

Geometry

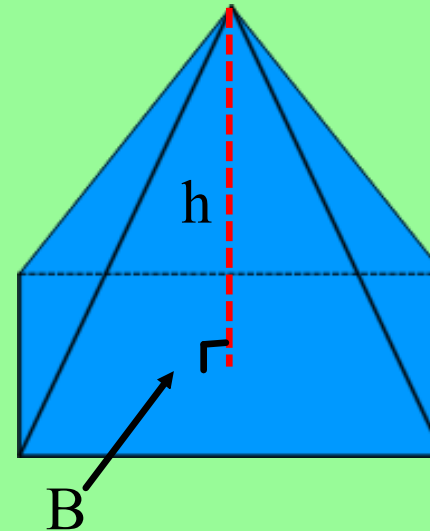
Ch. 11 Handout 11.5

Volumes of Pyramids and Cones

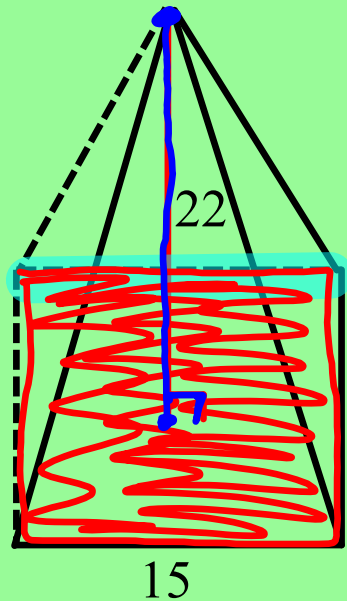
Volume of a Pyramid

The volume of a pyramid is one third the product of the area of the base and the height of the pyramid.

$$V = \frac{1}{3} B h$$



1. Find the volume of a square pyramid with base edges 15 cm and height 22 cm.



$$h = 22$$

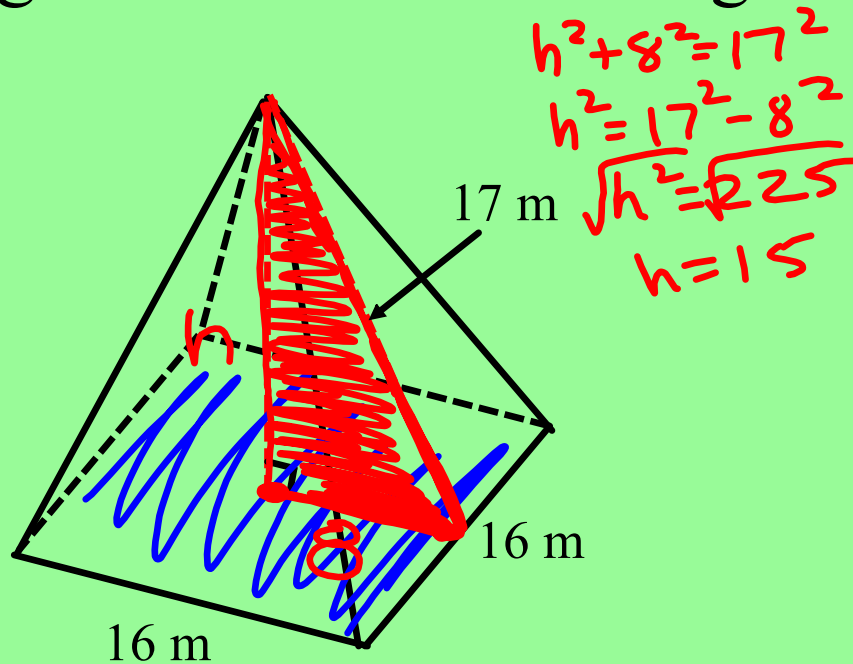
$$B = 15(15) = 225$$

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

$$V = \frac{1}{3} (225)(22)$$

$$V = 1650 \text{ cm}^3$$

2. Find the volume of a square pyramid with base edges 16 m and slant height 17 m.



$$\begin{aligned}h^2 + 8^2 &= 17^2 \\h^2 &= 17^2 - 8^2 \\\sqrt{h^2} &= \sqrt{225} \\h &= 15\end{aligned}$$

