

Geometry

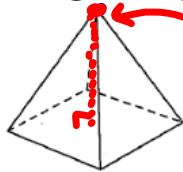
**9.3: Surface Area of  
Pyramids and Cones**

Name: \_\_\_\_\_

🎯 Students will be able to find the surface area of pyramids and cones.

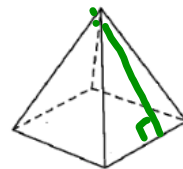
☆Pyramid: *base is a polygon and the lateral faces are triangles with a common vertex*

☆Height of a pyramid:



*perpendicular  
distance between  
the base & vertex*

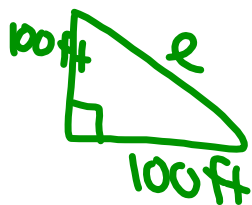
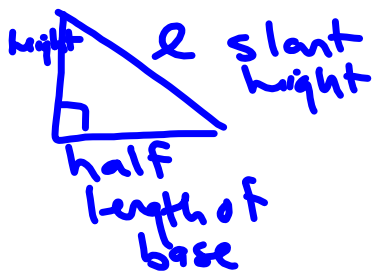
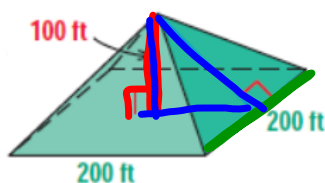
☆Slant Height of a pyramid:



*represented by "l"  
height of any of its  
lateral faces.*

**Example 1:** Find the slant height of the pyramid. Round your answer to the nearest whole number.

a.



$$100^2 + 100^2 = l^2$$

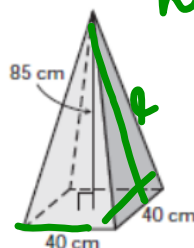
$$10,000 + 10,000 = l^2$$

$$\sqrt{20,000} = l^2$$

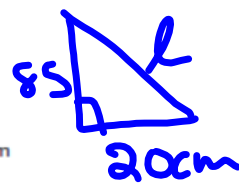
$$l \approx 141.42$$

$$l \approx 141 \text{ ft}$$

b.



height = 85 cm



$$85^2 + 20^2 = l^2$$

$$7,225 + 400 = l^2$$

$$\sqrt{7,625} = l^2$$

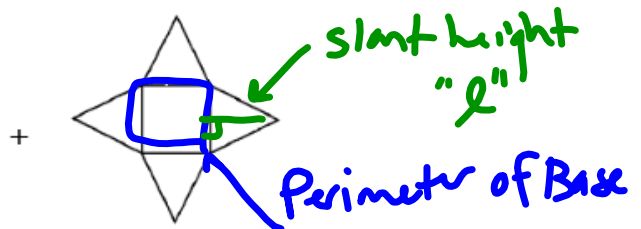
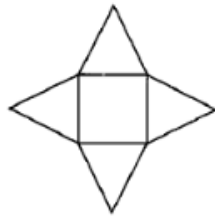
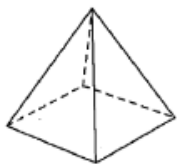
$$l \approx 87.2$$

$$l = 87 \text{ cm}$$

Surface area of a pyramid

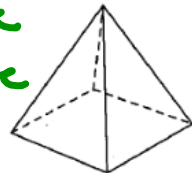
Surface area = (area of the base) + area of the lateral faces

$$SA = ( B ) + ( \frac{Pl}{2} )$$

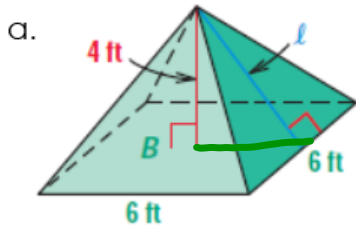
Surface Area of a Pyramid:

$$S = SA = B + \left( \frac{Pl}{2} \right)$$

$B$  = area of Base  
 $P$  = perimeter of Base  
 $l$  = slant height



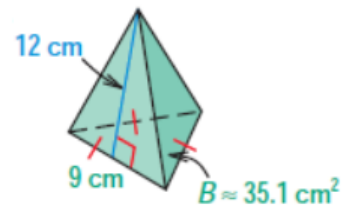
**Example 2:** Find the surface area of the pyramid.



