

4-9-18

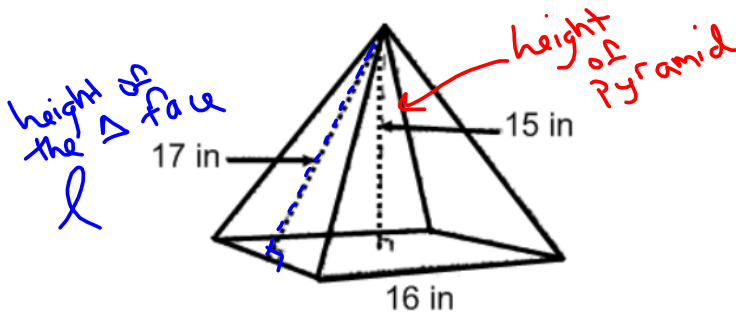
Aim: *SWBAT* calculate and estimate the surface area of cylinders, cones, and spheres.

HW: Packet Pages 20 - 21

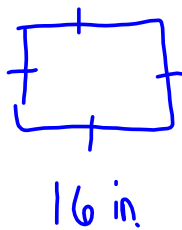
Do Now: Turn to Packet Page 14

A **square pyramid** is made up of its base (a square) and the rest of its faces are triangles. The number of triangles is equal to the number of sides of its base.

- A square pyramid has a square base and 4 congruent triangle faces (since a square has 4 congruent sides)



Draw and label the faces of the **square pyramid** above.



Next, find the surface area of the pyramid. Remember to label your answer.

$$SA = (16 \cdot 16) + 4 \left( \frac{16 \cdot 17}{2} \right)$$

$$SA = 256 + 544$$

$$SA = 800 \text{ in.}^2$$

Regular Pyramids

area of the base

perimeter of the base

$$SA = B + \frac{1}{2} P L$$

$$SA = (16 \cdot 16) + \frac{1}{2} (16 + 16 + 16 + 16) \cdot 17$$

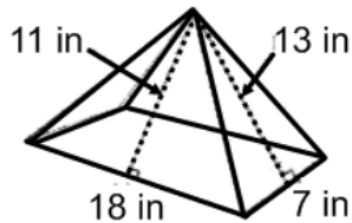
$$SA = 256 + \frac{1}{2} (64) (17)$$

$$SA = 256 + 544$$

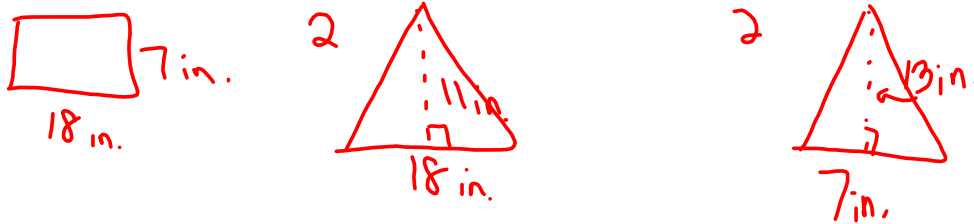
$$SA = 800 \text{ in.}^2$$

A **rectangular pyramid** is made up of its base (a rectangle) and the rest of its faces are triangles. The number of triangles is equal to the number of sides of its base.

- A rectangular pyramid has a rectangle base and 4 triangle faces (since a rectangle has 4 sides)
- Of the 4 triangle faces, there will be two pairs of congruent triangles since in a rectangle, opposite sides are congruent.



Draw and label the faces of the **rectangular pyramid** above.



Next, find the surface area of the pyramid. Remember to label your answer.

$$SA = (18 \cdot 7) + 2 \left( \frac{18 \cdot 11}{2} \right) + 2 \left( \frac{7 \cdot 13}{2} \right)$$

$$SA = 126 + 198 + 91$$

$$SA = 415 \text{ in.}^2$$

Aim: SWBAT calculate and estimate the surface area of cylinders, cones and spheres.

### Class Notes.

**Surface area** is the sum of the areas of the faces of a 3-dimensional figure.

#### Surface Area of a Cylinder

Surface Area = Areas of top and bottom + Area of the side

Surface Area = 2 (Area of top) + (perimeter of top)  $\times$  height

Surface Area = 2 (area of the circle) + (circumference of the circle)  $\times$  height

In words, the easiest way is to think of a can. The surface area is the areas of all the parts needed to cover the can. That's the top, the bottom, and the paper label that wraps around the middle.

You can find the area of the top (or the bottom). That's the formula for area of a circle ( $\pi r^2$ ). Since there is both a top and a bottom, that gets multiplied by two.

