

Parent Newsletter

Chapter 8: Volume and Similar Solids

Key Terms

A **sphere** is the set of all points in space that are the same distance from a point called the *center*.

A **hemisphere** is one-half of a sphere.

Similar solids are solids that have the same shape and proportional corresponding dimensions.

Standards

Common Core:
8.G.9: Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Students will...

- Find the volumes of cylinders.
- Find the heights of cylinders given the volumes.
- Find the volumes of cones.
- Find the heights of cones given the volumes.
- Find the volumes of spheres.
- Find the radii of spheres given the volumes.
- Identify similar solids.
- Use properties of similar solids to find missing measures.
- Understand the relationship between surface areas of similar solids.
- Understand the relationship between volumes of similar solids.
- Solve real-life problems.

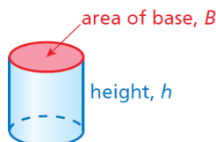
Key Ideas

Volume of a Cylinder

- The volume V of a cylinder is the product of the area of the base and the height of the cylinder.

$$V = Bh$$

Area of base Height of cylinder

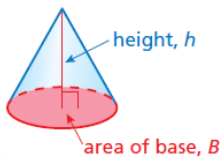


Volume of a Cone

- The volume V of a cone is one-third the product of the area of the base and the height of the cone.

$$V = \frac{1}{3}Bh$$

Area of base Height of cone

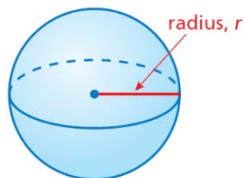


Volume of a Sphere

- The volume V of a sphere is the product of $\frac{4}{3}\pi$ and the cube of the radius of the sphere.

$$V = \frac{4}{3}\pi r^3$$

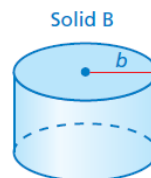
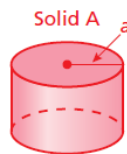
Cube of radius of sphere



Surface Areas of Similar Solids

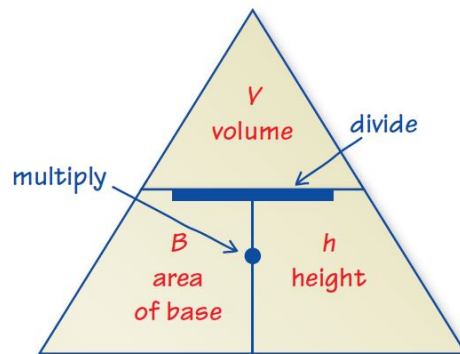
When two solids are similar, the ratio of their surface areas is equal to the square of the ratio of their corresponding linear measures.

$$\frac{\text{Surface Area of A}}{\text{Surface Area of B}} = \left(\frac{a}{b}\right)^2$$



Reference Tools

A **Formula Triangle** can be used to arrange variables and operations of a formula. Divide a triangle into the same number of parts as there are variables and factors in a formula. Then write the variables and factors in the parts of the triangle and place either a multiplication or a division symbol, as appropriate, between the parts. This type of organizer can help your student learn the formulas as well as see how the variables in the formulas are related. Place formula triangles on note cards to use as a quick study reference.

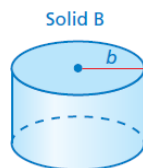
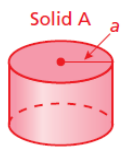


Key Ideas

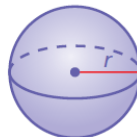
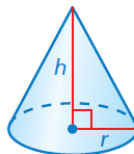
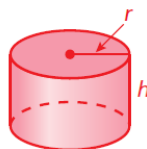
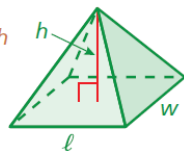
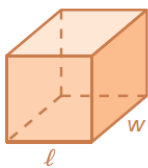
Volumes of Similar Solids

When two solids are similar, the ratio of their volumes is equal to the cube of the ratio of their corresponding linear measures.

$$\frac{\text{Volume of A}}{\text{Volume of B}} = \left(\frac{a}{b}\right)^3$$



Linear Measures



Essential Questions

How can you find the volume of a cylinder?

How can you find the volume of a cone?

How can you find the volume of a sphere?

When the dimensions of a solid increase by a factor of k , how does the surface area change? How does the volume change?

Quick Review

- To find the area of a composite figure, find the sum the areas of the basic figures.
- Pi (π) is the ratio of a circle's circumference (perimeter) to its diameter. This ratio is constant regardless of the size of the circle.
- Area is measured in square units. Volume is measured in cubic units.
- Volume = Bh is the general formula for both prisms and cylinders. The base of a cylinder is a circle, so the general formula can be rewritten as the specific formula $V = \pi r^2 h$.
- The *height* of a cone is the perpendicular distance from the base to the vertex.
- When the dimensions of a solid are multiplied by k , the surface area is multiplied by k^2 and the volume is multiplied by k^3 .

What's the Point?

The ability to understand and use volume is very useful in real life for events like marketing and packaging food. Have your student measure a few different shaped packages at the grocery store. How much can the containers hold? Why might the calculated volume be different from the actual amount in the package?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 8: Canning Salsa STEM Video is available online at www.bigideasmath.com.

