3
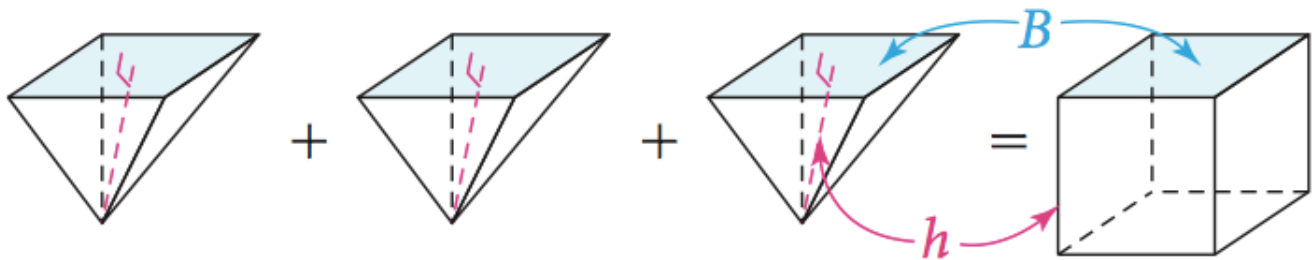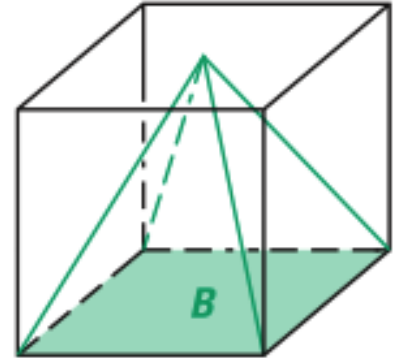
You learned that the volume of a prism is equal to Bh, where B is the area of the base and h is the height. From the figure at the right, it is clear that the volume of the pyramid with the same base area B and the same height h must be less than the volume of the prism. The volume of the pyramid is one-third the volume of the prism.

The same relationship is true of a cone and a cylinder with the same radius and height.

The volume of the pyramid with the same base area B and the same height h must be less than the volume of the prism. The volume of the pyramid is one third the volume of the prism.
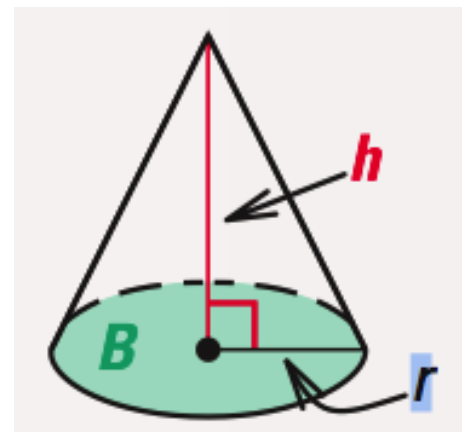
To determine the volume of a right prism, determine the area of the base and multiply it by the height.
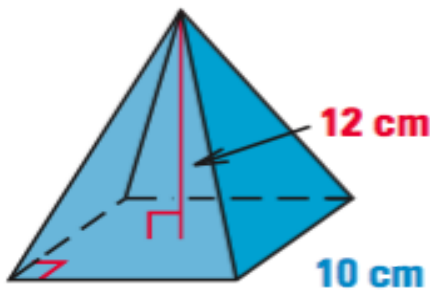
$$\frac{1}{3} A_B \bullet h$$
(1/3 AREA OF THE BASE • HEIGHT)

EXAMPLES

Find the volume figure below:

12 cm

10 cm

Given:

h = 12 cm

s = 10 cm

$B = 10(10) = 100$

Volume:

$$V = \frac{1}{3} A_B h$$

$$V = \frac{1}{3}(100)(12)$$
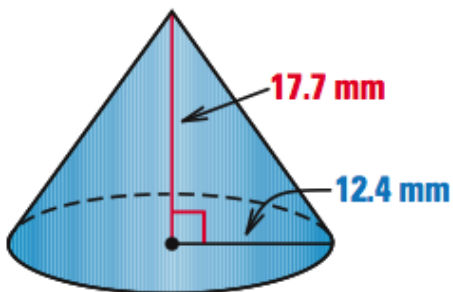
$$V = 400 cm^3$$

