

NOTES: Surface Area of Pyramids and Cones

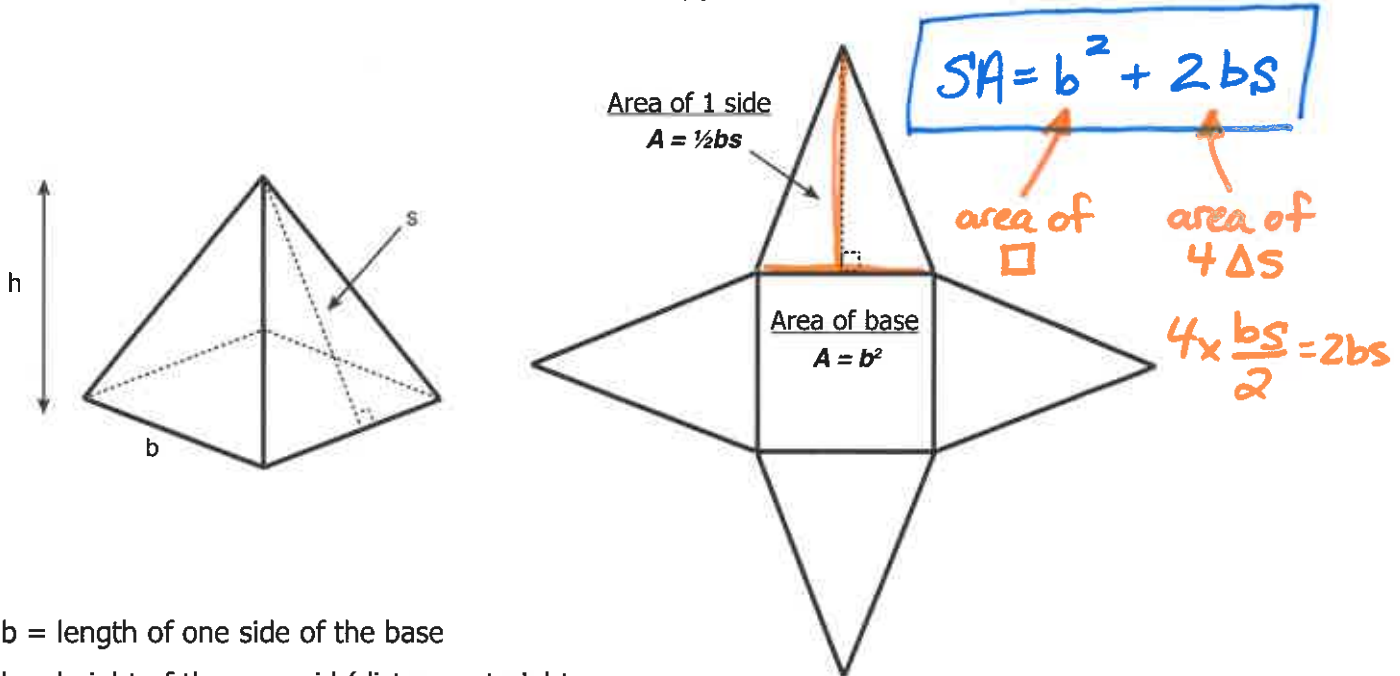
Date: Oct. 23

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

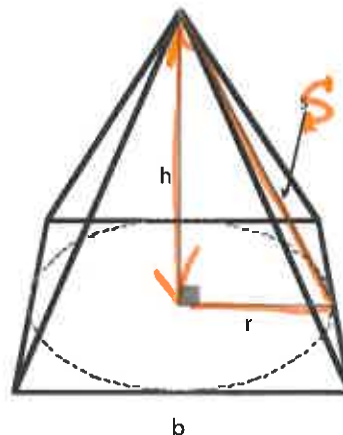
h = height of the pyramid (distance straight up from the centre of the base to the point)

s = slant height (height of triangle - distance an ant would crawl from the middle of one side of the base to the point)

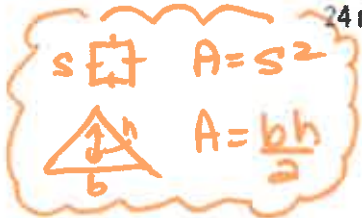
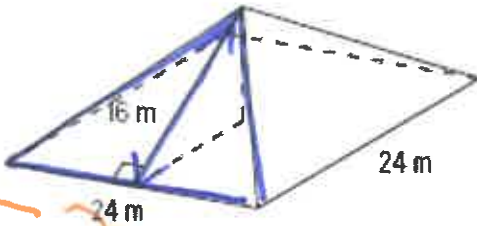
Be careful... h and s are NOT the same!!!

