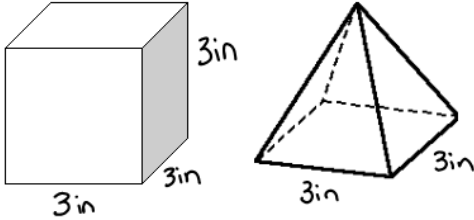


Volume of Pyramids and Cones

How do we find the volume of a pyramid? Use your knowledge of prisms...



In a polyhedron, any face that is not a base is called a **lateral face**. The lateral faces of a pyramid meet at a common vertex. The height of a pyramid is the distance from the vertex perpendicular to the base.

$$V_{\text{pyramid}} = \frac{1}{3} V_{\text{prism}}$$

w/ same dimensions

$$V_{\text{cube}} = 3^3 = 27 \text{ m}^3$$

$$V_{\text{pyramid}} = \frac{3^3}{3} = 9 \text{ m}^3$$

Examples

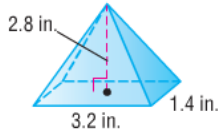


1. Find the volume of the pyramid. Round to the nearest tenth.

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

$$V = \frac{1}{3} \times 3.2 \times 1.4 \times 2.8$$

$$= \frac{12.544}{3} \approx 4.2 \text{ in}^3$$



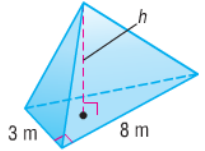
4. A triangular pyramid has a volume of 44 cubic meters. It has an 8-meter base and a 3-meter height. Find the height of the pyramid.

$$B = \frac{8 \cdot 3}{2} = 12 \text{ m}^2$$

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

$$44 = \frac{1}{3} \cdot 12 \cdot h$$

$$\frac{44}{4} = \frac{4h}{4} \Rightarrow h = 11 \text{ m}$$



Got It? Do this problem to find out.

a. Find the volume of a pyramid that has a height of 9 centimeters and a rectangular base with a length of 7 centimeters and a width of 3 centimeters.

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

$$V = \frac{7 \cdot 3 \cdot 9}{3} = 7 \cdot 9 = 63 \text{ cm}^3$$

Got It? Do these problems to find out.

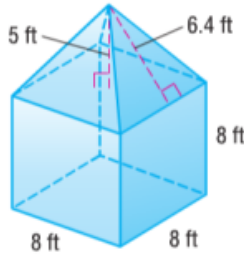
c. A rectangular pyramid has a volume of 525 cubic feet. It has a base of 25 feet by 18 feet. Find the height of the pyramid.

$$B = 25 \cdot 18 = 450 \text{ ft}^2$$

$$525 = \frac{1}{3} \cdot 450 \cdot h$$

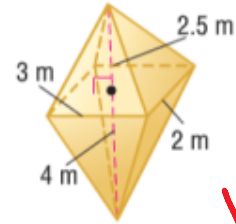
$$\frac{525}{150} = \frac{150h}{150} \Rightarrow h = 3.5 \text{ ft}$$

Example 2:



$$V = 618.7 \text{ ft}^3$$

Example 3:



$$V = 13 \text{ m}^3$$

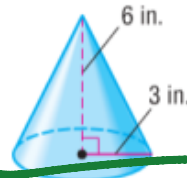
Example

1. Find the volume of the cone. Round to the nearest tenth.

$$V = \frac{1}{3} (3)^2 (3.14) (6)$$

$$V = \frac{1}{3} \cdot 9 \cdot 3.14 \cdot 6$$

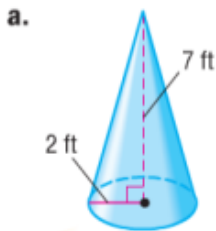
$$= 18 \cdot 3.14 \approx 56.52 \approx \boxed{56.5 \text{ in}^3}$$



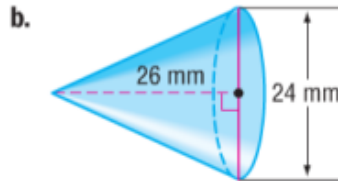
$$V = \frac{1}{3} \pi r^2 h$$

Got It? Do these problems to find out.