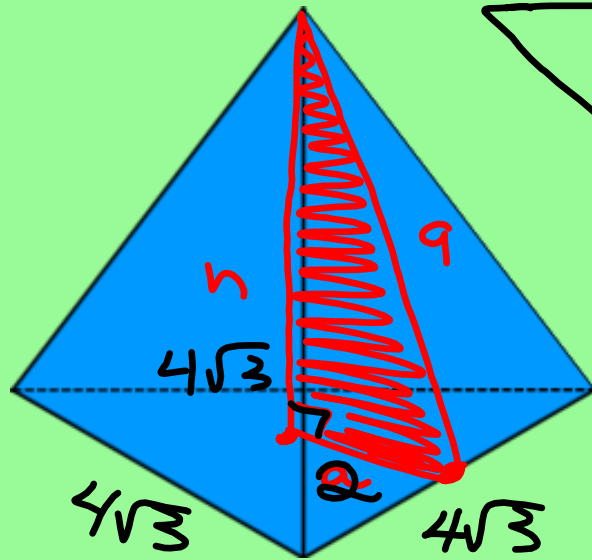
$$h = 15$$

$$B = 16(16) = 256$$

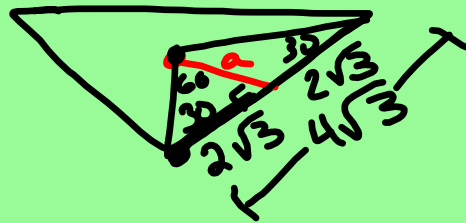
$$\begin{aligned}V &= \frac{1}{3} Bh \\&= \frac{1}{3} (256)(15)\end{aligned}$$

