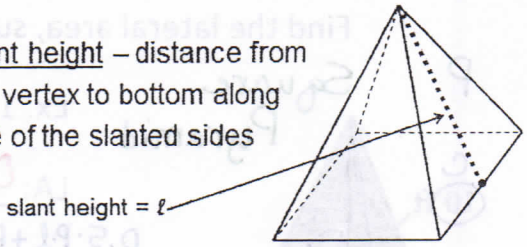
Formulas for pyramids and cones

- Slant height – distance from top vertex to bottom along one of the slanted sides



Notes – Right Pyramids:

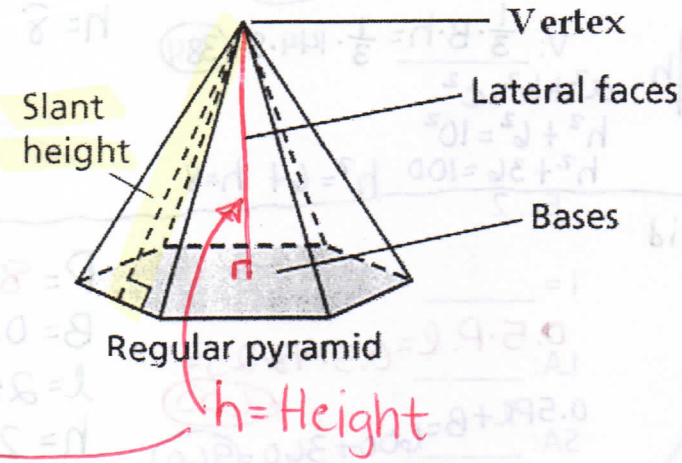
l = slant height (height of lateral triangle)

Pyramids:

LA= ½ P*l*

SA= 1/2P*l* + B

V= 1/3 Bh



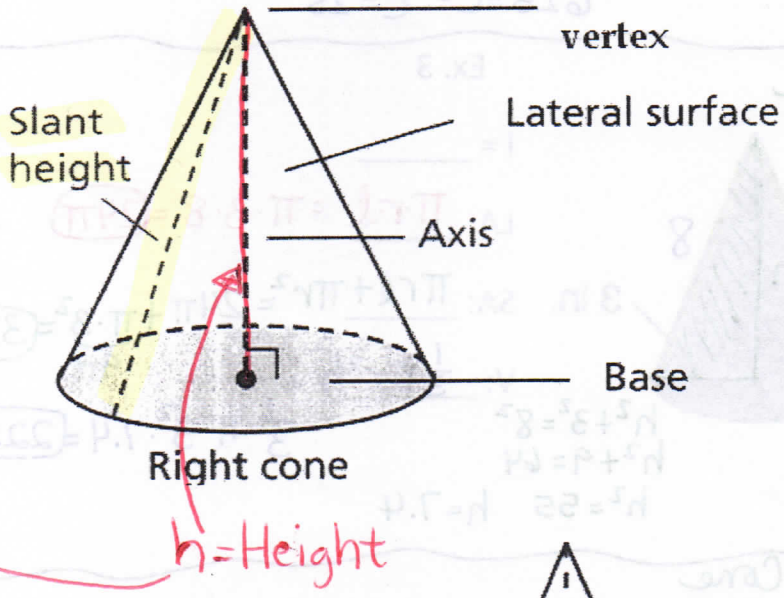
The **altitude** of a cone is the segment from the vertex of the cone to its base that is perpendicular to the base. The length of the altitude is the **height** of the cone.

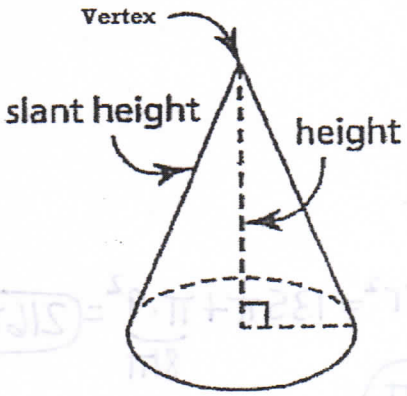
Cones:

