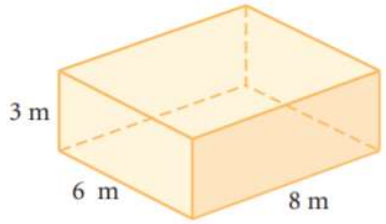
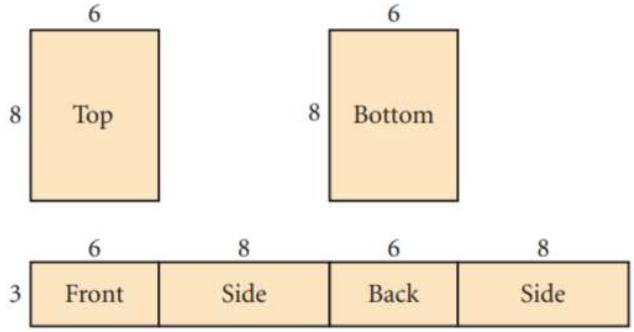
The **surface area** of a solid is the sum of the area of the faces or surfaces that enclose the solid.

Rectangular Prism Surface Area:

Find the surface area of the rectangular prism.



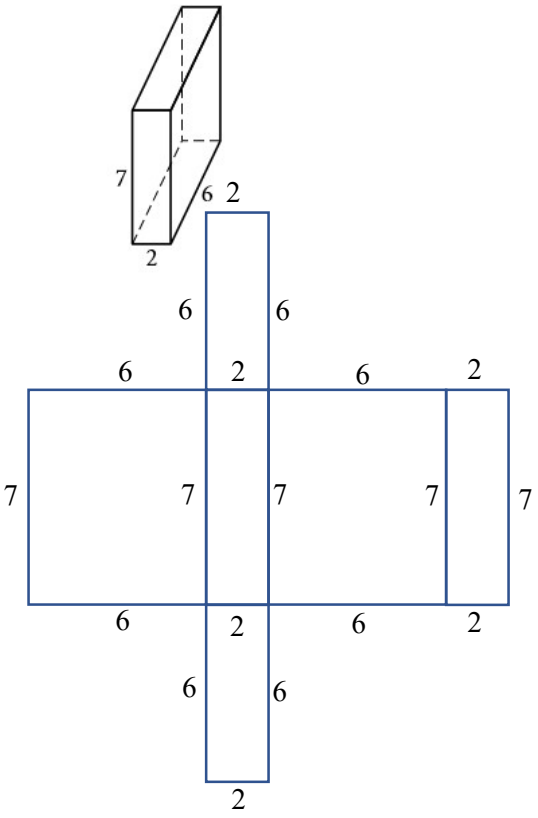
Draw and label the two congruent bases, and the four lateral faces unfolded into one rectangle. Then find the areas of all the rectangular faces.



$$\begin{aligned}\text{surface area} &= 2(\text{base area}) + (\text{lateral surface area}) \\ &= 2(6 \cdot 8) + 3(6 + 8 + 6 + 8) \\ &= 2(48) + 3(28) \\ &= 96 + 84 \\ &= 180\end{aligned}$$

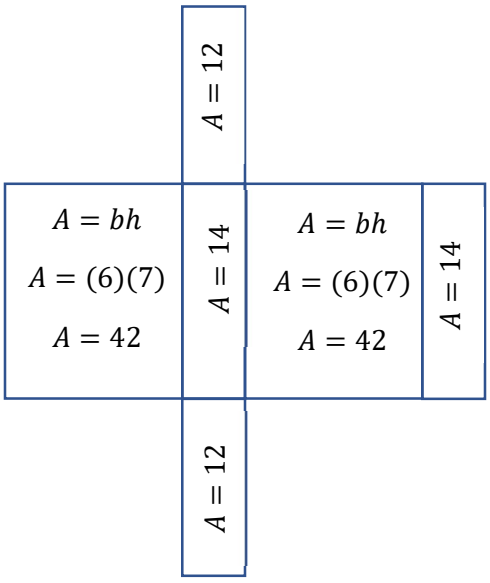
The surface area of the prism is 180 m^2.

Example 1: Surface Area of a Rectangular Prism



This is a net of the rectangular prism. I, obviously, went a little overboard on labeling sides, but I wanted to be sure that you recognize what all the measurements are for this net.

