

# Chapter 10 Lesson 3

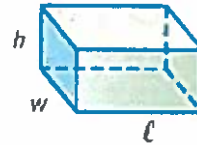
## Surface Area of Rectangular Prisms

$$SA = 2lh + 2lw + 2hw$$

**Surface Area:** sum of the areas of all the surfaces (faces) of a three-dimensional figure.

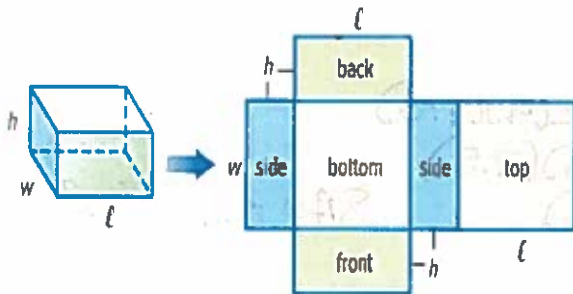
**Words** The surface area S.A. of a rectangular prism with length  $\ell$ , width  $w$ , and height  $h$  is the sum of the areas of the faces.

**Model**



**Symbols**  $S.A. = 2lh + 2lw + 2hw$

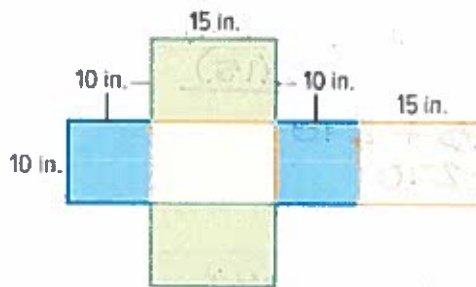
The surface area of a prism is the sum of the areas of its faces.



$$\left. \begin{array}{l} \text{front and back: } \ell h + \ell h = 2\ell h \\ \text{top and bottom: } \ell w + \ell w = 2\ell w \\ \text{two sides: } hw + hw = 2hw \end{array} \right\} 2\ell h + 2\ell w + 2hw$$

### EXAMPLES:

Find the surface area of the rectangular prism.



$$\begin{aligned} SA &= 2\ell h + 2\ell w + 2hw \\ SA &= 2(15)(10) + 2(15)(10) + 2(10)(10) \\ SA &= 300 + 2(15)(10) + 2(10)(10) \\ SA &= 300 + 300 + 2(10)(10) \\ SA &= 300 + 300 + 200 \\ SA &= 600 + 200 \\ SA &= 800 \text{ in}^2 \end{aligned}$$



$$\begin{aligned} SA &= 2\ell h + 2\ell w + 2hw \\ SA &= 2(12.7)(4.3) + 2(12.7)(8.1) + 2(4.3)(8.1) \\ SA &= 109.22 + 2(12.7)(8.1) + 2(4.3)(8.1) \\ SA &= 109.22 + 205.74 + 2(4.3)(8.1) \\ SA &= 109.22 + 205.74 + 69.66 \\ SA &= 314.96 + 69.66 \\ SA &= 384.62 \text{ cm}^2 \end{aligned}$$

**PS Identify Repeated Reasoning** Chrissy is making a bird nesting box for her backyard.



a. What is the surface area of the nesting box, including the hole? 316.5 in<sup>2</sup>

b. What is the surface area if the width of 7.5 inches is doubled? 534 in<sup>2</sup>

c. What is the surface area if the width of 7.5 inches is half as great? 207.75 in<sup>2</sup>

### SHOW WORK BELOW

A.  $SA = 2lw + 2lh + 2hw$   
 $SA = 2(5.5)(7.5) + 2(5.5)(9) + 2(9)(7.5)$   
 $SA = 82.5 + 2(5.5)(9) + 2(9)(7.5)$   
 $SA = 82.5 + 99 + 2(9)(7.5)$   
 $SA = 82.5 + 99 + 135$   
 $SA = 181.5 + 135$   
 $SA = 316.5$   $SA = 316.5 \text{ in}^2$

B.  $SA = 2lh + 2lw + 2hw$   
 $SA = 2(5.5)(9) + 2(5.5)(15) + 2(9)(15)$   
 $SA = 99 + 2(5.5)(15) + 2(9)(15)$   
 $SA = 99 + 165 + 2(9)(15)$   
 $SA = 99 + 165 + 270$   
 $SA = 264 + 270$   
 $SA = 534$   $SA = 534 \text{ in}^2$

C.  $SA = 2lh + 2lw + 2hw$   
 $SA = 2(5.5)(9) + 2(5.5)(3.75) + 2(9)(3.75)$   
 $SA = 99 + 2(5.5)(3.75) + 2(9)(3.75)$   
 $SA = 99 + 41.25 + 2(9)(3.75)$   
 $SA = 99 + 41.25 + 67.5$   
 $SA = 140.25 + 67.5$   
 $SA = 207.75$   $SA = 207.75 \text{ in}^2$