You may need to use the Pythagorean Theorem to find one, given the other.

$$r^2 + h^2 = s^2 \quad (r = \frac{b}{2})$$



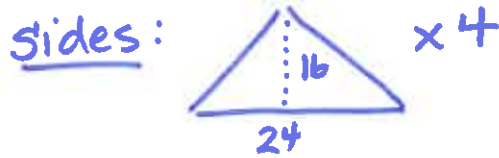
Find the surface area of the square-based pyramid below. Round your answer to the nearest hundredth.



$$\begin{aligned}
 SA &= 576 + 4 \times 192 \\
 &= 576 + 768 \\
 &= \boxed{1344 \text{ m}^2}
 \end{aligned}$$

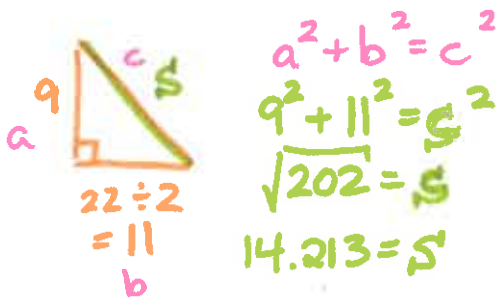
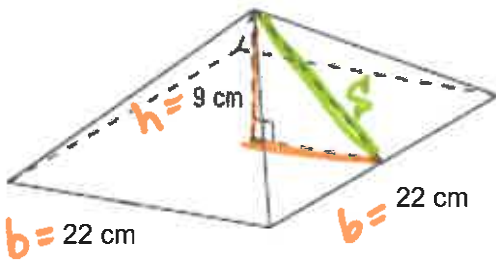
base: $24 \times 24 \times 1$

$$\begin{aligned}
 A &= 24^2 \\
 &= 24 \times 24 \\
 &= 576 \text{ m}^2
 \end{aligned}$$



$$\begin{aligned}
 A &= \frac{24 \times 16}{2} \\
 &= 192 \text{ m}^2 \text{ each}
 \end{aligned}$$

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

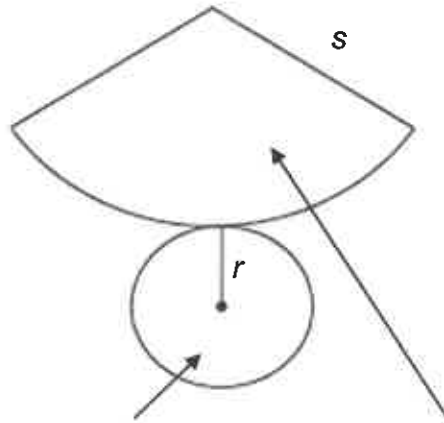
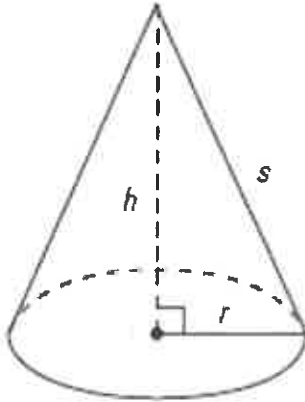


$$\begin{aligned}
 SA &= b^2 + 2bs \\
 &= 22^2 + 2 \times 22 \times 14.213 \\
 &= 484 + 625.372 \\
 &= \boxed{1109.37 \text{ cm}^2}
 \end{aligned}$$

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)

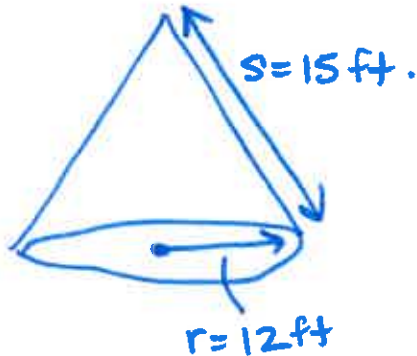
$$A = \pi r^2$$

Area of lateral face (sector)

$$A = \pi r s$$

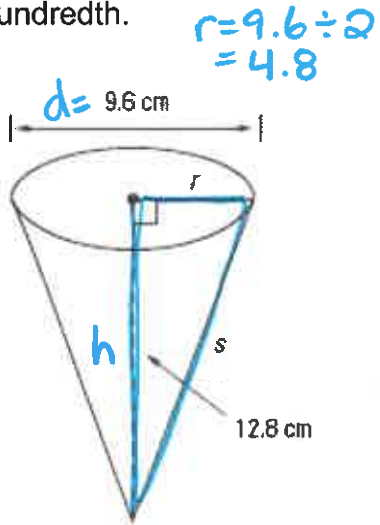
$$SA = \pi r^2 + \pi r s$$

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.



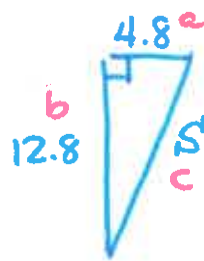
$$\begin{aligned} SA &= \pi \times 12^2 + \pi \times 12 \times 15 \\ &= 452.389 + 565.487 \\ &= \boxed{1017.88 \text{ ft}^2} \end{aligned}$$

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



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

Use Pythagoras to find s



$$a^2 + b^2 = c^2$$
$$4.8^2 + 12.8^2 = s^2$$

$$\sqrt{186.88} = s$$
$$13.670 = s$$

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