Now let's find the area of each of the faces of the rectangular prism.



To find the surface area, we add the area of the 6 faces.

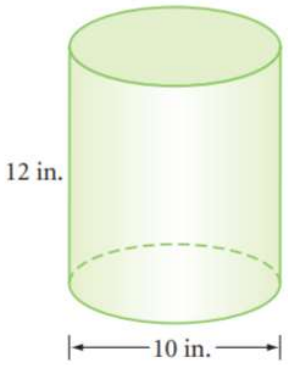
$$SA = 2(42) + 2(14) + 2(12)$$

$$SA = 84 + 28 + 24$$

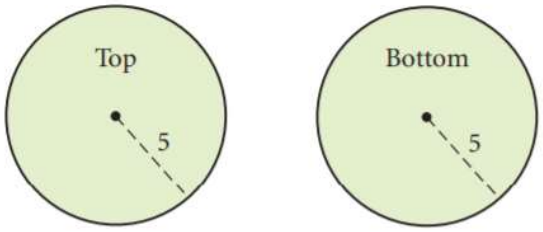
$$\boldsymbol{SA = 136 \text{ units}^2}$$

Cylinder Surface Area:

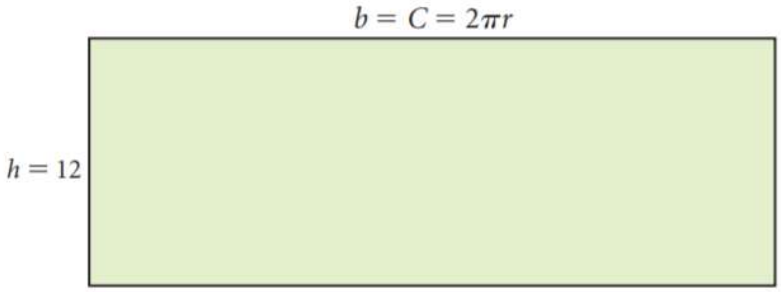
Find the surface area of the cylinder.



Imagine cutting apart the cylinder. The two bases are circular regions, so you need to find the areas of two circles. Think of the lateral surface as a wrapper. Slice it and lay it flat to get a rectangular region. You'll need the area of this rectangle. The height of the rectangle is the height of the cylinder. The base of the rectangle is the circumference of the circular base.



Bases

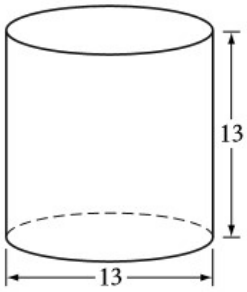


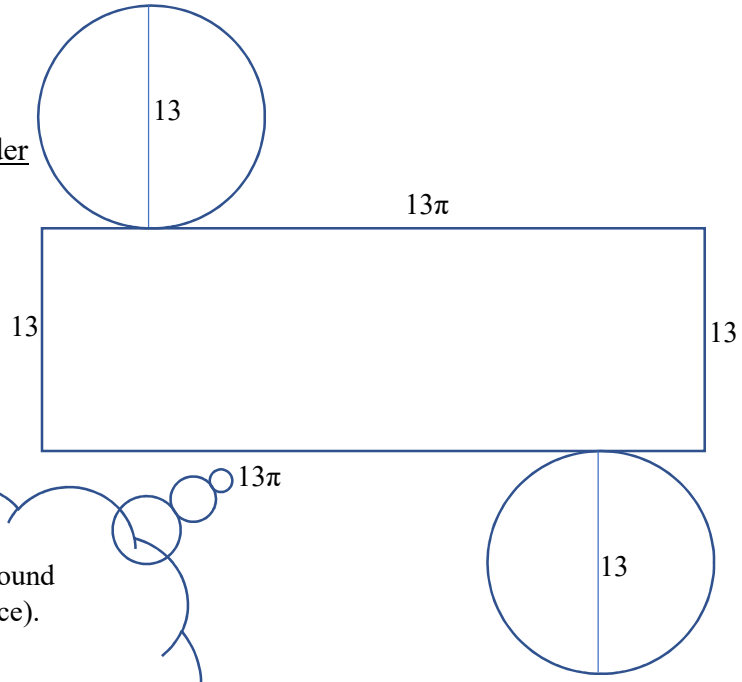
Lateral surface

$$\begin{aligned}\text{surface area} &= 2(\pi r^2) + (2\pi r)h \\ &= 2(\pi \cdot 5^2) + (2 \cdot \pi \cdot 5) \cdot 12 \\ &\approx 534\end{aligned}$$

The surface area of the cylinder is about 534 in^2.