$$V = 1280 \text{ m}^3$$

3. Find the volume of a regular triangular pyramid that has a slant height of 9 cm and base perimeter of $12\sqrt{3}$.



Base



$$LL = SL\sqrt{3}$$

$$2\sqrt{3} = a\sqrt{3}$$

$$a = 2$$

$$h^2 + 2^2 = 9^2$$

$$h^2 = 9^2 - 2^2$$

$$\sqrt{h^2} = \sqrt{77}$$

$$l = 9$$

$$P = 12\sqrt{3}$$

$$h = \sqrt{77}$$

$$B = \frac{1}{2} a P = \frac{1}{2} (2) (12\sqrt{3})$$

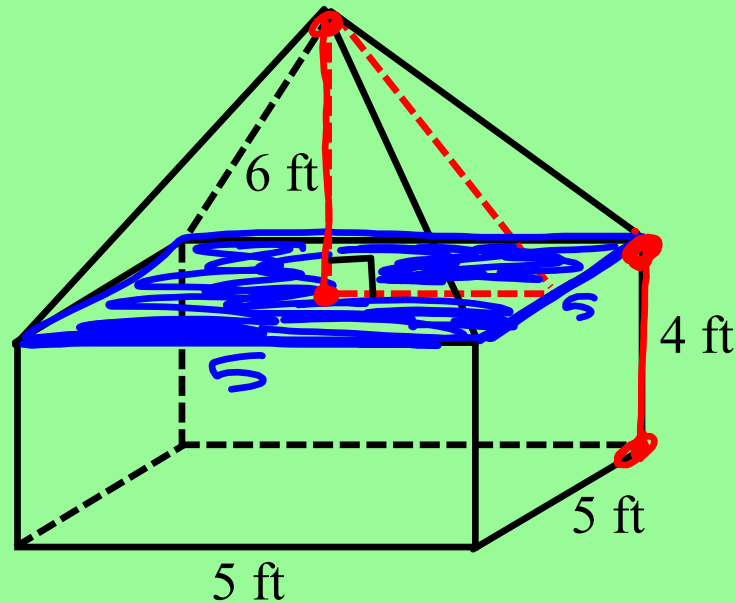
$$= 12\sqrt{3}$$

$$V = \frac{1}{3} B h$$

$$V = \frac{1}{3} (12\sqrt{3}) \sqrt{77}$$

$$V = 4 \sqrt{231} \text{ cm}^3$$

4. Find the surface area and volume of the figure.



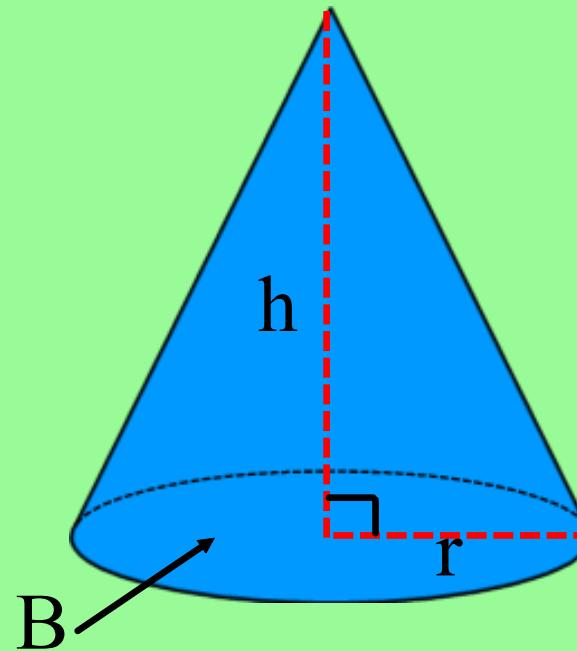
$$\begin{aligned}
 &V_{\text{pyr}} + V_{\text{prism}} \\
 &= \frac{1}{3}Bh + Bh \\
 &= \frac{1}{3}(25)(6) + 25(4)
 \end{aligned}$$

$$\begin{aligned}
 &50 + 100 \\
 &\boxed{V = 150 \text{ ft}^3}
 \end{aligned}$$

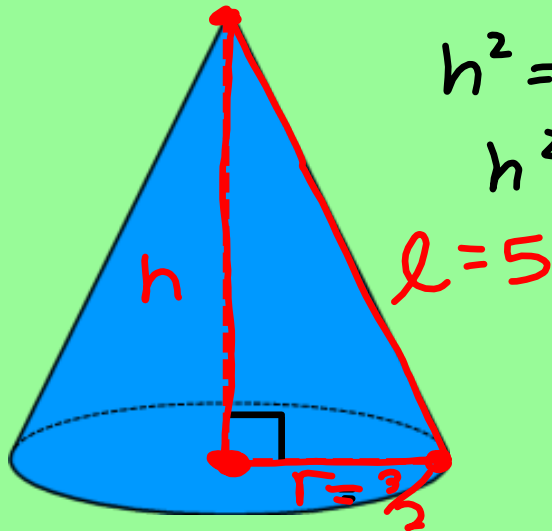
Volume of a Cone

The volume of a cone is one third the product of the area of the base and the height of the cone.

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



1. Find the volume of a cone with diameter 3 m and slant height 5 m.



$$h^2 + \left(\frac{3}{2}\right)^2 = 5^2$$

$$h^2 = 5^2 - \left(\frac{3}{2}\right)^2$$

$$h^2 = \frac{25(4) - 9}{4}$$

$$\sqrt{h^2} = \sqrt{\frac{91}{4}}$$

$$h = \frac{\sqrt{91}}{2}$$

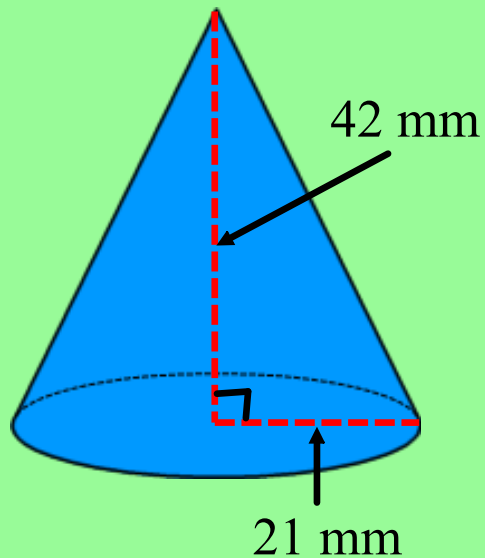
$$B = \pi \left(\frac{3}{2}\right)^2 = \frac{9\pi}{4}$$

