

NOTES: Surface Area of Pyramids and Cones

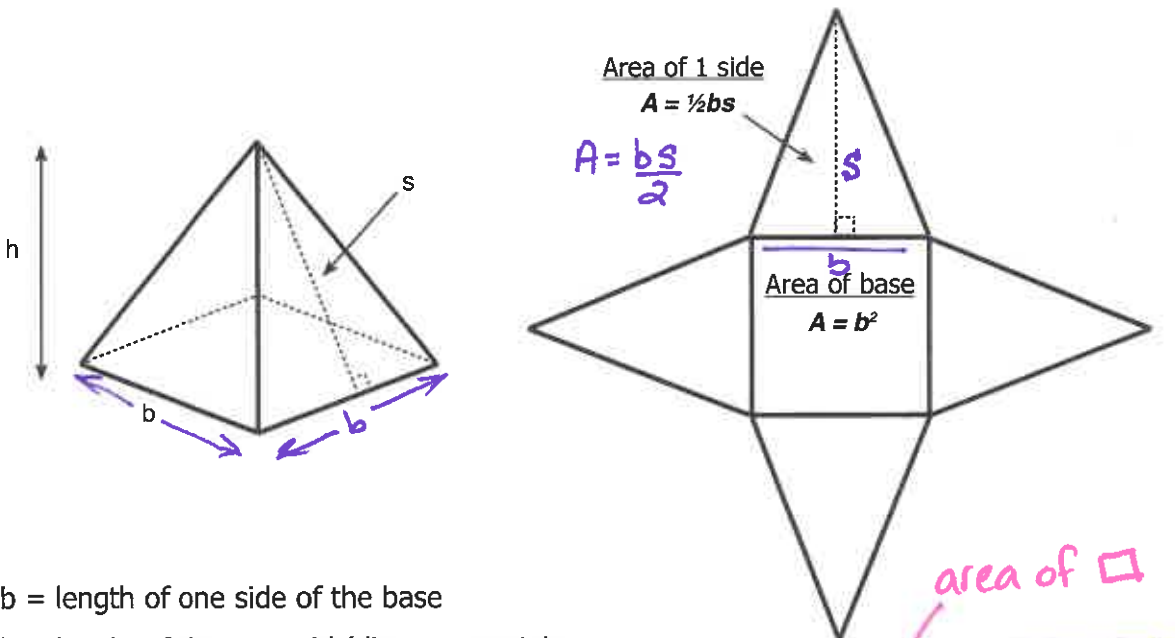
Date: Mar. 5

Surface Area of Pyramids

A pyramid is a three-dimensional object with a polygon as its base and lateral sides that are triangles.

The triangles meet at a point, called the apex.

The net of a pyramid will consist of the base (a polygon) plus as many triangles as there are sides to the base. The net of a square-based pyramid is shown below.



- b = length of one side of the base
- h = height of the pyramid (distance straight up from the centre of the base to the point)
- s = slant height (height of triangle - distance an ant would crawl from the middle of one side of the base to the point)

area of \square

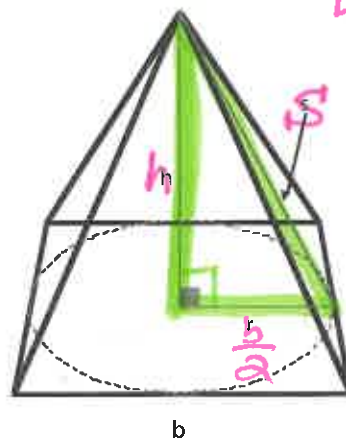
$SA = b^2 + 2bs$

4 x area of \triangle
 $4 \times \frac{bs}{2} = 2bs$

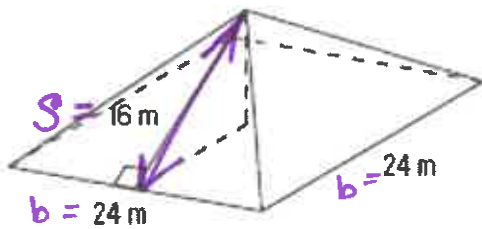
Be careful... h and s are NOT the same!!!

If you are given h , you need to use the Pythagorean Theorem to find s .

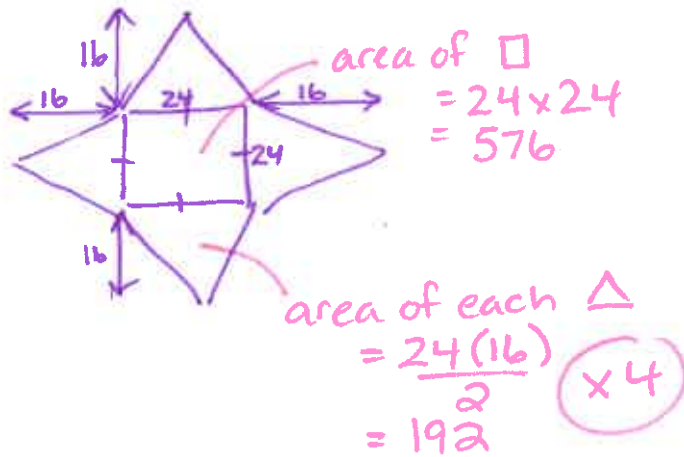
$$r^2 + h^2 = s^2 \quad (r = b \div 2)$$



Find the surface area of the square-based pyramid below. Round your answer to the nearest hundredth.

