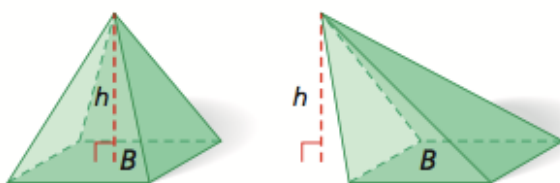


Volume of Pyramids and Cones

Volume of Pyramids:

Volume of a Pyramid

The volume of a pyramid with base area B and height h is $V = \frac{1}{3}Bh$.



Examples:

Finding Volumes of Pyramids

Find the volume of each pyramid.

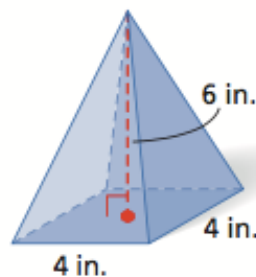
- A** a rectangular pyramid with length 7 ft, width 9 ft, and height 12 ft

$$V = \frac{1}{3}Bh = \frac{1}{3}(7 \cdot 9)(12) = 252 \text{ ft}^3$$

- B** the square pyramid

The base is a square with a side length of 4 in., and the height is 6 in.

$$V = \frac{1}{3}Bh = \frac{1}{3}(4^2)(6) = 32 \text{ in}^3$$

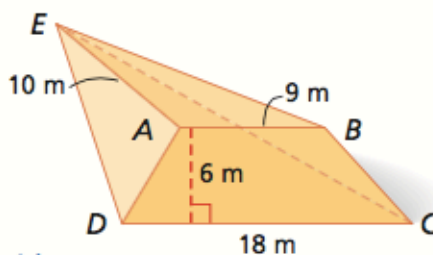


Find the volume of the pyramid.

- C** the trapezoidal pyramid with base $ABCD$, where $\overline{AB} \parallel \overline{CD}$ and $\overline{AE} \perp \text{plane } ABC$

Step 1 Find the area of the base.

$$\begin{aligned} B &= \frac{1}{2}(b_1 + b_2)h && \text{Area of a trapezoid} \\ &= \frac{1}{2}(9 + 18)6 && \text{Substitute 9 for } b_1, 18 \text{ for } b_2, \text{ and 6 for } h. \\ &= 81 \text{ m}^2 && \text{Simplify.} \end{aligned}$$



Step 2 Use the base area and the height to find the volume.

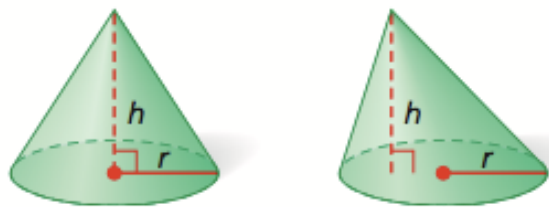
Because $\overline{AE} \perp \text{plane } ABC$, \overline{AE} is the altitude, so the height is equal to AE .

$$\begin{aligned} V &= \frac{1}{3}Bh && \text{Volume of a pyramid} \\ &= \frac{1}{3}(81)(10) && \text{Substitute 81 for } B \text{ and 10 for } h. \\ &= 270 \text{ m}^3 \end{aligned}$$

Volume of Cones

Volume of Cones

The volume of a cone with base area B , radius r , and height h is $V = \frac{1}{3}Bh$,
or $V = \frac{1}{3}\pi r^2 h$.



Examples

Finding Volumes of Cones

Find the volume of each cone. Give your answers both in terms of π and rounded to the nearest tenth.

A a cone with radius 5 cm and height 12 cm

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

Volume of a cone

$$= \frac{1}{3}\pi(5)^2(12)$$

Substitute 5 for r and 12 for h .

$$= 100\pi \text{ cm}^3 \approx 314.2 \text{ cm}^3$$

Simplify.

B a cone with a base circumference of 21π cm and a height 3 cm less than twice the radius

Step 1 Use the circumference to find the radius.

$$2\pi r = 21\pi$$

Substitute 21π for C .

$$r = 10.5 \text{ cm}$$

Divide both sides by 2π .

Step 2 Use the radius to find the height.

$$2(10.5) - 3 = 18 \text{ cm}$$

The height is 3 cm less than twice the radius.

Step 3 Use the radius and height to find the volume.

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

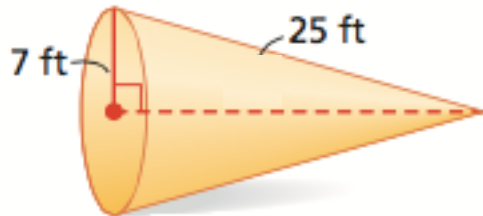
Volume of a cone

$$= \frac{1}{3}\pi(10.5)^2(18)$$

Substitute 10.5 for r and 18 for h .

$$= 661.5\pi \text{ cm}^3 \approx 2078.2 \text{ cm}^3$$

Simplify.

C

Step 1 Use the Pythagorean Theorem to find the height.

$$7^2 + h^2 = 25^2 \quad \text{Pythagorean Theorem}$$

$$h^2 = 576 \quad \text{Subtract } 7^2 \text{ from both sides.}$$

$$h = 24 \quad \text{Take the square root of both sides.}$$

Step 2 Use the radius and height to find the volume.

$$V = \frac{1}{3}\pi r^2 h \quad \text{Volume of a cone}$$

$$= \frac{1}{3}\pi(7)^2(24) \quad \text{Substitute 7 for } r \text{ and 24 for } h.$$

$$= 392\pi \text{ ft}^3 \approx 1231.5 \text{ ft}^3 \quad \text{Simplify.}$$

The assignment is posted in Teams.

Show all your work and then upload your work to the Teams assignment.