

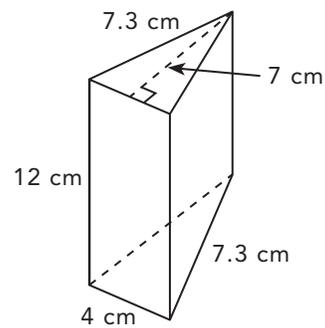
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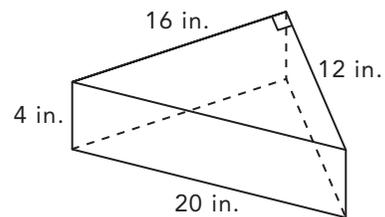
## Lesson 12.2 Surface Area of Solids

### Solve. Show your work.

1. A cube has edges measuring 9 inches each. Find the surface area of the cube.
2. A rectangular shipping container measures 20 feet by 8 feet by 6 feet. Find the surface area of the shipping container.
3. A triangular prism with its measurements is shown. Find the surface area of the prism.



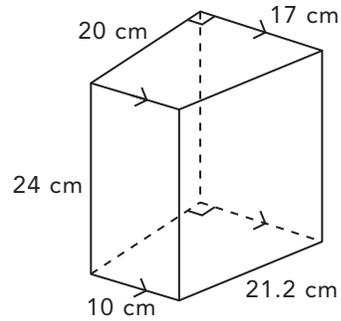
4. A wedge of cheese in the shape of a triangular prism is shown below. Find the surface area of the cheese.



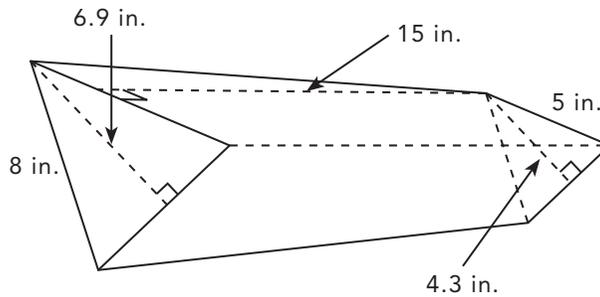
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5. A block of wood is shaped like a prism with bases that are trapezoids. The block of wood has the measurements shown. What is the surface area of the block of wood?



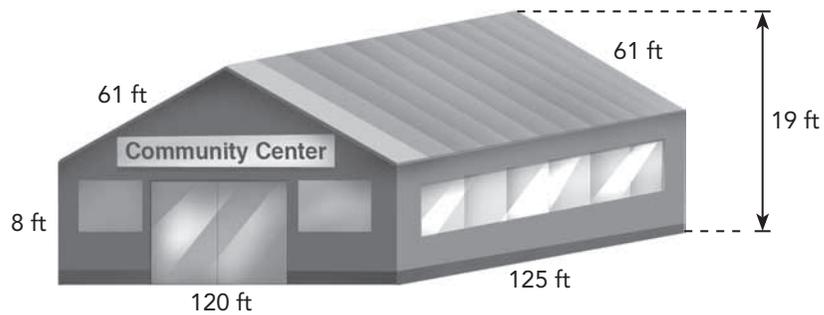
6. This solid consists of three identical trapezoidal faces and two equilateral triangular bases. The side lengths of the small triangular base is 5 inches and the side lengths of the large triangular base is 8 inches. The height of each trapezoidal face is 15 inches. Find the surface area of the solid.



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7. A community center is a prism with bases that are pentagons, and has the dimensions shown in the diagram.



The external walls of the community center are to be painted. The doors and windows total 225 square feet and are not going to be painted. Find the total area of the walls that need to be painted.

8. A prism has  $m$  vertices. Write an expression for each of the following.
- the number of sides of each base
  - the number of edges, and
  - the number of faces.