LA= πrl

SA = πrl + πr²

V= 1/3 πr²h





Pythagorean Theorem

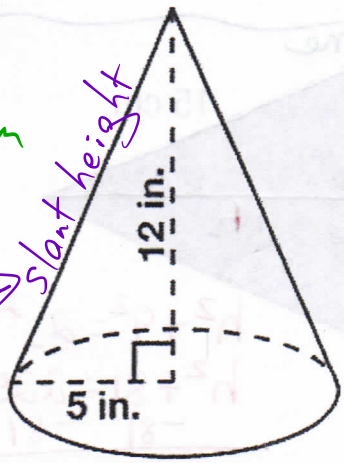
$a^2 + b^2 = c^2$

$12^2 + 5^2 = c^2$

$144 + 25 = c^2$

$169 = c^2$

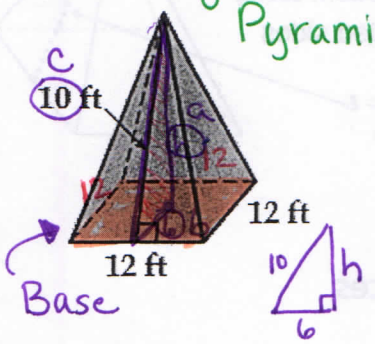
$c = \sqrt{169} = 13$



Find the lateral area, surface area, and volume of each figure.

Square Pyramid

Ex. 1



LA: $0.5 \cdot P \cdot l = 0.5 \cdot 48 \cdot 10 = 240$

SA: $0.5 \cdot P \cdot l + B = 240 + 144 = 384$

V: $\frac{1}{3} \cdot B \cdot h = \frac{1}{3} \cdot 144 \cdot 8 = 384$

$P = 12+12+12+12 = 48$

$B = s^2 = 12^2 = 144$

$l = 10$

$h = 8$

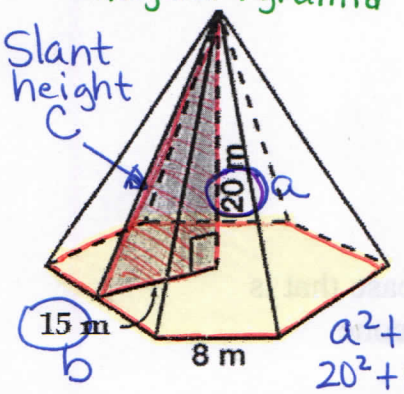
$a^2 + b^2 = c^2$

$h^2 + 6^2 = 10^2$

$h^2 + 36 = 100$ $h^2 = 64$ $h = 8$

Hexagonal Pyramid

Ex. 2



LA: $0.5 \cdot P \cdot l = 0.5 \cdot 48 \cdot 25 = 600$

SA: $0.5Pl + B = 600 + 360 = 960$

V: $\frac{1}{3}Bh = \frac{1}{3} \cdot 360 \cdot 20 = 2400$

$P = 8 \cdot 6 = 48$

$B = 0.5 \cdot a \cdot P = 0.5 \cdot 15 \cdot 48 = 360$

$l = 25$

$h = 20$

$a^2 + b^2 = c^2$

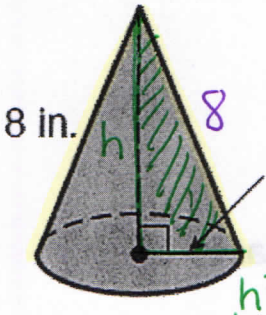
$20^2 + 15^2 = c^2$

$400 + 225 = c^2$

$625 = c^2$ $c = 25$

Cone

Ex. 3



LA: $\pi \cdot r \cdot l = \pi \cdot 3 \cdot 8 = 24\pi$

SA: $\pi rl + \pi r^2 = 24\pi + \pi \cdot 3^2 = 24\pi + 9\pi = 33\pi$

V: $\frac{1}{3} \cdot \pi \cdot r^2 \cdot h = \frac{1}{3} \cdot \pi \cdot 3^2 \cdot 7.4 = 22.2\pi$

$r = 3$

$l = 8$

$h = 7.4$

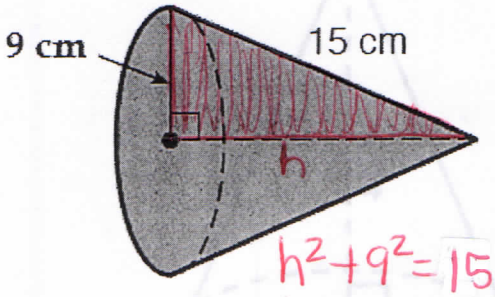
$h^2 + 3^2 = 8^2$

$h^2 + 9 = 64$

$h^2 = 55$ $h = 7.4$

Cone

Ex. 4



LA: $\pi rl = \pi \cdot 9 \cdot 15 = 135\pi$

SA: $\pi rl + \pi r^2 = 135\pi + \pi \cdot 9^2 = 135\pi + 81\pi = 216\pi$

V: $\frac{1}{3} \cdot \pi \cdot r^2 \cdot h = \frac{1}{3} \cdot \pi \cdot 9^2 \cdot 12 = 324\pi$

$r = 9$

$l = 15$

$h = 12$

$h^2 + 9^2 = 15^2$

$h^2 + 81 = 225$

$-81 \quad -81$

$h^2 = 144$ $h = 12$