English Spanish

7.6b Volume and Surface Area

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Lesson Tutorials
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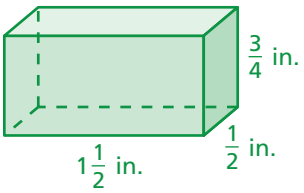
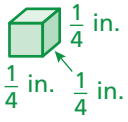
To find the volume of a rectangular prism, multiply the number of cubes needed to fill the prism by the volume of one of the cubes.

EXAMPLE 1 Finding the Volume of a Rectangular Prism

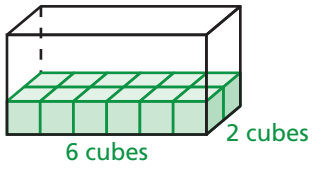


Use cubes to find the volume of the rectangular prism.

Use cubes with an edge length of $\frac{1}{4}$ inch.

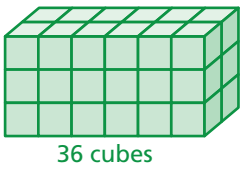


The bottom layer is 6 cubes long and 2 cubes wide. So, you need 6×2, or 12 cubes to cover the bottom layer.



To fill the prism, you need three layers of 12 cubes. So, you need 3×12, or 36 cubes.

The volume of each cube is $\left(\frac{1}{4}\right)^3 = \frac{1}{64}$ cubic inch.



∴ So, the volume of the prism is $36 \times \frac{1}{64} = \frac{9}{16}$ cubic inch.

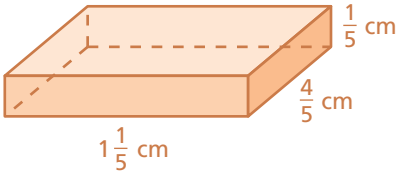
Check

$$V = Bh = \ell wh$$
$$= \left(1\tfrac{1}{2}\right)\left(\tfrac{1}{2}\right)\left(\tfrac{3}{4}\right)$$
$$= \left(\tfrac{3}{2}\right)\left(\tfrac{1}{2}\right)\left(\tfrac{3}{4}\right)$$
$$= \frac{9}{16} \text{ in.}^3 \checkmark$$

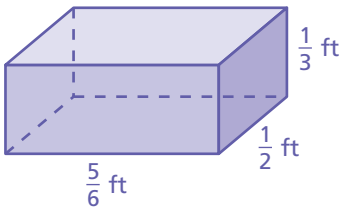
Practice

Use cubes with the given edge length to find the volume of the rectangular prism. Check your answer using the volume formula.

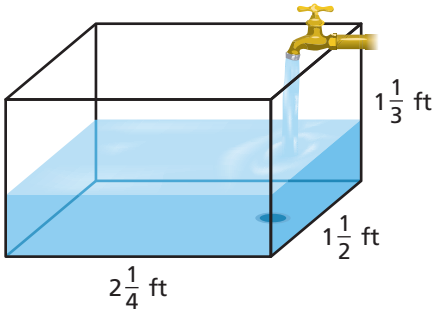
1. Edge length: $\frac{1}{5}$ cm



2. Edge length: $\frac{1}{6}$ ft



3. **SINK** A sink is shaped like a rectangular prism. How much water can the sink hold?



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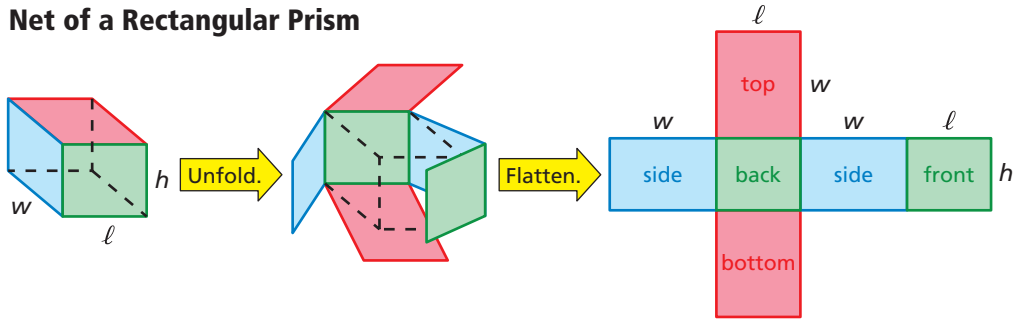
English Spanish

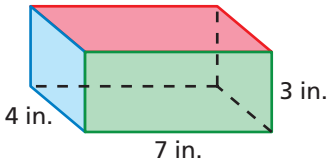
The **surface area** S of a three-dimensional figure is the sum of the areas of its faces. Surface area is measured in **square units**. You can find the surface area of a three-dimensional figure by using a two-dimensional representation of the figure called a **net**.

Key Idea

Net of a Rectangular Prism



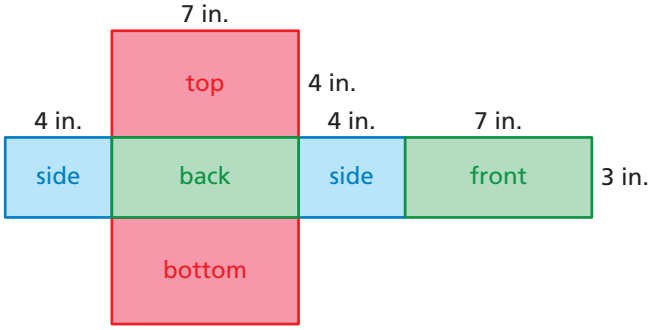
EXAMPLE 2 Finding the Surface Area of a Rectangular Prism



Find the surface area of the rectangular prism.

Use a net to find the area of each face.

