

6.02 Applications of Volume

Formula Review Video [Click Here](#)

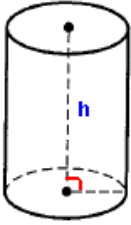
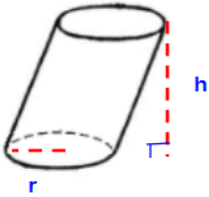
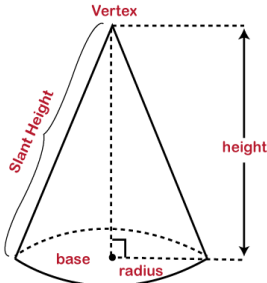
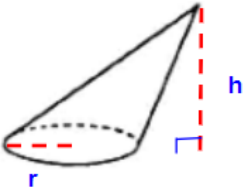
Volume of a Cylinder or Prism: $V = (B)(h)$ Cylinder: $V = \pi r^2 h$	Volume of a Cone or Pyramid: $V = \frac{1}{3} (B)(h)$ Cone: $V = \frac{1}{3} \pi r^2 h$	Volume of a sphere: $V = \frac{4}{3} \pi r^3$
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Percent Change Review Video [Click Here](#)

We can write scale factors in terms of percents by multiplying by _____. Scale factor(k) = .80 Percent = (.80)(100) = 80% Scale factor(k) = 1.75 Percent = (1.75)(100) = 175% A percent _____ occurs when the size of a figure is increased by a certain percentage from its original size. A percent _____ occurs when the size of a figure is decreased by a certain percentage.	Example: The dimensions of a cube are 75% of the original. Scale Factor: _____ Example: Joe has a cube box, but wants to increase the dimensions by 25%. What is the percent of change of the dimensions? Joe's new box's dimensions are _____% the size of the original. Example: George has a cube box, but wants to decrease the dimensions by 25%. What is the percent of change of the dimensions? George's next box dimensions are _____% the size of the original.
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Right versus Oblique Video [Click Here](#)

Cylinders and cones can be considered _____ or _____. Let's look at the difference:
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Right Cylinders In a right cylinder, the height or _____ can be drawn so that it connects the _____ of the circular bases.	 $V = \pi r^2 h$
Oblique Cylinders In an oblique cylinder, the height or altitude _____ be drawn so that it connects the centers of the circular bases.	 $V = \pi r^2 h$
Right Cones In a right cone, the height or altitude can be drawn so that it connects the _____ of the cone with the center of the base.	 $V = \frac{1}{3} \pi r^2 h$
Oblique Cones In an oblique cone, the height or altitude _____ be drawn so that it connects the tip of the cone with the center of the base.	 $V = \frac{1}{3} \pi r^2 h$

Application of Volume Examples

Application Problem 1 Video [Click Here](#)

A cylindrical vase has a diameter of 8 inches. At the bottom of the vase, there are 6 marbles, each marble has a diameter of 4 inches. The vase is filled with water up to a height of 12 inches.

What is the volume of the water in the vase?

Application Problem 2 Video [Click Here](#)

The Great Pyramid of Khufu is a square pyramid. The lengths of the base edges are 755ft. The original height was 481 ft. Over time, the Great Pyramid of Khufu has gotten shorter. Its current height is 449 ft. How much volume has been lost over the years?

Application Problem 3 Video [Click Here](#)

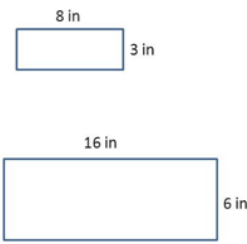
A farmer wants to fill his silo with grain. Find the volume of the silo pictured below. The radius of the cylinder is 10 feet and the height is 30 feet. The radius of the cone is 10 feet, and its height is 10 feet. Use 3.14 for pi, and round your answers to the nearest hundredth.

**Application Problem 4** Video [Click Here](#)

Sheryl and Charlie are playing a game where you must fill up a large container with water. Sheryl has a cone shaped cup with a height of 8 inches and will hold volume of 95 inches cubed. If Charlie has a cylindrical cup with the same base area as Sheryl and will hold the same volume of water, what is the height of Charlie's cup?

Dimensional Change Video [Click Here](#)

When we change the dimensions of a 2D or 3D figure, the area & volume also changes. When we multiply _____ of a 2-D figure's dimensions by a _____, similar figures are formed. The dimensions change in a 1:1 ratio, however, the ratio for the areas will _____ stay in a 1:1 ratio.

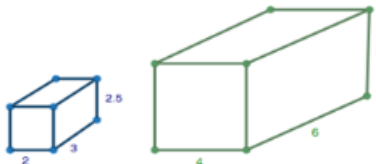
2D figures	Scale Factor(k)	Ratio	Ratio in General terms
			
Dimensions (side length)		_____ : _____	_____ : _____
Perimeter		_____ : _____	_____ : _____
Area		_____ : _____ or _____ : _____	_____ : _____

When ALL of a 2D figure's dimensions are multiplied by a scale factor, we have changed _____ measurements on the figure. Therefore, the _____ will change by the scale factor _____.

Be careful with perimeter! Even though we are changing multiple dimensions, we are only _____, not multiplying, when we calculate perimeter. Therefore the scale factor stays in a 1:1 ratio for perimeter.

Dimensional Change with 3D figures Video [Click Here](#)

When _____ of a 3D figure's dimensions are multiplied by a scale factor, we have changed _____ measurements on the figure. Therefore, the _____ will change by the scale factor _____.

3D figures	Scale Factor (k)	Ratio	Ratio in General terms
			
Dimensions (side length)		_____ : _____	_____ : _____
Volume		_____ : _____ or _____ : _____	_____ : _____

In Summary:

Dimensions: $a:b$ or $\frac{a}{b}$

Area: $a^2:b^2$ or $\frac{a^2}{b^2}$

Volume: $a^3:b^3$ or $\frac{a^3}{b^3}$

Dimensional Change (cont.)

Dimensional Change (cont.) Video [Click Here](#)

A change in dimensions can be represented by a scale factor, a ratio, a proportion, or a _____.

Remember, if we wanted our new shape to be 1.4 times larger, we would increase each dimension.

For example, the volume of a rectangular prism is

$$V = lwh$$

The new volume after increasing each dimension is:

$$V = (1.4l)(1.4w)(1.4h)$$

$$V = (1.4^3)lwh$$

$$V = (2.744)lwh$$

We can write this relationship as:

- Scale Factor: _____
- Ratio: _____ : _____
- Percent: _____
- Proportion: _____

Practice:

Question 1 Video Click Here	Question 2 Video Click Here
Cylinder A has a volume of 48 cubic meters. Cylinder B is similar to cylinder A. To create cylinder B, cylinder A's dimensions were doubled. What is the volume of cylinder B?	Pyramid A is a square pyramid with a base side length of 10 inches and a height of 12 inches. Pyramid B has a volume of 2050 cubic inches. How many times bigger is the volume of pyramid B than pyramid A? Give your answer as a percent.
Question 3 Video Click Here	Question 4 Video Click Here
Betty Crocker is increasing the size of the vanilla frosting can. The volume of the current can is 35.325 inches cubed. The dimensions of the original can will be increased by a scale factor of 1.2 to create a super sized frosting. How much more frosting will be in the new container?	A decorative sphere has a diameter of 27 inches. An artist wants to make a clay sculpture modeling the sphere whose dimensions are 40% of the original sphere. What is the volume of clay needed for the sculpture? Use 3.14 for π and round your answer to the nearest tenth.