## Objective

Find the surface area of a rectangular solid.

## Common Core State Standards

■ **6.G.4** Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

**Geometry**

# Surface Area of a Rectangular Solid

Using a model to explore and find surface area helps students distinguish surface area from volume and helps them visualize the dimensions of each face of a solid. In this lesson, students build a rectangular solid and use it to find surface area and to develop a formula for finding surface area.

**Try It!** *Perform the Try It! activity on the next page.*

## Talk About It

Discuss the Try It! activity.

■ **Ask:** *How are all rectangular solids alike? How can they be different?*
■ **Ask:** *What does each square unit in the model represent?*
■ **Say:** *Pairs of faces on a rectangular solid are congruent.* **Ask:** *How can you use this fact to help you find the total surface area?*
■ **Ask:** *How can a net help you find the surface area of a solid?*

## Solve It

Reread the problem with students. Have them explain how to find the surface area of a rectangular solid. Have students cut out their net and fold and tape it to make the prism.

## More Ideas

For other ways to teach about surface area of rectangular solids—

■ Students work in pairs, using Centimeter Cubes to build two models of rectangular solids in which the dimensions of one are twice the dimensions of the other, such as 4 × 6 × 2 and 2 × 3 × 1. Have students find and compare the surface areas of the solids.

■ Have students make nets of the rectangular prisms in a set of Relational GeoSolids®. Students can draw a unit grid on each face of a net and count squares to find the total surface area in arbitrary square units.

## Formative Assessment

Have students try the following problem.

*How much construction paper does Bryant need to cover a pencil box that is 14 inches long, 6 inches wide, and 1 inch high?*

**A.** 84 square inches

**C.** 202 square inches

**B.** 188 square inches

**D.** 208 square inches

## Try It! 40 Minutes | Groups of 4

Here is a problem about the surface area of a rectangular solid.

*Teri plans to cover all sides of a jewelry box in fabric. How much fabric does she need if the length of the jewelry box is 6 inches, the width is 4 inches, and the height is 2 inches? Write a formula for the surface area of a rectangular solid.*

Introduce the problem. Then have students do the activity to solve the problem. Distribute Snap Cubes, paper, pencils, scissors, and tape to students. **Say:** *The surface area of a rectangular solid is the sum of the areas of its faces.*

### Materials
- Snap Cubes® (50 per group)
- paper (2 sheets per group)
- pencils (1 per group)
- scissors (1 per group)
- tape (1 per group)



**1. Say:** *Use Snap Cubes to build a rectangular solid that is 6 units long, 4 units wide, and 2 units high.* **Ask:** *How many faces does the solid have? How many pairs of faces are congruent?* Students should see that there are six faces and three pairs of congruent faces.



**2. Ask:** *How can you find the areas of the faces of the rectangular solid?* Guide students to see that they can count the number of square units on the faces or they can multiply the dimensions of the faces. **Say:** *Record the areas of the faces. Add the areas of the faces to get the total surface area.*



**3. Say:** *You can write a formula for surface area.* **Ask:** *Which dimensions do you multiply together for each pair of faces?* Encourage students to use their models to see that they multiply length by width, length by height, and width by height. Help them write the formula.
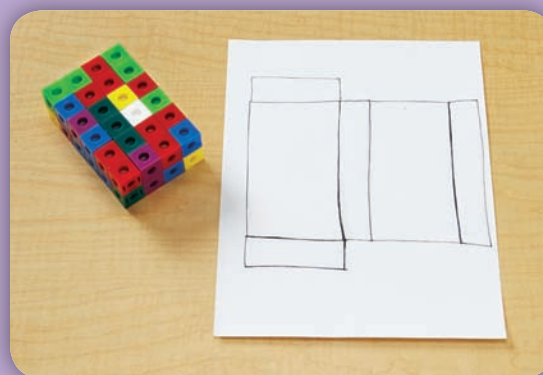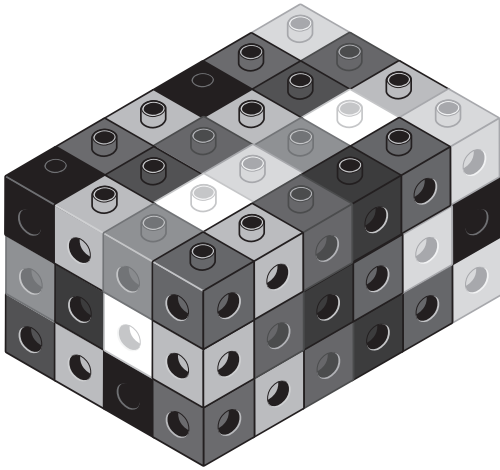


**4.** To enhance students' visual sense of the problem, have students draw a net of the solid. Encourage students to make the net actual size by tracing the solid's faces. **Ask:** *How does the net help you visualize the problem?* Students can draw the unit squares on the faces.

