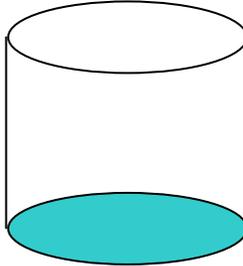


Math by Design
Lesson Plan: Volume of a Cylinder

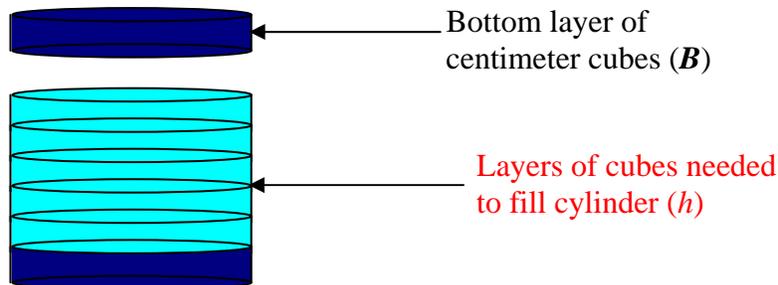
National Standard: <u>Measurement</u> : Apply appropriate techniques, tools, and formulas.../solve problems involving scale factors, using ratio and proportion
MD Standard 2: <u>Knowledge of Measurement</u>
MD Topic C: Applications in Measurement
MD Indicator 1: Estimate and apply measurement formulas
MD Objective c: Estimate and determine the volume of a cylinder
Materials and/or Set Up: Clear plastic cylinder, centimeter cubes
Relevant Vocabulary: Cylinder, base, height, circle, radius, diameter, area, volume
Note to Teacher: This lesson is designed to be used in conjunction with the online interactive activity at http://mathbydesign.thinkport.org .

Suggested Activities:

- Demonstrate finding the volume of a cylinder by using a clear plastic cylinder and some centimeter cubes. Ask the students how they could determine the number of cubes needed to fill the cylinder. Lead them to the conclusion that they need to find the number of cubes needed to cover the base first. Ask the students what type of geometric figure is the base and what is the formula for calculating its area? (*The base is a circle. The formula is $A = \pi r^2$.*)



- By determining the number of centimeter cubes in the bottom layer, students can then build up additional layers each having the same number of cubes to determine the total volume. Multiplying the number in each layer by the number of layers provides the total.



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- Assist students in transitioning from the concrete example to the words and then to the formula as shown below.

Volume of Cylinder = (Number of cubes on bottom layer)(number of layers of cubes)

Volume of Cylinder = (Area of Base) (height of cylinder)

Volume of Cylinder = (B) (h)

or

Volume of Cylinder = (πr^2) (h)

- Provide practice in calculating the volume of various cylinders. Be sure that students understand the difference between the exact answers in terms of pi and the decimal approximations typically used for the answers.

Differentiation Suggestions:

- Students have probably already learned to calculate volumes of rectangular prisms. Help them to understand that the formula $V = \text{Area of Base times height of figure}$ (often written as $V = Bh$) applies to cylinders as well as to prisms.

Assessment:

- What is the volume of a cylinder that has a radius of 12 cm and a height of 15 cm?
Answer: The volume is about 6785.8 cm^3 . (Using 3.14 as the value for pi, $V = 6782.4 \text{ cm}^3$.)

Follow Up:

- Have students compare the volumes of cylinders when the measure of the height is doubled. Then compare volumes when the measure of the radius is doubled. Facilitate a discussion about the results.