Volume of Prisms, Pyramids, Cones and Spheres
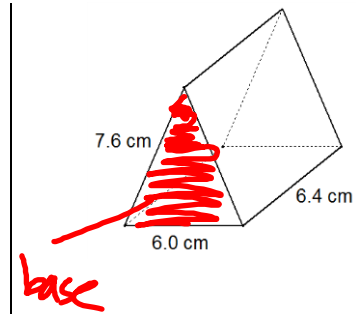
1. Determine the volume of each geometric solid shown below.

6.0 cm   8.0 cm   4.0 cm   base

5.0 cm   10.4 cm   4.0 cm   base

7.6 cm   6.4 cm   6.0 cm   base
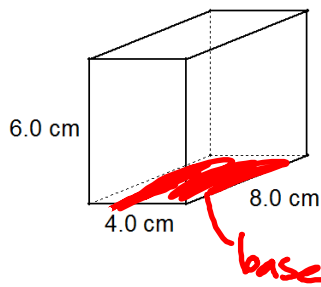
V = area of base × height
$= (8.0 \times 4.0) \times 6.0$
$= 32 \times 6$
$= 192 \, cm^3$
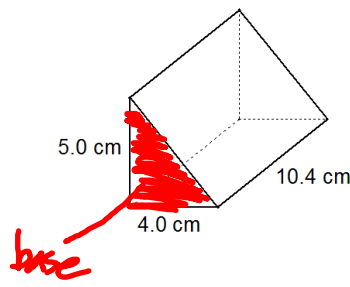
V = area of base × height
$= \left(\frac{4 \times 5}{2}\right) \times 10.4$
$= 10 \times 10.4$
$= 104 \, cm^3$

*need height of triangle first

7.6 ℓ 3
$\ell^2 = 7.6^2 - 3^2$
$\ell^2 = 57.76 - 9$
$\sqrt{\ell^2} = \sqrt{48.76}$
$\ell = 7.0 \, cm$

V = area of base × height
$= \left(\frac{6 \times 7}{2}\right) \times 6.4$
$= 21 \times 6.4$
$= 134.4 \, cm^3$

2. The formula for the volume of a **rectangular**- or **triangular**-based prism is the same as the formula for the volume of a **square**-based pyramid.
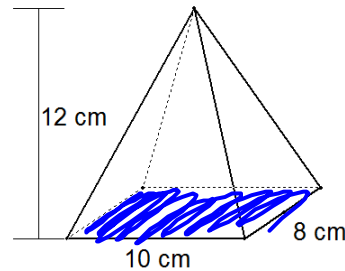   Determine the volume of each pyramid shown below.

6 cm   3 cm   4 cm

12 cm   8 cm   10 cm
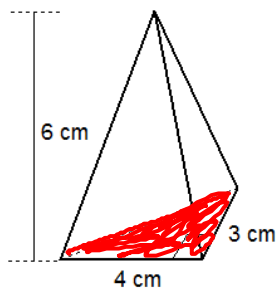
$V = \dfrac{\text{area of base} \times \text{height}}{3}$

$V = \dfrac{\left(\frac{3 \times 4}{2}\right) \times 6}{3}$

$V = \dfrac{6 \times 6}{3}$

$V = 12 \, cm^3$

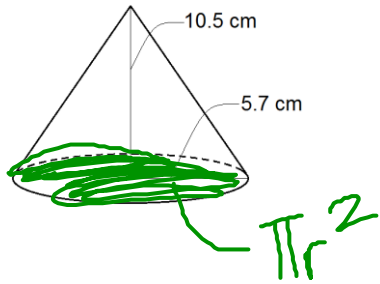$V = \dfrac{\text{area of base} \times \text{height}}{3}$

$V = \dfrac{(10 \times 8) \times 12}{3}$

$V = \dfrac{80 \times 12}{3}$

$V = 320 \, cm^3$

3. Find the volume of each solid.

r = 5.7
h = 10.5

10.5 cm

5.7 cm

πr^2

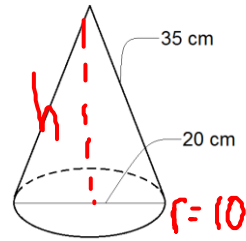$$V = \frac{\pi r^2 h}{3}$$

$$= \frac{\pi (5.7)^2 \times 10.5}{3}$$

$$= \frac{\pi \times 32.49 \times 10.5}{3}$$

$$= 357.2 \, cm^3$$

find h

35 cm

h

20 cm

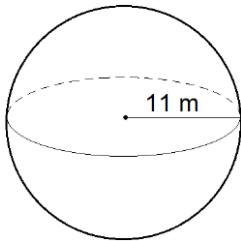r = 10

$$h^2 = 35^2 - 10^2$$

$$\sqrt{h^2} = \sqrt{1125}$$

$$h = 33.54$$

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

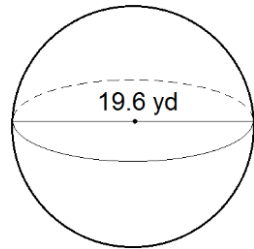$$= \frac{\pi \times 10^2 \times 33.5}{3}$$

$$= 3506.1 \, cm^3$$

r = 11

11 m

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

$$V = \frac{4 \times \pi \times 11^3}{3}$$

$$V = 5575.3 \, m^3$$

19.6 yd

$$r = \frac{19.6}{2}$$

$$r = 9.8$$

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

$$= \frac{4 \times \pi \times 9.8^3}{3}$$

$$= 3942.5 \, yd^3$$