LESSON 12.3

Surface Area of Rectangular Prisms

BEFORE You found the areas of rectangles and squares.

Now You'll find the surface area of rectangular prisms.

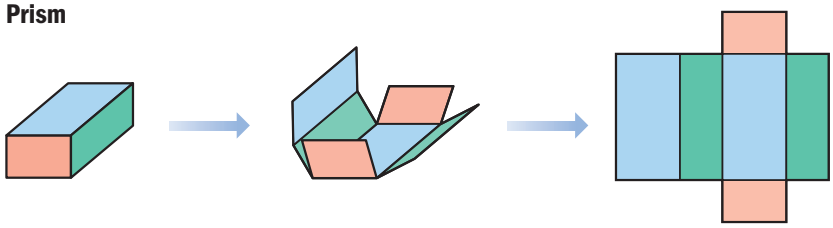
WHY? So you can find how much wrapping paper is needed, as in Ex. 14.

Word Watch

surface area, p. 594
net, p. 594

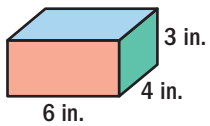
The **surface area** of a solid is the sum of the areas of its outside surfaces. The two-dimensional representation of a solid is called a **net**. The surface area of a rectangular prism is equal to the area of its net.

Rectangular Prism → **Unfold.** → **Net**



EXAMPLE 1 Finding Surface Area Using a Net

Find the surface area of the rectangular prism.



HELP with Solving

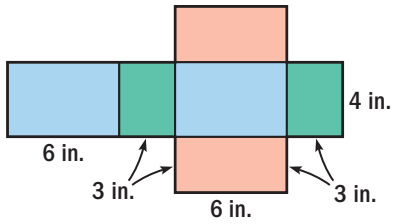
In this book, every rectangular prism is also a *right prism*, which means that the edges connecting the bases are perpendicular to the bases.

(1) Find the area of each face.

Area of top or bottom: $6 \times 4 = 24$

Area of front or back: $6 \times 3 = 18$

Area of either side: $4 \times 3 = 12$



(2) Add the areas of all six faces.

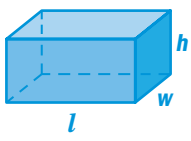
$24 + 24 + 18 + 18 + 12 + 12 = 108$

ANSWER The surface area of the prism is 108 square inches.

Surface Area of a Rectangular Prism

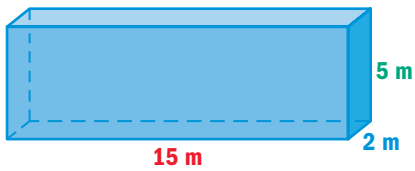
Words The surface area S of a rectangular prism is the sum of the areas of its faces.

Algebra $S = 2lw + 2lh + 2wh$



EXAMPLE 2 Finding Surface Area Using a Formula

Find the surface area of the rectangular prism.



$S = 2lw + 2lh + 2wh$ — Write formula for surface area.

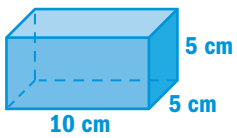
$= 2(15)(2) + 2(15)(5) + 2(2)(5)$ — Substitute 15 for l, 2 for w, and 5 for h.

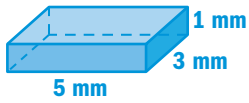
$= 60 + 150 + 20$ — Multiply.

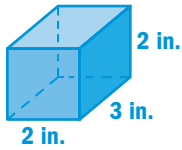
$= 230$ — Add.

ANSWER The surface area of the prism is 230 square meters.

Your turn now **Find the surface area of the rectangular prism. Check your answer by finding the area of the prism's net.**

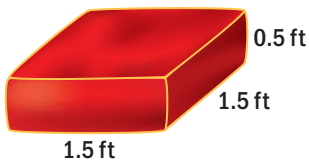
1. 

2. 

3. 

EXAMPLE 3 Using Surface Area

Stadium Cushion You are making the stadium cushion shown. The foam for the cushion costs \$1.50, and the fabric costs \$.50 per square foot. How much does it cost to make the cushion?



Solution

(1) Find the surface area of the cushion.

$S = 2lw + 2lh + 2wh$ — Write formula.

$= 2(1.5)(1.5) + 2(1.5)(0.5) + 2(1.5)(0.5)$ — Substitute values.

$= 7.5 \text{ ft}^2$ — Simplify.

(2) Find the cost of the fabric: $7.5 \text{ ft}^2 \times \$.50/\text{ft}^2 = \$3.75$

(3) Find the total cost of fabric and foam: $\$3.75 + \$1.50 = \$5.25$

ANSWER It costs \$5.25 to make the stadium cushion.