VOLUME OF A CONE

$$\frac{1}{3} \pi r^2 \bullet h$$
(1/3 AREA OF THE BASE • HEIGHT)

Find the volume figure below:

17.7 mm

12.4 mm

Given:

h = 17.7 mm
r = 12.4 cm

$B = \pi r^2$

$B = \pi(12.4)^2$

$B = 153.76\pi mm^2$

Volume:

$$V = \frac{1}{3} A_B h$$
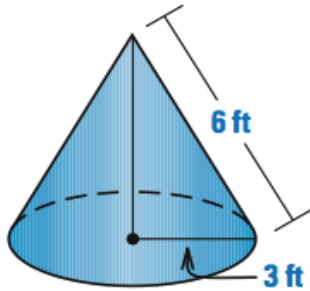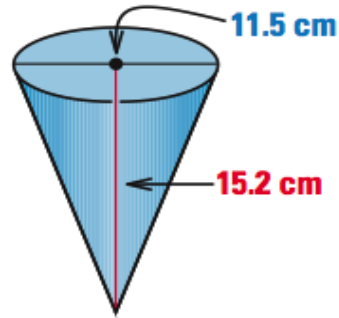
$$V = \frac{1}{3}(153.76\pi)(17.7)$$

$$V = 907.18\pi mm^3$$

Find the Volume of the following. Write complete solutions and answers in terms of π, then use π in your calculator and round off **final** answers correct to two decimal places.

1.

6 ft

3 ft

2.

11.5 cm

15.2 cm

3.

8 in.

9 in.

9 in.

4.

9 ft

10 ft

10 ft

Solve the following problems completely. Write complete solutions and answers in terms of π, then use π in your calculator and round off **final** answers correct to two decimal places.
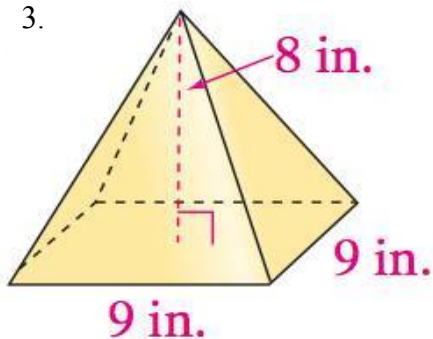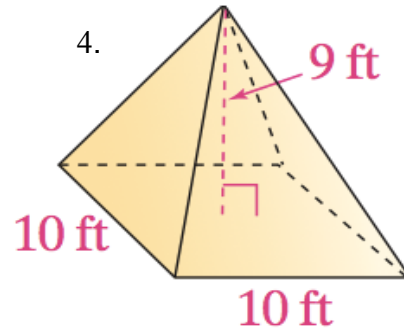
1) How much frozen yogurt can you pack inside a cone that is 5in. high with a radius of 1.25 in?

2) The eight segments from the center of a cube to the eight corners of the cube form the edges of six pyramids. If one edge of the cube is 4 in., what is the volume of each pyramid, to the nearest cubic inch?

3) A water storage tank with a roof that is in the shape of a cone has a diameter of 10 ft. The height of the cylindrical part of the tank is 15 ft. The slant height of the roof is 8 ft.

    a. What is the radius of the tank?

    b. What is the lateral area of the cylindrical part of the tank?

    c. What is the surface area of the entire tank?

4) A cone-shaped paper cup is 7 cm high with a diameter of 6 cm. If the ivy plant on Julia's desk needs 240 mL of water, about how many paper cups of water will she use to water it? (1 mL = 1 cm^3)

5) The Louvre Pyramid in Paris has a square base with sides 112 feet long. If the volume is 296,875 cubic feet, find the height of the pyramid.

6) A model of a volcano constructed for a science project is cone-shaped with a diameter of 8 inches. If the volume of the model is about 201 cubic inches, how tall is the model?