$$B = 6^2 = 36 \text{ ft}^2$$

$$P = 6 + 6 + 6 + 6 = 24 \text{ ft}$$

$$l = 5 \text{ ft}$$



$$\begin{array}{l} 4 \\ \triangle \\ 3 \end{array} \quad l$$

$$3^2 + 4^2 = l^2$$

$$9 + 16 = l^2$$

$$\sqrt{25} = \sqrt{l^2}$$

$$l = 5$$

$$SA = B + \left(\frac{Pl}{2}\right)$$

$$SA = 36 + \left(\frac{24 \cdot 5}{2}\right)$$

$$SA = 36 + 60$$

$$SA = 96 \text{ ft}^2$$

$$B = 35.1 \text{ cm}^2$$

$$P = 9 + 9 + 9 + 9 = 36 \text{ cm}$$

$$l = 12 \text{ cm}$$

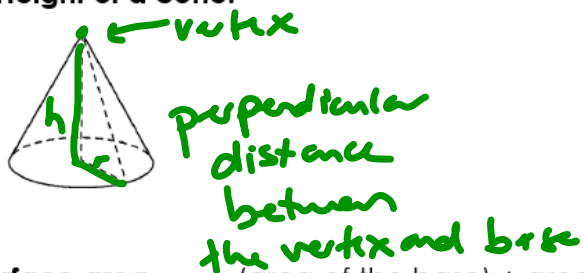
$$SA = 35.1 + \left(\frac{36 \cdot 12}{2}\right)$$

$$SA = 35.1 + 216$$

$$SA = 251.1 \text{ cm}^2$$

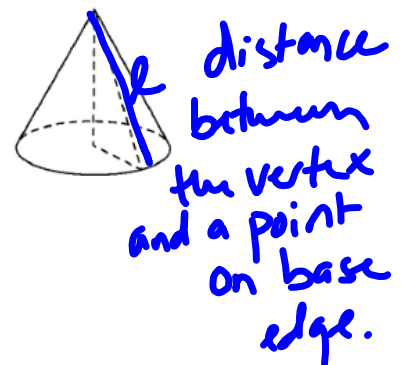
Surface Area of a Cone

☆ Height of a cone:



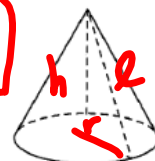
Surface area = (area of the base) + area of the sector  
 = (  $\pi r^2$  ) + (  $\pi r l$  ).

☆ Slant Height of a cone:

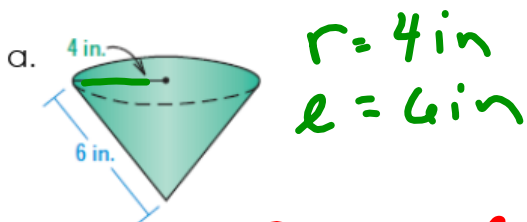
Surface Area of a Cone:

$$S = SA = B + \pi r l$$

$$SA = \pi r^2 + \pi r l$$



**Example 3:** Find the surface area of the cone to the nearest whole number.



$$SA = \pi r^2 + \pi r l$$

$$SA = \pi(4^2) + \pi(4)(6)$$

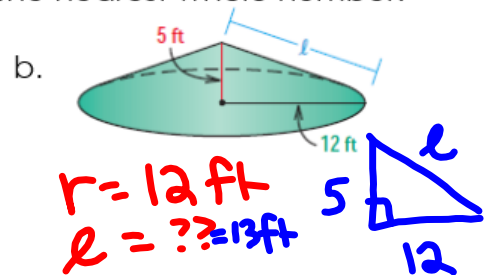
$$SA = 16\pi + 24\pi$$

$$SA = 40\pi$$

$$SA \approx 125.7$$

$$SA = 126 \text{ in}^2$$

Homework: pg. 495: #9 – 22 all, 23 – 27 odds



$$5^2 + 12^2 = l^2$$

$$25 + 144 = l^2$$

$$169 = l^2$$

$$l = 13$$

$$SA = \pi(12)^2 + \pi(12)(13)$$

$$SA = 144\pi + 156\pi$$

$$SA = 300\pi$$

$$SA \approx 942.5$$

$$SA \approx 943 \text{ ft}^2$$