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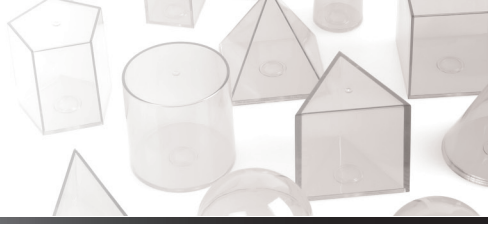
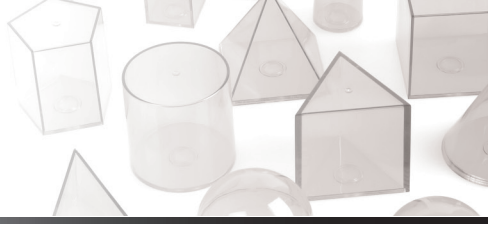


About the Author

Bob Robinson is a mathematics education consultant. He is a former member of the Board of Directors for the National Council of Teachers of Mathematics (NCTM) and is actively involved on the board of the Washington State Mathematics Council (WSMC). Bob is also a member of the Association of State Supervisors of Mathematics (ASSM) and the National Council of Supervisors of Mathematics (NCSM) as well as an honorary lifetime member of the Ontario Association for Mathematics Educators (OAME) and a lifetime member of the Ontario Mathematics Coordinators Association (OMCA). Bob speaks at local, state, provincial, national and international conferences about the use of mathematics manipulatives. He has authored several textbooks and other support materials pertaining to mathematics education. In 2006, Bob was the recipient of the award for the "Male Mathematics Educator of the Year" by the WSMC.

4.2 Volume: Filling Method



2. **Volume Relationships of the Volumes of Rectangular Prisms (including the cube)**
By filling each of the solids observe how each of the volumes compare. Write the comparisons in words.

In preparation for these investigations place masking tape marked in fourths (¼ or 0.25) on a vertical edge of the rectangular prisms except for the small cube.

a) The volume of the small cube and the square prism.

b) The volume of the square prism to the volume of the rectangular prism.

c) The volume of the rectangular prism to the volume of the large cube.

d) Based on the volume relationships you discovered. How do the following compare?

i) The volume of the square prism and the large cube

ii) The volume of the small cube and the large cube.

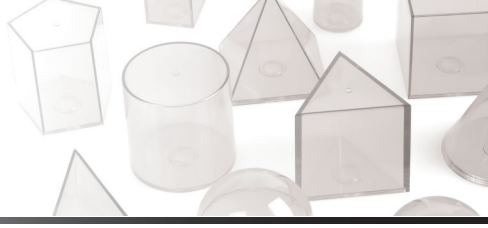
3. **Volume Relationships of the other Pyramids and Prisms**

Preparation
Place masking tape marked in **thirds** on the large triangular prism. Place masking tape marked in thirds on the large cylinder, large triangular prism, and large cube.

Write about the following relationships. Some of these will help us later develop formulas for calculating volumes.

a) Predict how the volume of the small triangular prism compares with the volume of the large triangular prism. Compare their volumes. How close were you? Explain the relationship.

5.4 Volume Formulas: Simplified



We have investigated the volume relationship of different solids from the **Volumetric Solids** set. From our discoveries we developed a formula for a specific figure. We will now examine those volume formulas by first revisiting our discoveries and the related formula. We will investigate if there is a simplified formula. In some cases we will use algebra skills.

Prisms

1. What is a general formula that can be used to calculate the volume of any prism? Be careful to state what each symbol in your formula represents.

This formula applies to the volume of any prism but, of course, the formula for finding the area of the base (B) will differ.

2. To calculate the volume of the rectangular prism $V = Bh$ could become $V =$ _____

3. The volume of a square prism is $V = Bh$ which could be written as $V =$ _____

4. How could you rewrite the formula $V = Bh$ for the cube? Explain.

5. The formula for the triangular prism is $V = Bh$ where B represents the area of the base and h represents the height of the prism.

Rewrite this formula to include the formula for calculating the area of the triangular base $V =$ _____

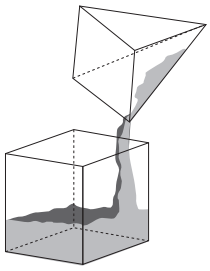
Cylinders

1. The general formula for calculating the volume of prisms also applies to calculating the volume of cylinders. Write this formula $V =$ _____

2. Rewrite this general formula to include the formula for finding the area of the base.
$V = Bh$ or $V =$ _____

Pyramids

In our earlier investigations we found that the volume of pyramids were what fraction of the corresponding volume of a prism with the same base and the same vertical height.



1. Write a general formula for finding the volume of a pyramid. $V =$ _____

Formulas for calculating the areas of the bases (B) of pyramids differ because of their different shapes.