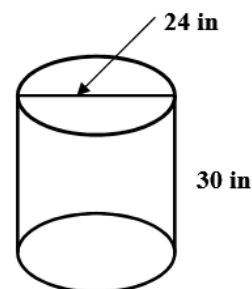
The side is like the label of the can. If you peel it off and lay it flat it will be a rectangle. The area of a rectangle is the product of the two sides. One side is the height of the can, the other side is the perimeter of the circle, since the label wraps once around the can. So the area of the rectangle is  $(2\pi r) \times h$ .

Add those two parts together and you have the formula for the surface area of a cylinder.

**Formula:** Surface Area =  $2\pi r^2 + 2\pi rh$

Example 1) Find the surface area of the cylinder.

$$\begin{aligned} SA &= 2 \cdot \pi \cdot 12^2 + 2 \cdot \pi \cdot 12 \cdot 30 \\ SA &= 288\pi + 720\pi \\ SA &= 1008\pi \text{ in.}^2 \end{aligned}$$



To find the surface area of a cone, we can use the following formula.

**Formula:** Surface Area =  $\pi r (r + \sqrt{h^2 + r^2})$

Example 2) Find the surface area of the cone.

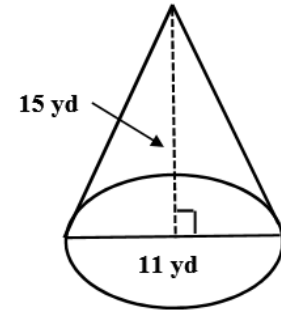
$$SA = \pi r (r + \sqrt{h^2 + r^2})$$

$$SA = \pi \cdot 5.5 (5.5 + \sqrt{15^2 + (5.5)^2})$$

$$SA = 5.5\pi (21.476545\dots)$$

$$SA = 371.08806\dots$$

$$SA \approx 371 \text{ yd}^2$$



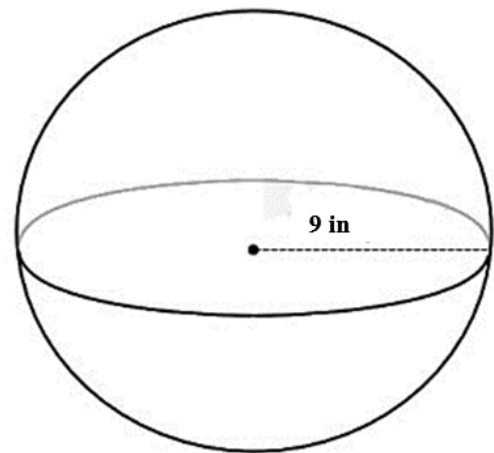
To find the surface area of a sphere, we can use the following formula.

**Formula:** Surface Area =  $4\pi r^2$

Example 3) Find the surface area of the sphere.

$$SA = 4 \cdot \pi \cdot 9^2$$

$$SA = 324\pi \text{ in}^2$$

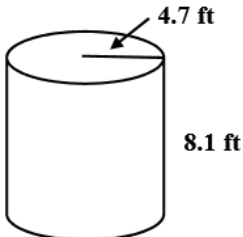
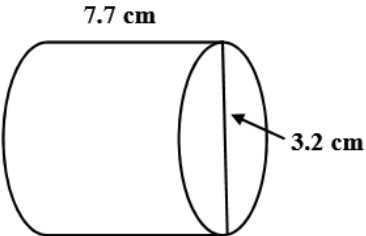


## Homework - Surface Area of Cylinders, Cones &amp; Spheres

Find the surface area of each of the following figures. Be sure to show your work step-by-step and label your answer with the correct units.

**This means you must:**

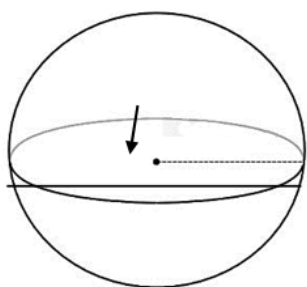
- Write the formula
- Show your substitution
- State your final answer including units

 <p>A cylinder is shown with a radius of 4.7 ft and a height of 8.1 ft.</p>	 <p>A cylinder is shown with a length of 7.7 cm and a radius of 3.2 cm.</p>
<p>Surface Area</p>	<p>Surface Area</p>

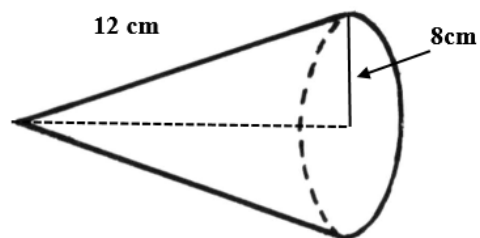
Find the surface area of each of the following figures. Be sure to show your work step-by-step and label your answer with the correct units.

**This means you must:**

- Write the formula
- Show your substitution
- State your final answer including units



**Surface Area**



**Surface Area**