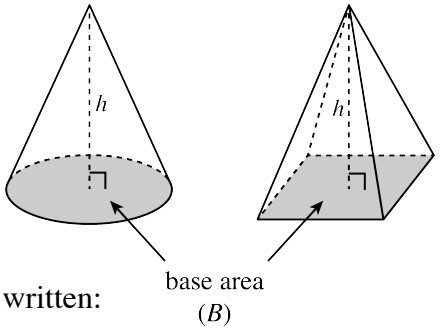
PYRAMIDS AND CONES – VOLUME 10.1.3

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:

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



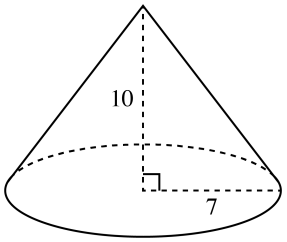
For the cone, since the base is a circle the formula may also be written:

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

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.



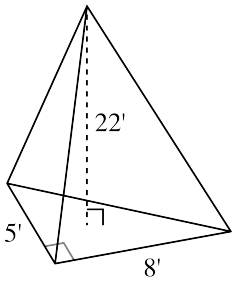
Volume $= \frac{1}{3}(7)^2 \pi \cdot 10$

$= \frac{490\pi}{3}$

$\approx 513.13 \text{ units}^3$

Example 2

Find the volume of the pyramid below.



Base is a right triangle

$B = \frac{1}{2} \cdot 5 \cdot 8 = 20$

Volume $= \frac{1}{3} \cdot 20 \cdot 22$

$\approx 146.67 \text{ ft}^3$

Example 3

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

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

$4325.87 = \frac{1}{3}(9)^2\pi h$

$12977.61 = 81\pi h$

$\frac{12977.61}{81\pi} = h$

$51 \text{ cm} \approx h$

Problems

Find the volume of each cone.

1. $r = 4$ cm, $h = 10$ cm
2. $r = 2.5$ inches, $h = 10.4$ inches
3. $d = 12$ inches, $h = 6$ inches
4. $d = 9$ cm, $h = 10$ cm
5. $r = 6\frac{1}{3}$ ft, $h = 12\frac{1}{2}$ ft
6. $r = 3\frac{1}{4}$ ft, $h = 6$ 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 cm^3 and $r = 10$ cm, find h.

11. If V = 2000 cm^3 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 cm^3
2. 68.07 in^3
3. 226.19 in^3
4. 212.06 cm^3
5. 525.05 ft^3
6. 66.37 ft^3
7. 256 cm^3
8. 42 ft^3
9. 80 in^3
10. 9.54 cm
11. 11.28 cm
12. 4211.24 cm^3