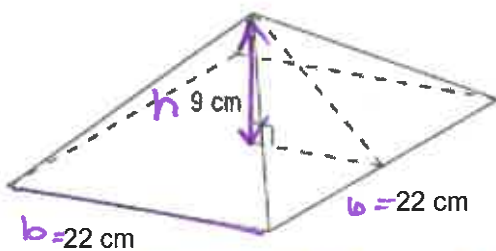


$$\begin{aligned}
 SA &= b^2 + 2bs \\
 &= 24^2 + 2(24)(16) \\
 &= 576 + 768 \\
 &= \boxed{1344 \text{ m}^2}
 \end{aligned}$$



$$\begin{aligned}
 \text{total} &= 576 + 4(192) \\
 &= 1344 \text{ m}^2
 \end{aligned}$$

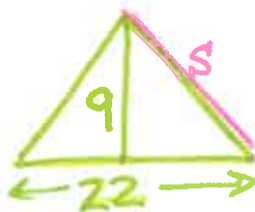
Find the surface area of the square based pyramid. Round your answer to the nearest hundredth.



②

$$\begin{aligned}
 SA &= b^2 + 2bs \\
 &= 22^2 + 2(22)(14.213) \\
 &= 484 + 625.372 \\
 &= \boxed{1109.37 \text{ cm}^2}
 \end{aligned}$$

* we have h
 we need s



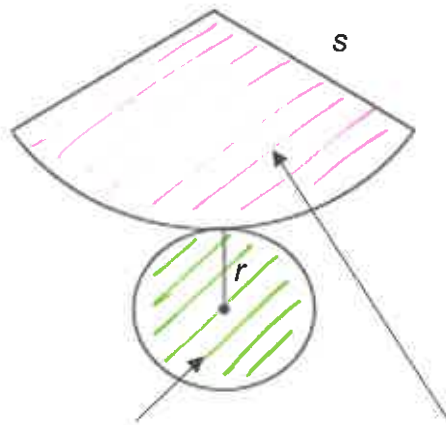
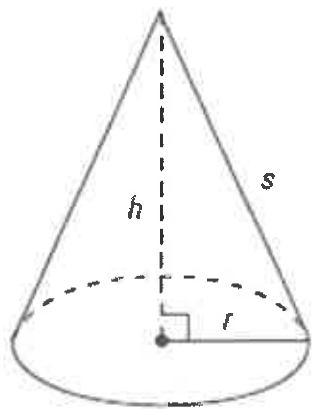
①

$$\begin{aligned}
 9^2 + 11^2 &= s^2 \\
 \sqrt{202} &= s \\
 14.213 &= s
 \end{aligned}$$

Surface Area of Cones

A cone is like a pyramid, but it has a circular base.

The net of a cone is a sector of a large circle, and the circular base of the cone.



r = radius of the base

h = height of the cone (distance straight up from the centre of the base to the point)

s = slant height (distance an ant would crawl from the base to the point)

Area of base (circle)

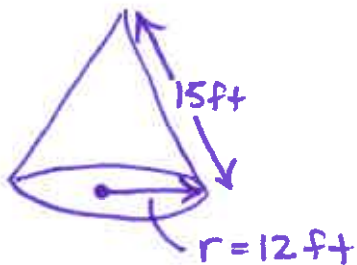
Area of lateral face (sector)

$$A = \pi r^2$$

$$A = \pi r s$$

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

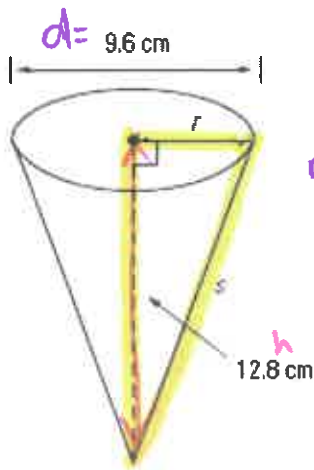
Find the surface area of a cone that has a radius of 12 feet and a slant height of 15 feet. Round your answer to the nearest hundredth.



$$\begin{aligned}
 SA &= \pi \times 12^2 + \pi \times 12 \times 15 \\
 &= 452.389 + 565.487 \\
 &= \boxed{1017.88 \text{ ft}^2}
 \end{aligned}$$

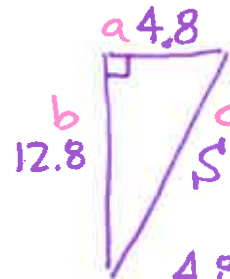
$$SA = \pi r^2 + \pi r s$$

Find the surface area of the cone shown below. Round your answer to the nearest hundredth.



$$r = 9.6 \div 2 \\ = 4.8$$

We have h
we need s



$$4.8^2 + 12.8^2 = s^2$$

$$\sqrt{186.88} = s$$

$$13.670 = s$$

$$SA = \pi \times 4.8^2 + \pi \times 4.8 \times 13.670 \\ = 72.382 + 206.139 \\ = \boxed{278.52 \text{ cm}^2}$$