12.3 Exercises

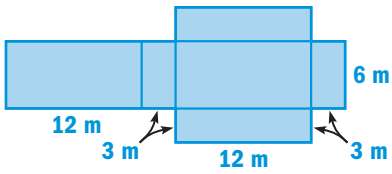
More Practice, p. 716

INTERNET eWorkbook Plus CLASSZONE.COM

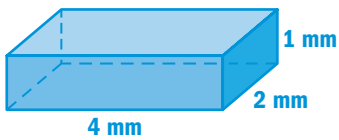
Getting Ready to Practice

1. **Vocabulary** Copy and complete: The ? of a rectangular prism is the sum of the areas of its faces.

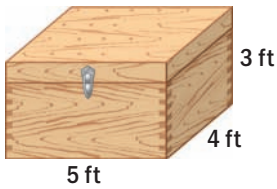
2. Find the surface area of the rectangular prism whose net is shown.



3. Find the area of each face of the rectangular prism. Then find the surface area of the prism.



4. **Storage Box** You are building a storage box out of plywood using the dimensions shown. Plywood costs $1.50 per square foot. Find the total cost of the plywood.



Practice and Problem Solving

HELP with Homework

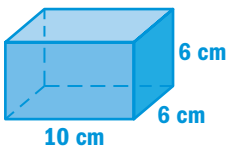
Example	Exercises
1	5–7
2	8–13, 15–16
3	14, 18

Online Resources CLASSZONE.COM

- More Examples
- eTutorial Plus

Draw a net for the rectangular prism. Then use the net to find the surface area of the prism.

5.



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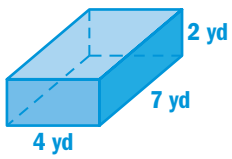

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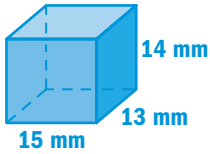
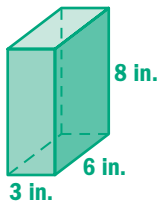


Find the surface area of the rectangular prism.

8.



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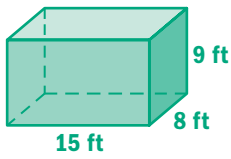

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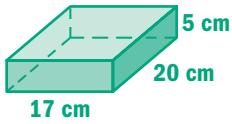

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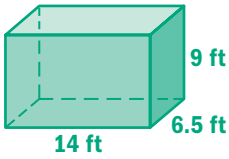

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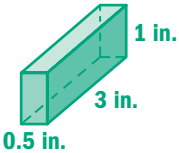

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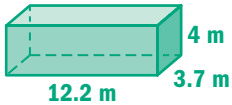


14. Wrapping Paper You are wrapping a gift box that is 18 inches by 12 inches by 3 inches. What is the least amount of wrapping paper you need in order to wrap the box?

Find the surface area of a rectangular prism with the given dimensions.

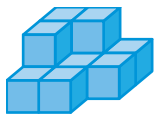
15. 2 m by 15 cm by 1.2 m

16. 3.5 ft by 10 in. by 6 in.

17. Algebra Find the width of a rectangular prism that is 12 inches high, 27 inches long, and has a surface area of 1194 square inches.

18. Photo Cube The length of each edge of a photo cube is 3 inches. Does the photo cube have more or less viewing surface than a flat photograph that is 8 inches wide and 10 inches long? Explain.

19. Unit Cubes The solid shown is made of unit cubes where each edge is 1 unit. None of the hidden cubes are missing. What is the surface area of the solid?



20. Challenge A room is 13 feet long, 11 feet wide, and 10 feet high. In the room, there are three windows that are each 4 feet wide and 5 feet tall. If one gallon of paint covers 350 square feet, how many gallons of paint do you need to paint the walls and door of the room? Explain.

Mixed Review

Find the diameter and the radius of the circle with the given circumference. Use 3.14 for π. *(Lesson 11.6)*

21. $C = 69.08$ mm

22. $C = 116.18$ ft

23. $C = 142.87$ cm

24. Sketch a cube. *(Lesson 12.2)*

Basic Skills **Evaluate the expression when $s = 5$ and $t = 7$.**

25. $7s + 3t$

26. $4(3.14)s$

27. $2(3.14)st$

28. $6.28s(2 + t)$

Test-Taking Practice

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29. Multiple Choice What is the surface area of a rectangular prism that is 8 inches long, 4 inches wide, and 12 inches high?

A. 176 in.^{2} **B.** 332 in.^{2} **C.** 352 in.^{2} **D.** 384 in.^{2}

30. Multiple Choice If the length, width, and height of a rectangular prism are all doubled, by how much does the surface area increase?

F. 2 times **G.** 4 times **H.** 8 times **I.** 16 times