### Lesson 12.2

- Area of one square face  
 $= 9 \cdot 9 = 81 \text{ in.}^2$   
Surface area of cube  
 $= 81 \cdot 6 = 486 \text{ in.}^2$   
The surface area of the cube is 486 square inches.
- Area of two rectangular bases  
 $= 2 \cdot 20 \cdot 8 = 320 \text{ ft}^2$   
Total area of the other four rectangular faces  
 $= (20 + 8 + 20 + 8) \cdot 6$   
 $= 336 \text{ ft}^2$   
Surface area of rectangular prism  
 $= 320 + 336 = 656 \text{ ft}^2$   
The surface area of the rectangular prism is 656 square feet.
- Area of two triangular bases  
 $= \left(\frac{1}{2} \cdot 4 \cdot 7\right) \cdot 2 = 28 \text{ cm}^2$   
Total area of three rectangular faces  
 $= (4 + 7.3 + 7.3) \cdot 12 = 223.2 \text{ cm}^2$   
Surface area of prism  
 $= 28 + 223.2 = 251.2 \text{ cm}^2$   
The surface area of the prism is 251.2 square centimeters.
- Area of two triangular bases  
 $= \left(\frac{1}{2} \cdot 16 \cdot 12\right) \cdot 2$   
 $= 192 \text{ in.}^2$   
Area of the other three rectangular faces  
 $= (20 + 12 + 16) \cdot 4$   
 $= 192 \text{ in.}^2$   
Surface area of container  
 $= 192 + 192 = 384 \text{ in.}^2$   
The surface area of the container is 384 square inches.
- Area of two trapezoidal bases  
 $= \frac{1}{2} \cdot 20 \cdot (10 + 17) \cdot 2 = 540 \text{ cm}^2$   
Area of four rectangular faces  
 $= (20 + 10 + 21.2 + 17) \cdot 24$   
 $= 1,636.8 \text{ cm}^2$   
Surface area of prism  
 $= 540 + 1,636.8 = 2,176.8 \text{ cm}^2$   
The surface area of the prism is 2,176.8 square centimeters.
- Area of large triangular base  
 $= \frac{1}{2} \cdot 8 \cdot 6.9 = 27.6 \text{ in.}^2$   
Area of small triangular base  
 $= \frac{1}{2} \cdot 5 \cdot 4.3 = 10.75 \text{ in.}^2$   
Area of three trapezoidal faces  
 $= \frac{1}{2} \cdot 15 \cdot (8 + 5) \cdot 3 = 292.5 \text{ in.}^2$

$$\begin{aligned} \text{Surface area of solid} \\ &= 27.6 + 10.75 + 292.5 \\ &= 330.85 \text{ in.}^2 \end{aligned}$$

The surface area of the solid is 330.85 square inches.

- Area of one pentagonal base  
 $= (120 \cdot 8) + \frac{1}{2} \cdot 120 \cdot (19 - 8)$   
 $= 1,620 \text{ ft}^2$   
Area of two pentagonal bases  
 $= 1,620 \cdot 2 = 3,240 \text{ ft}^2$   
Area of two rectangular faces  
 $= 125 \cdot 8 \cdot 2 = 2,000 \text{ ft}^2$   
Total area of walls to be painted  
 $= (3,240 + 2,000) - 225 = 5,015 \text{ ft}^2$   
The total area of the walls that need to be painted is 5,015 square feet.
- a) Each base of the prism has  $\frac{m}{2}$  sides.  
b) The prism has  $1\frac{1}{2}m$  edges.  
c) The prism has  $\left(2 + \frac{m}{2}\right)$  faces.

### Lesson 12.3

- Volume  $= 8^3 = 512 \text{ in.}^3$   
The volume of the cube is 512 cubic inches.
- Volume  $= 3.5 \cdot 1.8 \cdot 2 = 12.6 \text{ ft}^3$   
The volume of the box is 12.6 cubic feet.
- Area of triangular base  
 $= \frac{1}{2} \cdot 9 \cdot 12 = 54 \text{ in.}^2$   
Volume  $= 54 \cdot 20 = 1,080 \text{ in.}^3$   
The volume of the triangular prism is 1,080 cubic inches.
- Volume of each cube  
 $= 3^3 = 27 \text{ in.}^3$   
There are 13 cubes.  
Volume of solid  $= 27 \cdot 13 = 351 \text{ in.}^3$   
The volume of the solid is 351 cubic inches.
- No. Ovals will have different dimensions with other cuts.
- No. Rectangles will have different dimensions with other cuts.
- Yes.
- Edge length of cube  $= \sqrt[3]{512} = 8 \text{ cm}$   
Area of each face  $= 8^2 = 64 \text{ cm}^2$   
The area of each face of the cube is 64 square centimeters.
- Area of square base  $= 5,880 \div 30 = 196 \text{ in.}^2$   
Side length of square base  $= \sqrt{196} = 14 \text{ in.}$   
The side length of the square base is 14 inches.