Example 2: Surface Area of a Cylinder





This length will wrap around the circle (circumference).

$C = \pi d$

$C = \pi(13)$

$C = 13\pi$

The 13 is a diameter. The radius of the circle is half of that, or 6.5.

$A = \pi r^2$

$A = \pi(6.5)^2$

$A = 42.25\pi$

$A = bh$

$A = (13\pi)(13)$

$A = 169\pi$

$A = \pi r^2$

$A = \pi(6.5)^2$

$A = 42.25\pi$

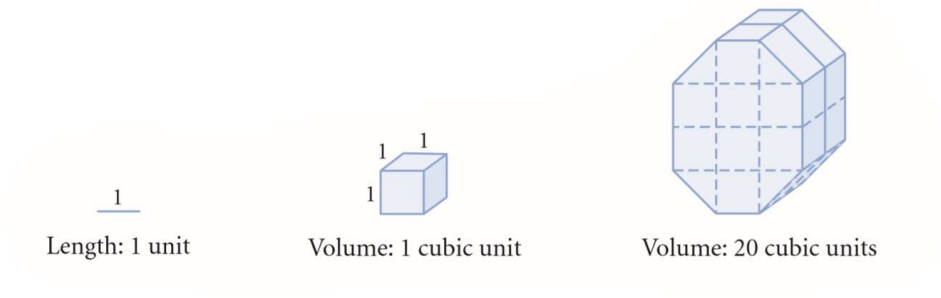
$SA = 2(42.25\pi) + 169\pi$

$SA = 84.5\pi + 169\pi$

$SA = 253.5\pi$ units^2

You should multiply π out and get an approximation. So, $\boldsymbol{SA \approx 796.39}$ **units^2**.

Volume is the measure of the amount of space contained in a solid.



Prism-Cylinder Volume Conjecture:

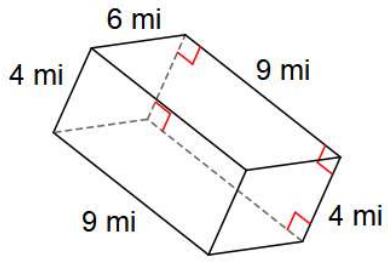
If B is the area of the base of a prism or cylinder and H is the height of the solid, then the formula for the volume is $V = BH$.

Important Area Formulas that you will need:

Rectangle: $A = bh$

Circle: $A = \pi r^2$

Example 3: Rectangular Prism Volume



The base is a rectangle.

**We can call any rectangle the base in a rectangular prism. For this problem, I will use the 9 mi by 6 mi rectangle as the base. That means that the height will be the distance between those two sides that are congruent (4 mi).

$B = bh$ **This is the area formula for a rectangle. We have used B to indicate that this will be the area of the base of the prism.

$B = (9)(6)$

$B = 54$ **Now that we have area of the base, we can find the volume.

$V = BH$

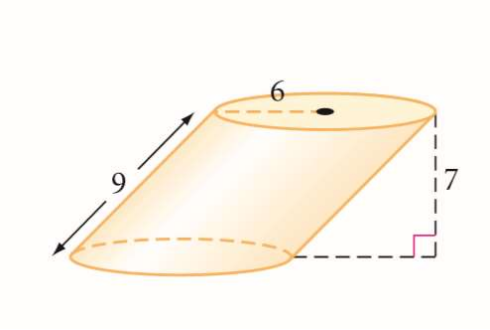
$V = (54)(4)$

$V = 216$

The volume of the rectangular prism is **216 mi^3**.

Example 4: Cylinder Volume

Find the volume of an oblique cylinder that has a base with a radius of 6 inches and a height of 7 inches.



The base is a circle.

$B = \pi r^2$

$B = \pi(6)^2$

$B = 36\pi$

$V = BH$

$V = (36\pi)(7)$ **Remember that the height should be perpendicular to the base.

$V = 252\pi$

The volume of the cylinder is 252π in^3, or about **791.68 in^3**.