

PYRAMIDS AND CONES – VOLUME

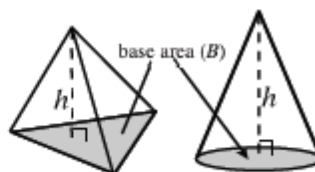
The volume of a pyramid is one-third the volume of the prism with the same base and height and the volume of a cone is one-third the volume of the cylinder with the same base and height. The formula for the volume of the pyramid or cone with base B and height h is:

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

For the cone, since the base is a circle the formula may also be written:

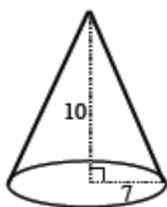
$$V = \frac{1}{3} r^2 \pi h$$

For additional information, see the Math Notes box in Lesson 10.1.4 of the *Core Connections, Course 3* text.



Example 1

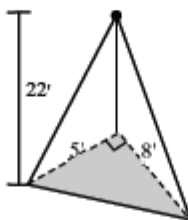
Find the volume of the cone below.



$$\begin{aligned} \text{Volume} &= \frac{1}{3} (7)^2 \pi \cdot 10 \\ &= \frac{490\pi}{3} \\ &\approx 513.13 \text{ units}^3 \end{aligned}$$

Example 2

Find the volume of the pyramid below.



$$\begin{aligned} \text{Base is a right triangle} \\ B &= \frac{1}{2} \cdot 5 \cdot 8 = 20 \\ \text{Volume} &= \frac{1}{3} \cdot 20 \cdot 22 \\ &\approx 146.67 \text{ ft}^3 \end{aligned}$$

Example 3

If the volume of a cone is 4325.87 cm^3 and its radius is 9 cm, find its height.

$$\begin{aligned} \text{Volume} &= \frac{1}{3} r^2 \pi h \\ 4325.87 &= \frac{1}{3} (9)^2 \pi \cdot h \\ 12977.61 &= \pi(81) \cdot h \\ \frac{12977.61}{81\pi} &= h \\ 51 \text{ cm} &= h \end{aligned}$$

Problems

Find the volume of each cone.

- | | | |
|--|--|--|
| 1. $r = 4 \text{ cm}$
$h = 10 \text{ cm}$ | 2. $r = 2.5 \text{ in.}$
$h = 10.4 \text{ in.}$ | 3. $d = 12 \text{ in.}$
$h = 6 \text{ in.}$ |
| 4. $d = 9 \text{ cm}$
$h = 10 \text{ cm}$ | 5. $r = 6\frac{1}{3} \text{ ft}$
$h = 12\frac{1}{2} \text{ ft}$ | 6. $r = 3\frac{1}{4} \text{ ft}$
$h = 6 \text{ ft}$ |

Find the volume of each pyramid.

7. base is a square with side 8 cm
 $h = 12$ cm
8. base is a right triangle with legs 4 ft and 6 ft
 $h = 10\frac{1}{2}$ ft
9. base is a rectangle with width 6 in., length 8 in.
 $h = 5$ in.

Find the missing part of each cone described below.

10. If $V = 1000$ cm³ and $r = 10$ cm, find h .
11. If $V = 2000$ cm³ and $h = 15$ cm, find r .
12. If the circumference of the base = 126 cm and $h = 10$ cm, find the volume.

Answers

1. 167.55 cm³ 2. 68.07 in.³ 3. 226.19 in.³
4. 212.06 cm³ 5. 525.05 ft³ 6. 66.37 ft³
7. 256 cm³ 8. 42 ft³ 9. 80 in.³
10. 9.54 cm 11. 11.28 cm 12. 4211.24 cm³