Find the volume of each cone. Round to the nearest tenth.

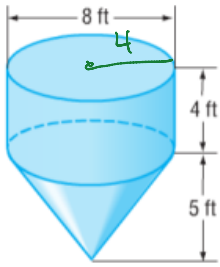


$$V \approx 29.3 \text{ ft}^3$$



$$V \approx 3918.7 \text{ mm}^3$$

3. Find the volume of the solid. Round to the nearest tenth.



$$V_{\text{cyl}} = 3.14(4)^2 \cdot 4$$

$$= 200.96$$

$$V_{\text{cone}} = \frac{3.14(4)^2 \cdot 5}{3} = 83.7\bar{3}$$

$$V_{\text{total}} = 200.96 + 83.7\bar{3} \approx \boxed{284.7\text{ft}^3}$$

Got It? Do this problem to find out.

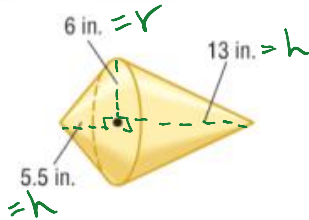
d. Find the volume of the solid.

$$V_{\text{small}} = \frac{6^2 \cdot 3.14 \cdot 5.5}{3}$$

$$= 207.24$$

$$V_{\text{big}} = \frac{6^2 \cdot 3.14 \cdot 13}{3}$$

$$= 489.84$$



$$V_{\text{total}} = 207.24 + 489.84$$

$$\approx \boxed{697.1\text{in}^3}$$

9 A cylinder has a radius of 5 centimeters and a height of 12 centimeters. What would the height of a cone need to be if it has the same volume and radius? Round to the nearest centimeter. 36 cm

$$V_{\text{cyl}} = V_{\text{cone}} \cdot 3$$

$$V_{\text{cyl}} = 942$$

$$942 = \frac{1}{3} \text{ of } \pi r^2 h$$

$$\times 3 \quad \times 3$$

$$2826 = 3.14 \cdot 25 \cdot h$$

10. **CCSS Reason Abstractly** Isaiah is making cone-shaped ice cubes by using a mold. The radius of the mold is 1.5 inches and the height is 2 inches. If one cubic inch is about 0.55 ounce, how many ounces will ten ice cubes weigh? Round to the nearest tenth. 25.9 oz

11. The volume of a cone with a 30-millimeter radius is 9,420 cubic millimeters. What is the height of the cone to the nearest millimeter?

10 mm

Volume of a Sphere

Words The volume V of a sphere is four thirds the product of π and the cube of the radius r .

Symbols

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

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

Model



You can use the formula for the volume of a sphere to solve mathematical and real-world problems.

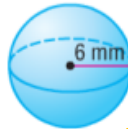
Example



1. Find the volume of the sphere. Round to the nearest tenth.

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

$$= \frac{4 \cdot 3.14 \cdot 6^3}{3} = \frac{2712.96}{3} \approx 904.3 \text{ mm}^3$$



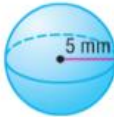
Got It? Do these problems to find out.

Find the volume of each sphere. Round to the nearest tenth.

a.



b.



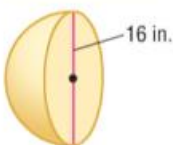
3. Sarah is blowing up spherical balloons for her brother's birthday party. One of the balloons has a radius of 3 inches. Round to the nearest tenth.

(Examples 2 and 3)

- What is the volume of the balloon? _____
- Suppose Sarah can inflate the balloon at a rate of 200 cubic inches per minute. How long will it take her to inflate the balloon? _____

Find the volume of each hemisphere. Round to the nearest tenth. (Example 4)

4.



5.

