPT: Volume and Surface Area

SOL 7.4a, 7.4b

Remediation Plan Summary

Students measure the volume and surface area of real-life examples of rectangular prisms and cylinders to solve practical problems.

Common Misconceptions

Students have difficulty with volume measurement. They treat three-dimensional figures as two-dimensional ones. Students have difficulty with creating the arrays that fill the prism. Students often don't understand the relationship of the formula and the counting of the cubes.

Materials

- Real-life examples of rectangular prisms and cylinders, such as cereal boxes, paint cans, gelatin boxes, soup cans, tissue boxes, potato chip canisters, and vegetable cans
- Metric tape measures
- Copies of the Grade 7 Mathematics Formula Sheet
- Copies of the attached "Solid Situations Task Cards"

Introductory Activity

1. Give copies of the Grade 7 Mathematics Formula Sheet to the students, and write the formulas for the volume and surface area of a rectangular prism and a cylinder on the board.
2. Have each student select one rectangular prism and one cylinder from the items on display, for example, a tissue box and a soup can. Discuss volume and surface area as demonstrated by these items. Review measuring volume by multiplying the area of the base by the height. Review measuring surface area by adding up the areas of all of the shapes (faces) that make up the net.
3. Have students point to all of the shapes that make up the net of a rectangular prism (six rectangles). Have students identify the areas that make up the surface of the cylinder (two circular bases and one rectangle whose length is the circumference of the base and whose width is the height of the cylinder).
4. Follow with a matching game. Hold up each example of a rectangular prism and each example of a cylinder, and call out a surface area or volume situation. Ask students to match the situation to the correct measurement formula. For example, ask: "What is the minimum amount of wrapping paper needed to cover this box? Which formula would help you measure this?"

Plan for Instruction

1. Distribute copies of the “Solid Situations Task Cards” to the class. Have students cut out the cards and work individually to solve them.
2. When all students are finished, have them share their solutions and methods.

Pulling It All Together (Reflection)

Have students make a foldable two-tab concept map for measurement of surface area and volume. This is done as follows:

- Fold a sheet of paper in half.
- Cut a line down one of the halves to the center creating two flaps.
- Label one flap “surface area” and one flap “volume.”
- Under the surface area flap, sketch the nets for a rectangular prism and cylinder with formulas and an example.
- Under the volume flap, create a 3-D sketch of a rectangular prism and cylinder with formulas and an example.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Name: _____

Solid Situations Task Cards

Cut out the task cards below and solve. Record your solutions and strategies in your own words. Prepare to share your solutions and methods with the class.

Note: for pi, use $\pi \approx 3.14$.

<p>You are entering a pancake-eating contest! Each plate has a stack of pancakes 9 cm high. Each pancake has a diameter of 5 cm. If your stomach can hold about 1 liter (1,000 cubic centimeters), about how many plates of pancakes can your stomach hold?</p>  <p>Solution in numbers:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Strategy in words:</p> <p>_____</p>	<p>How much apple cider can a barrel that is 30 inches high hold? The radius of the barrel is 16 inches.</p>  <p>Solution in numbers:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Strategy in words:</p> <p>_____</p>
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Which rectangular cake gives you more to eat—a vanilla cake measuring 8 in. x 11 in. x 3 in., or a chocolate cake measuring 9 in. x 12 in. x 2 in.?



Solution in numbers:

Strategy in words:

Which can of mixed nuts give you the most—a blue can with a radius of 5 cm and a height of 10 cm, or a red can with a radius of 4 cm and a height of 12 cm?



Solution in numbers:

Strategy in words:

Hannah is wrapping a gift whose dimensions are 17 inches wide by 5 inches wide by 4 inches high. What is the minimum amount of paper she will need to cover the entire box?



Solution in numbers:

Strategy in words:

Cole is planning to cover a drum in leather. The diameter of the drum is 10 inches, and its height is 16 inches. What is the minimum amount of leather Cole will need?



Solution in numbers:

Strategy in words: