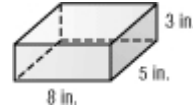
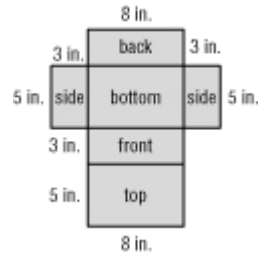


Lesson 12-4

Example 1 Find Surface Area Find the surface area of the rectangular prism.



You can use a net of the rectangular prism to find its surface area. There are three pairs of congruent faces.

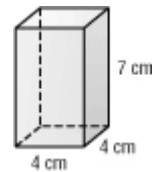


- top and bottom
- front and back
- two sides

Faces	Area
top and bottom	$2(8 \cdot 5) = 80$
front and back	$2(8 \cdot 3) = 48$
two sides	$2(3 \cdot 5) = 30$
Sum of the areas	$80 + 48 + 30 = 158$

The surface area is 158 square inches.

Example 2 Find Surface Area Find the surface area of the rectangular prism.



Replace ℓ with 4, w with 4, and h with 7.

$$\begin{aligned}\text{surface area} &= 2\ell w + 2\ell h + 2wh \\ &= 2 \cdot 4 \cdot 4 + 2 \cdot 4 \cdot 7 + 2 \cdot 4 \cdot 7 \\ &= 32 + 56 + 56 \\ &= 144\end{aligned}$$

Multiply first. Then add.

The surface area of the rectangular prism is 144 square centimeters.

Example 3 Use Surface Area to Solve a Problem

GIFTS Marybeth is wrapping a package 10 inches long, 3 inches wide, and 8 inches high. She bought a roll of wrapping paper that is 1 foot wide and 2 feet long. Did she buy enough to wrap the package?

Step 1 Find the surface area of the package.

Replace ℓ with 10, w with 3, and h with 8.

$$\begin{aligned}\text{surface area} &= 2\ell w + 2\ell h + 2wh \\ &= 2 \cdot 10 \cdot 3 + 2 \cdot 10 \cdot 8 + 2 \cdot 3 \cdot 8 \\ &= 60 + 160 + 48 \\ &= 268\end{aligned}$$

Step 2 Find the surface area of the wrapping paper.

$$\text{area} = 12 \text{ in.} \cdot 24 \text{ in. or } 288 \text{ square inches} \quad 1 \text{ foot} = 12 \text{ inches, } 2 \text{ feet} = 24 \text{ inches}$$

Since $288 > 268$, Marybeth bought enough wrapping paper.

Example 4 Use the Pythagorean Theorem

Find the surface area of a rectangular prism that has width 4 feet, diagonal 5 feet, and height 2 feet.

The width and height of the prism are given. To find surface area, you need to find the length of the prism. Notice that the diagonal, length, and width of the top face of the prism form a right triangle.

$$\begin{aligned}c^2 &= a^2 + b^2 \\ 5^2 &= 4^2 + b^2 \\ 25 &= 16 + b^2 \\ 25 - 16 &= 16 + b^2 - 16 \\ 9 &= b^2 \\ \pm 3 &= b\end{aligned}$$

The length of the prism is 3 feet. Find the surface area.

$$\begin{aligned}\text{surface area} &= 2\ell w + 2\ell h + 2wh \\ &= 2 \cdot 3 \cdot 4 + 2 \cdot 3 \cdot 2 + 2 \cdot 4 \cdot 2 \\ &= 24 + 12 + 16 && \text{Multiply first. Then add.} \\ &= 52\end{aligned}$$

The surface area of the prism is 52 square feet.