

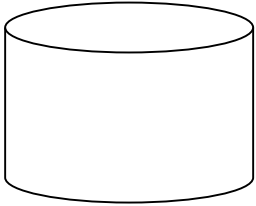
Date: KEY

### 5.4 Surface Area of a Cylinder

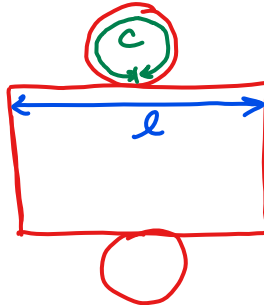
Review:

A cylinder is a 3d shape with two \_\_\_\_\_ and \_\_\_\_\_ bases

The net of a cylinder is made up of one lateral surface and two circular bases.



Draw the net:



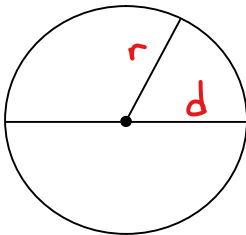
NOTICE:

$$l = C$$

So

$$l = 2\pi r$$

The circle at the top and bottom of the cylinder is important for finding the surface area of the cylinder:



Label the diameter and radius on the circle.

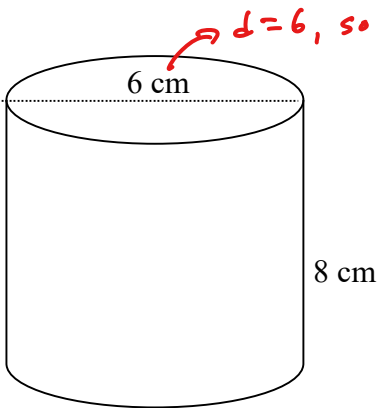
Which is used to find the circumference of the circle? BOTH

$$C = 2\pi r \quad \text{OR} \quad C = \pi d$$

Which is used to find the area of the circle? RADIUS

$$A = \pi r^2$$

Find the surface area of the cylinder shown:



Find the area of the top and bottom:

$$\begin{aligned} A &= \pi r^2 \\ &= \pi (3)^2 \\ &= 28.27... \\ &= 28.3 \text{ cm}^2 \end{aligned}$$

using 3.14  
 $A = 28.26$

Find the area of the side:

$$\begin{aligned} A &= 2\pi rh \\ &= 2\pi (3)(8) \\ &= 150.79... \\ &= 150.8 \text{ cm}^2 \end{aligned}$$

SURFACE AREA IS TWO CIRCLES PLUS LATERAL SURFACE

$$\begin{aligned} SA &= 2(28.27...) \\ &\quad + 150.79... \\ &= 207.34... \\ &= 207.3 \text{ cm}^2 \end{aligned}$$

207.24

using 3.14  
 $A = 150.72$   
 $= 150.7 \text{ cm}^2$

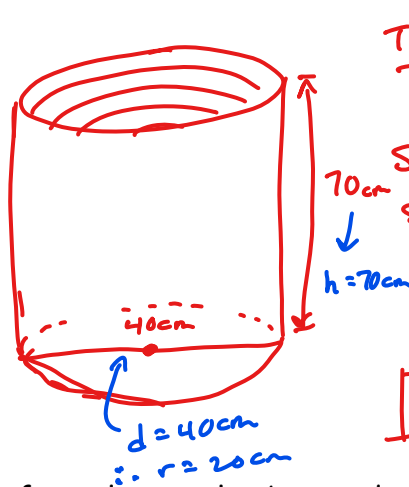
The total surface area of the cylinder is

207.3 cm<sup>2</sup>

↳ 207.2 cm<sup>2</sup>

Example:

Oscar is making a garbage can. It will be an open top cylinder. How much material does he need if the can has a diameter of 40 cm and a height of 70 cm?



THINK! ONLY ONE BASE!  
(NO TOP)

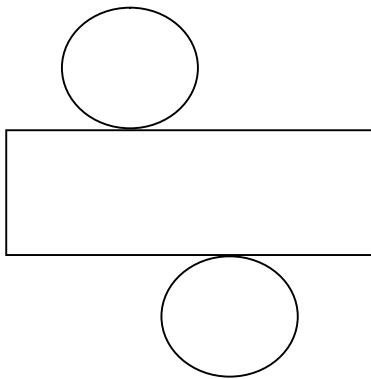
SA = ONE CIRCLE + LATERAL SURFACE

$$\begin{aligned} SA &= \pi r^2 + 2\pi r h \\ &= \pi(20)^2 + 2\pi(20)(70) \\ &= 10\,053.09\dots \end{aligned}$$

$$SA = 10\,053.1 \text{ cm}^2$$

using 3.14  
= 10 048  
= 10 048 cm<sup>2</sup>

A formula can also be used to find the surface area of a cylinder:



Think:

How do you find the area of 1 circle?  $\pi r^2$

Therefore, 2 circles is  $2\pi r^2$

How do you find the width of the rectangle?  $w = h$ ;  $l = 2\pi r$

Therefore, the area of the rectangle is  $2\pi r h$

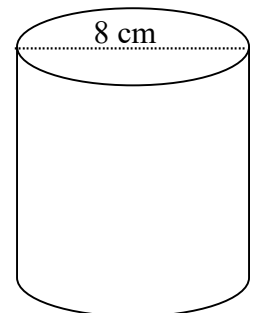
The formula for the surface area of a cylinder is:  
 $SA = 2\pi r^2 + 2\pi r h$

$$\begin{aligned} A_{\text{rectangle}} &= l \times w \\ &= 2\pi r \times h \end{aligned}$$

Find the surface area of the cylinder using the formula:

$$\begin{aligned} SA &= 2\pi r^2 + 2\pi r h \\ &= 2\pi(4)^2 + 2\pi(4)(10) \\ &= 351.85\dots \\ &= 351.9 \text{ cm}^2 \end{aligned}$$

using 3.14  
= 351.68  
= 351.7 cm<sup>2</sup>



You can cut out pieces of this isometric dot paper if you need to use them for your homework

