

Activity 35 **KEY**
Volume of Pyramids and Cones

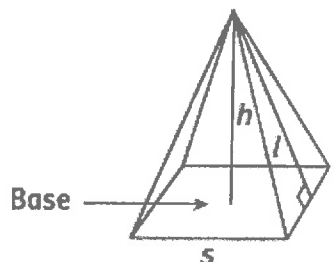
Volume of Pyramids

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

$B =$ area of the base

$h =$ height of the pyramid

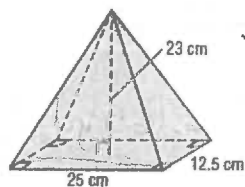
NOTE: Do not plug in the slant height of the pyramid, as represented by the variable l , into the volume formula of a pyramid! Use the perpendicular height, represented by h .



Oftentimes, you will need to use the Pythagorean Theorem, a special right triangle or a trigonometric ratio to find the height.

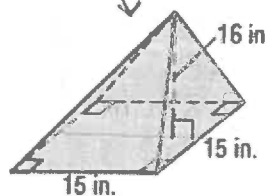
Examples: Find the volume of each right pyramid. In question 4, the pyramid has a square base.

1)



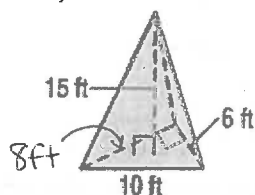
$$\begin{aligned} V &= \frac{1}{3}Bh \\ V &= \frac{1}{3}lwh \\ V &= \frac{1}{3}(25)(12.5)(23) \\ V &= 2395.83 \text{ cm}^3 \end{aligned}$$

2) oblique !!



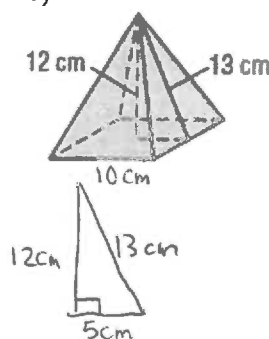
$$\begin{aligned} V &= \frac{1}{3}Bh \\ V &= \frac{1}{3}lwh \\ V &= \frac{1}{3}(15)(15)(16) \\ V &= 1200 \text{ in}^3 \end{aligned}$$

3)



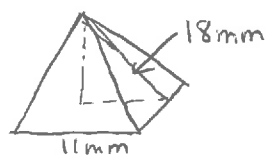
$$\begin{aligned} V &= \frac{1}{3}Bh \\ V &= \frac{1}{3}(\frac{1}{2}bh)(h) \\ V &= \frac{1}{3}(\frac{1}{2} \cdot 6 \cdot 8)(15) \\ V &= 120 \text{ ft}^3 \end{aligned}$$

4)



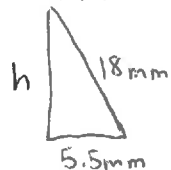
$$\begin{aligned} V &= \frac{1}{3}Bh \\ V &= \frac{1}{3}lwh \\ V &= \frac{1}{3}(10)(10)(12) \\ V &= 400 \text{ cm}^3 \end{aligned}$$

5) Find the volume of a right pyramid whose slant height is 18 mm and whose base is a square with area 121 mm².



$$\begin{aligned} V &= \frac{1}{3}Bh \\ V &= \frac{1}{3}(121)(17.1391) \end{aligned}$$

$$V \approx 691.279 \text{ mm}^3$$



$$\begin{aligned} h^2 &= 18^2 - 5.5^2 \\ h^2 &= 293.75 \\ h &\approx 17.1391 \end{aligned}$$

Activity 35
Volume of Pyramids and Cones

KEY

Volume of Cones

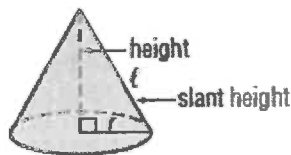
Volume = $\frac{1}{3}Bh$ or $\frac{1}{3}\pi r^2 h$

$B =$ area of the circular base

$h =$ height of the cone

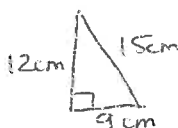
NOTE: As in pyramids, do not plug in r as the height of the cone when finding its volume.

Again, you will often need to use the Pythagorean Theorem, a special right triangle or a trigonometric ratio to find its height.

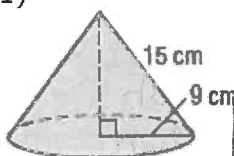


Examples: Find the volume of each right cone.

1)



$r = 9\text{ cm}$
 $h = 12\text{ cm}$



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

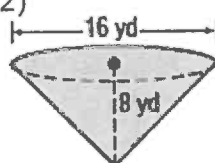
$$V = \frac{1}{3}\pi (9)^2 (12)$$

$$V = 324\pi \text{ cm}^3$$

OR

$$1017.88 \text{ cm}^3$$

2)



$r = 8\text{ yd}$
 $h = 8\text{ yd}$

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

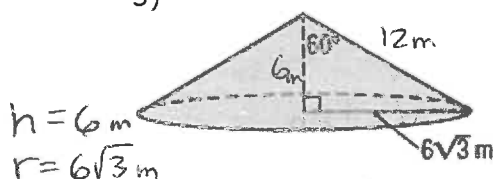
$$V = \frac{1}{3}\pi (8)^2 (8)$$

$$V = \frac{512\pi}{3} \text{ yd}^3$$

OR

$$536.165 \text{ yd}^3$$

3)



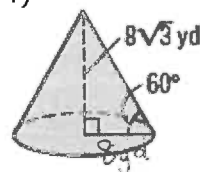
$h = 6\text{ m}$
 $r = 6\sqrt{3}\text{ m}$

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

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

$$V = 216\pi \text{ m}^3 \text{ OR } 678.584 \text{ m}^3$$

4)



$r = 8\text{ yd}$
 $h = 8\sqrt{3}\text{ yd}$

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

$$V = \frac{1}{3}\pi (8)^2 (8\sqrt{3})$$

$$V = \frac{512\sqrt{3}}{3}\pi \text{ yd}^3$$

OR

$$928.665 \text{ yd}^3$$

5) Calculate the volume of the cylindrical rocket and "nose cone" if the slant height of the nose cone is 8 feet.

Vol. of cylinder

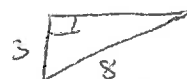
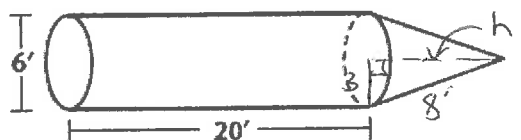
$$V = \pi r^2 h$$

$$V = \pi (3)^2 (20) = 180\pi \text{ ft}^3$$

Vol. of cone

$$V = \frac{1}{3}\pi (3)^2 (\sqrt{55}) = 3\sqrt{55}\pi \text{ ft}^3$$

Total volume = 635.383 ft^3



$$h^2 = 8^2 - 3^2$$

$$h^2 = 55$$

$$h = \sqrt{55}$$