

**Chapter Overview** One way you can help your student succeed in Chapter 12 is by discussing the lesson goals in the chart below. When a lesson is completed, ask your student the following questions. “What were the goals of the lesson? What new words and formulas did you learn? How can you apply the ideas of the lesson to your life?”

Lesson Title	Lesson Goals	Key Applications
<b>12.1: Explore Solids</b>	Identify solids.	<ul style="list-style-type: none"> <li>• House Construction</li> <li>• Puzzles</li> <li>• Music</li> </ul>
<b>12.2: Surface Area of Prisms and Cylinders</b>	Find the surface areas of prisms and cylinders.	<ul style="list-style-type: none"> <li>• Compact Discs</li> <li>• Bass Drum</li> <li>• Gift Box</li> </ul>
<b>12.3: Surface Area of Pyramids and Cones</b>	Find the surface areas of pyramids and cones.	<ul style="list-style-type: none"> <li>• Traffic Cone</li> <li>• Candles</li> <li>• Lampshade</li> </ul>
<b>12.4: Volume of Prisms and Cylinders</b>	Find the volume of prisms and cylinders.	<ul style="list-style-type: none"> <li>• Sculpture</li> <li>• Jewelry</li> <li>• Oceanography</li> </ul>
<b>12.5: Volume of Pyramids and Cones</b>	Find the volume of pyramids and cones.	<ul style="list-style-type: none"> <li>• Science</li> <li>• Cake Decoration</li> <li>• Popcorn</li> </ul>
<b>12.6: Surface Area and Volume of Spheres</b>	Find the surface areas and volumes of spheres.	<ul style="list-style-type: none"> <li>• Extreme Sports</li> <li>• Grain Silo</li> <li>• Geography</li> </ul>
<b>12.7: Explore Similar Solids</b>	Use properties of similar solids.	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Consumer Economics</li> <li>• Coffee Mugs</li> </ul>

### Big Ideas for Chapter 12

In Chapter 12, you will apply the big ideas listed in the Chapter Opener (see page 791) and reviewed in the Chapter Summary (see page 856).

1. Exploring solids and their properties
2. Solving problems using surface area and volume
3. Connecting similarity to solids

**Key Ideas** Your student can demonstrate understanding of key concepts by working through the following exercises with you.

Lesson	Exercise
<b>12.1</b>	A pyramid has 7 vertices and 12 edges. How many faces does it have? What is the shape of the pyramid's base?
<b>12.2</b>	A cereal box measures 8 centimeters by 20 centimeters by 28 centimeters. Not counting overlap, how much cardboard would it take to make the box?
<b>12.3</b>	Find the surface area of a cone with radius 9 inches and height 12 inches.
<b>12.4</b>	A cylindrical silo has a radius of 3 meters and a height of 10 meters. How much grain can it hold?
<b>12.5</b>	Find the volume of a pyramid with a square base that is 70 feet on a side and has a height of 90 feet.
<b>12.6</b>	Earth's radius is about 4000 miles. What is the surface area of Earth? The Pacific Ocean covers approximately 64,186,300 square miles. What percent is this of Earth's surface?
<b>12.7</b>	A cone has a volume of $81\pi$ cubic meters. A similar cone has a volume of $192\pi$ cubic meters. Find their scale factor.

### Home Involvement Activity

**Directions** Cut a 12 by 12 square out of grid paper. Cut a 1 by 1 square out of each corner and fold to form an open-top box. Find the volume of the box. Repeat by cutting a 2 by 2 square out of each corner, then a 3 by 3 square, and so on. What are the integer dimensions of the box that maximizes volume while using the 12 by 12 square? Start with a different rectangular shape and try to guess what dimensions will maximize volume. Calculate to check.

### Answers

**12.1:** 7 faces; hexagon **12.2:**  $1888\text{ cm}^2$  **12.3:** about  $678.6\text{ in.}^2$  **12.4:**  $282.7\text{ m}^3$   
**12.5:**  $147,000\text{ ft}^3$  **12.6:**  $201,061,930\text{ mi}^2$ ; about 32% **12.7:** 3 : 4  
**Home Involvement Activity:** An 8 by 8 by 2 box has the maximum volume.