

LESSON
8.5
Surface Area

Learning Targets:

- a. I can apply the surface area formulas to solve problems involving prisms and cylinders

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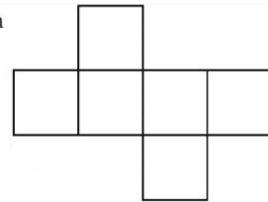
Warm-Up

This shape is composed of 6 squares with a side length equal to 8 cm.

What is the total area of the shape?

If you fold this shape, what solid will be formed?

What is the area of the outer surface of the solid?
Explain how you calculated your answer.





Surface Area

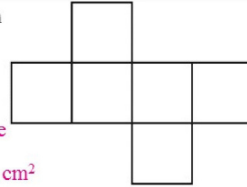
Launch

This shape is composed of 6 squares with a side length equal to 8 cm.

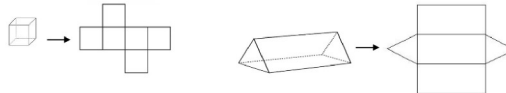
What is the total area of the shape? 384 cm^2

If you fold this shape, what solid will be formed? *cube*

What is the area of the outer surface of the solid? 384 cm^2
 Explain how you calculated your answer.



A cube or a triangular prism can be unfolded as follows:

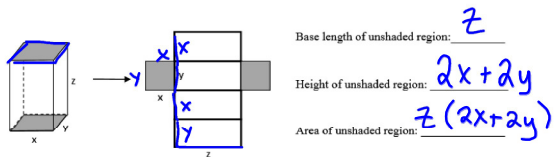


These are called **nets**.

Combine the areas of all faces to get the total area.

Surface Area: The total area of all faces of a solid.

Investigation: Use the prism below and its net to find the area of the unshaded region in terms of x , y , and z .



Lateral Area: The sum of the areas of the lateral faces, equal to the perimeter of the base times the height of the prism.

LA = Ph , where P = perimeter of the base, and h = height of the prism.

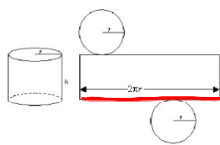
To find the **surface area of a prism**, combine the areas of the bases with the lateral area.

$$SA = LA + 2B$$

where LA = Lateral Area, and B = the area of a base of the prism.

Cylinders

We can also unfold cylinders to achieve the net shown below. Notice that the perimeter of bases (circumference) happens to be the base length of the rectangle. Use the net to find the following.



Area of one base: πr^2

Area of rectangle: $2\pi r \cdot h$

Total Area: $\underbrace{2\pi r h}_P + \underbrace{2\pi r^2}_B$

For a prism, the lateral area was $P \cdot h$. It is the same for a cylinder, except the perimeter in this case is $2\pi r$. Thus, the formula for the lateral area and surface area of a cylinder is the same as a prism.

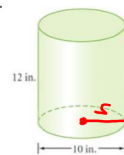
Lateral Area of a Cylinder: $LA = Ph$ or $LA = 2\pi rh$
 Surface Area of a Cylinder: $SA = LA + 2B$ or
 where P = perimeter of the base (circumference), h = height of the cylinder, and B = area of one base (πr^2).

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

Examples

Find the lateral area and surface areas of each.

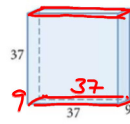
1.



$$\begin{aligned} P &= 2\pi r = 10\pi \\ LA &= 10\pi(12) \\ B &= \pi r^2 = 25\pi \\ SA &= 120\pi + 2(25\pi) \\ &= 120\pi + 50\pi \end{aligned}$$

Lateral Area: $120\pi \text{ in}^2$
 Surface Area: $170\pi \text{ in}^2$

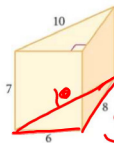
2.



$$\begin{aligned}
 P &= 92 \\
 LA &= (92)(37) \\
 B &= (9)(37) = 333 \\
 SA &= 3404 + 2(333)
 \end{aligned}$$

Lateral Area: 3404
 Surface Area: 4070

3.



$$\begin{aligned}
 P &= 24 \\
 LA &= 24(7) \\
 B &= \frac{1}{2}(6)(8) = 24 \\
 SA &= 168 + 2(24)
 \end{aligned}$$

Lateral Area: 168
 Surface Area: 216

Assignment:

8.5 Day 1 Practice