$$V = \frac{1}{3} B h$$

$$V = \frac{1}{3} \left(\frac{9\pi}{4} \right) \left(\frac{\sqrt{91}}{2} \right)$$

$$V = \frac{3\pi\sqrt{91}}{8} \text{ m}^3$$

2. Find the volume of the cone to the nearest millimeter.



$$h = 42$$

$$B = \pi (21)^2 = 441\pi$$

$$V = \frac{1}{3} B h$$

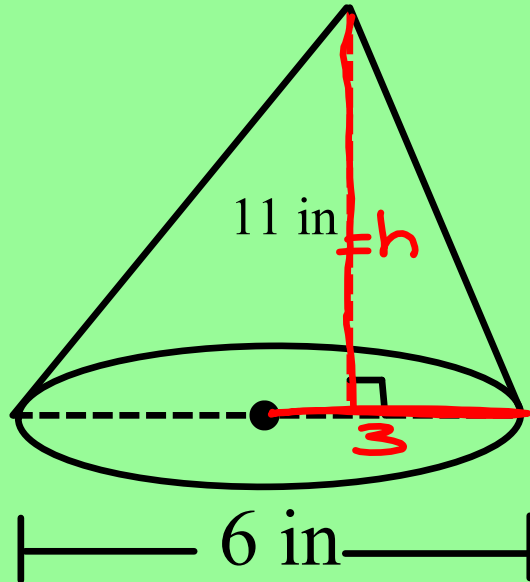
$$V = \frac{1}{3} (441\pi)(42)$$

$$V \approx 6174\pi \text{ mm}^3$$

$$V \approx 19,396 \text{ mm}^3$$

3. Find the volume of the oblique cone in terms of π .

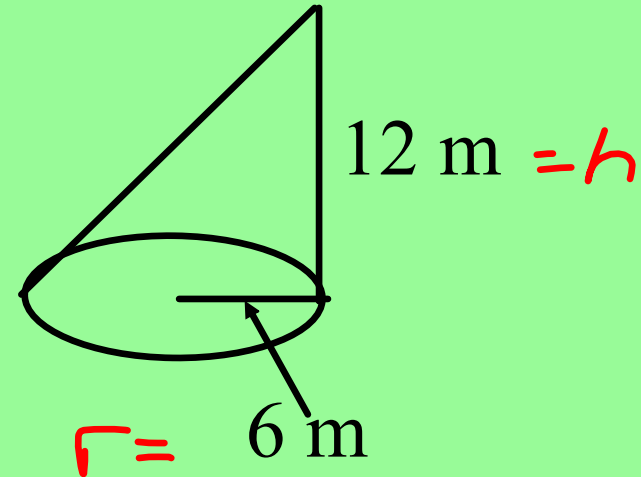
a.



$$V = \frac{1}{3} Bh = \frac{1}{3} (9\pi) (11)$$

$$V = 33\pi \text{ in}^3$$

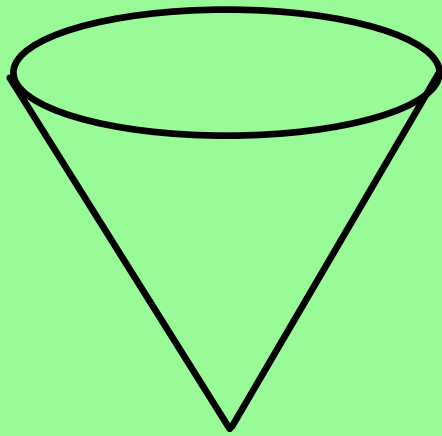
b.



$$V = \frac{1}{3} Bh = \frac{1}{3} (36\pi) (12)$$

$$V = 144\pi \text{ m}^3$$

4. An ice cream cone is 7 cm tall and 4 cm in diameter. About how much ice cream can fit entirely inside the cone to the nearest whole number?



Assignment:

pgs 635-637 1-18,21-23,25,29,30