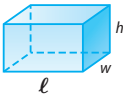
Key Concept

Surface Area of a Rectangular Prism

Work Zone

Words The surface area *S.A.* of a rectangular prism with base ℓ, width w, and height h is the sum of the areas of its faces.

Model



Symbols $S.A. = 2\ell h + 2\ell w + 2hw$

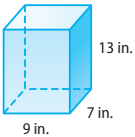
The sum of the areas of all the surfaces, or faces, of a three-dimensional figure is the **surface area**. In the previous Inquiry Lab, you used a net to find the surface area of a rectangular prism. You can also use a formula to find surface area.

When you find the surface area of a three-dimensional figure, the units are square units, not cubic units.

Example

Watch Tutor

1. Find the surface area of the rectangular prism shown at the right.



Replace ℓ with 9, w with 7, and h with 13.

surface area $= 2\ell h + 2\ell w + 2hw$

$= 2 \cdot 9 \cdot 13 + 2 \cdot 9 \cdot 7 + 2 \cdot 13 \cdot 7$

$= 234 + 126 + 182$ Multiply first. Then add.

$= 542$

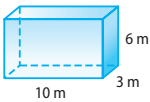
The surface area of the prism is 542 square inches.

Show your work.

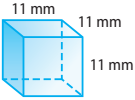
Got It? **Do these problems to find out.**

Find the surface area of each rectangular prism.

a.



b.



a. 216 m²

b. 726 mm²

Real World Example

Tutor

2. Domingo built a toy box 60 inches long, 24 inches wide, and 36 inches high. He has 1 quart of paint that covers about 87 square feet of surface. Does he have enough to paint the outside of the toy box? Justify your answer.

Step 1 Find the surface area of the toy box.

Replace ℓ with 60, w with 24, and h with 36.

$$\text{surface area} = 2\ell h + 2\ell w + 2hw$$
$$= 2 \cdot 60 \cdot 36 + 2 \cdot 60 \cdot 24 + 2 \cdot 36 \cdot 24$$
$$= 8{,}928 \text{ in}^2$$

Step 2 Find the number of square inches the paint will cover.

$1 \text{ ft}^2 = 1 \text{ ft} \times 1 \text{ ft}$ Replace 1 ft with 12 in.

$= 12 \text{ in.} \times 12 \text{ in.}$ Multiply.

$= 144 \text{ in}^2$

So, 87 square feet is equal to 87 × 144 or 12,528 square inches.

Since 12,528 > 8,928, Domingo has enough paint.

Consistent Units

Since the surface area of the toy box is expressed in inches, convert 87 ft^2 to square inches so that all measurements are expressed using the same units.

Got It? Do this problem to find out.

Show your work.

c. The largest corrugated cardboard box ever constructed measured about 23 feet long, 9 feet high, and 8 feet wide. Would 950 square feet of paper be enough to cover the box? Justify your answer.

c. Yes; the surface area of the box is 926 ft^2 and 950 ft^2 > 926 ft^2.

Surface Area of Triangular Prisms

To find the surface area of a triangular prism, it is more efficient to find the area of each face and calculate the sum of all of the faces rather than using a formula.