**Use Snap Cubes to build the rectangular solid. Find the surface area.**

(Check students' work.)

**1.**

area of top surface ___ 24 square units

area of bottom surface ___ 24 square units

area of right side surface ___ 18 square units

area of left side surface ___ 18 square units

area of front surface ___ 12 square units

area of back surface ___ 12 square units

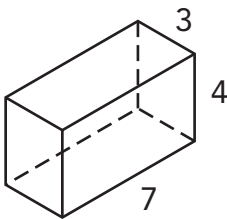**Total surface area** ___ 108 square units

**Using Snap Cubes, build the solid with the given dimensions. Sketch the model. Find the surface area.**

**2.** length: 5 units, width: 4 units, and height: 5 units
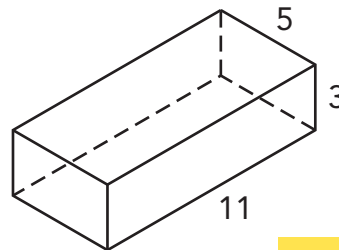
130 square units

**Find the surface area of each rectangular solid.**

**3.** 3 / 4 / 7

122 square units

**4.** 5 / 3 / 11

206 square units

**5.** length: 6 units width: 4 units height: 1 unit

68 square units

**6.** length: 9 units width: 2 units height: 2 units

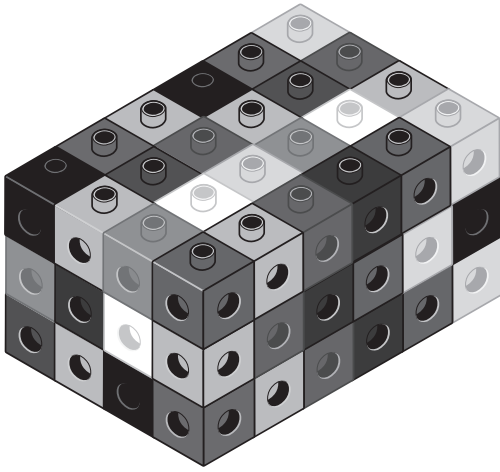80 square units

# *Answer Key*

**Challenge!**   How many faces does a rectangular solid have? How are these faces used to find the surface area of the solid?

Challenge: (Sample) 6; Find the area of each face. Add the areas of all six faces to find the total surface area.

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Name _____

**Use Snap Cubes to build the rectangular solid. Find the surface area.**

**1.**



area of top surface _____

area of bottom surface_____

area of right side surface _____

area of left side surface _____
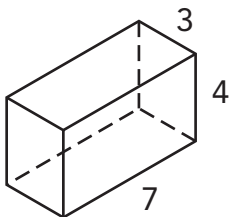
area of front surface _____

area of back surface _____

**Total surface area** _____

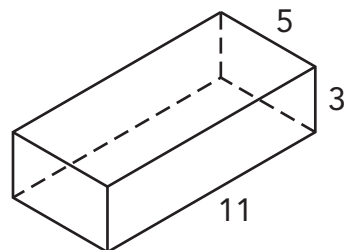**Using Snap Cubes, build the solid with the given dimensions. Sketch the model. Find the surface area.**

**2.**  length: 5 units, width: 4 units, and height: 5 units

_____

**Find the surface area of each rectangular solid.**

**3.**



3

4

7

_____

**4.**



5

3

11

_____

**5.**  length: 6 units
width: 4 units
height: 1 unit

_____

**6.**  length: 9 units
width: 2 units
height: 2 units

_____

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Name _____

**Challenge!**   How many faces does a rectangular solid have? How are these faces used to find the surface area of the solid?

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