Top: $7 \cdot 4 = 28$
Bottom: $7 \cdot 4 = 28$
Front: $7 \cdot 3 = 21$
Back: $7 \cdot 3 = 21$
Side: $4 \cdot 3 = 12$
Side: $4 \cdot 3 = 12$



Find the sum of the areas of the faces.

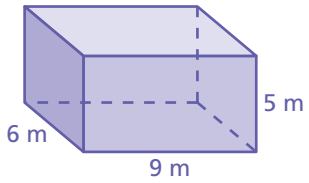
$$\begin{aligned} \text{Surface area} &= \text{Area of top} + \text{Area of bottom} + \text{Area of front} + \text{Area of back} + \text{Area of a side} + \text{Area of a side} \\ S &= 28 + 28 + 21 + 21 + 12 + 12 \\ &= 122 \end{aligned}$$

∴ The surface area is 122 square inches.

Practice

Find the surface area of the rectangular prism.

4.



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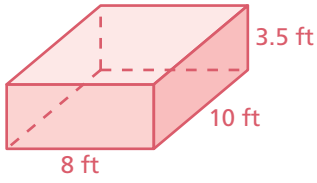


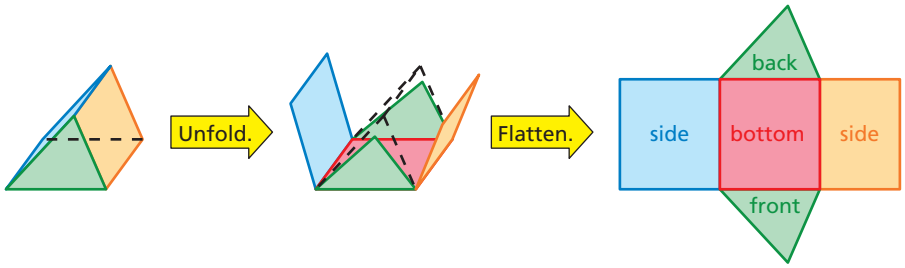
6.

English Spanish

Key Idea

Net of a Triangular Prism

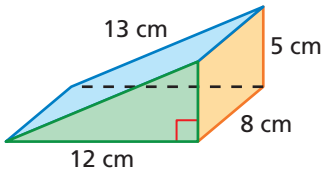
A **triangular prism** is a three-dimensional figure that has two triangular faces and three rectangular faces.



Remember

The area A of a triangle with base b and height h is $A = \frac{1}{2}bh$.

EXAMPLE 3 Finding the Surface Area of a Triangular Prism



Find the surface area of the triangular prism.

Use a net to find the area of each face.

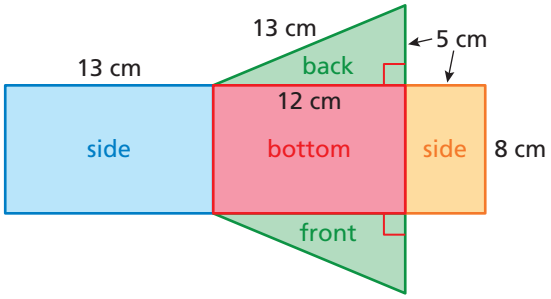
Bottom: $12 \cdot 8 = 96$

Front: $\frac{1}{2} \cdot 12 \cdot 5 = 30$

Back: $\frac{1}{2} \cdot 12 \cdot 5 = 30$

Side: $13 \cdot 8 = 104$

Side: $8 \cdot 5 = 40$



Find the sum of the areas of the faces.

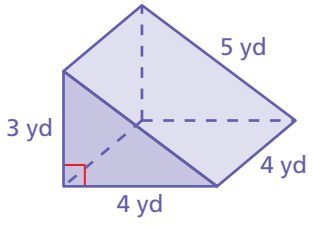
$$\begin{array}{rcccccccccc} \text{Surface area} & = & \text{Area of bottom} & + & \text{Area of front} & + & \text{Area of back} & + & \text{Area of a side} & + & \text{Area of a side} \\ S & = & 96 & + & 30 & + & 30 & + & 104 & + & 40 \\ & = & 300 & & & & & & & & \end{array}$$

∴ The surface area is 300 square centimeters.

Practice

Find the surface area of the triangular prism.

7.



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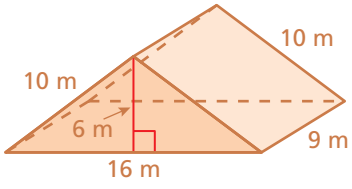


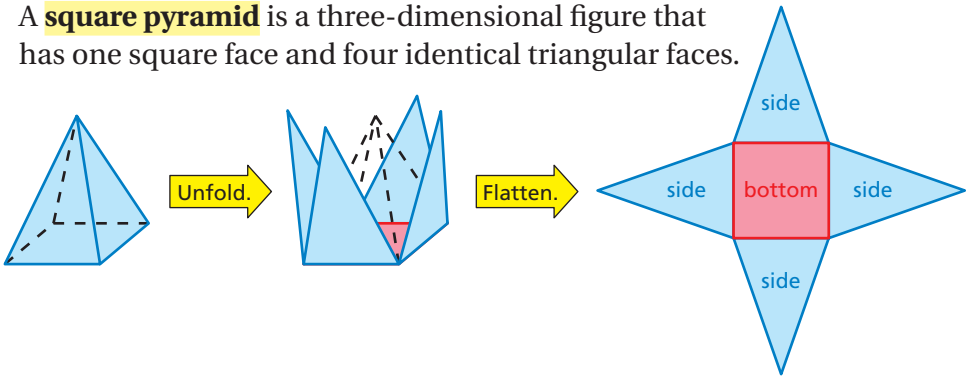
9.

English Spanish

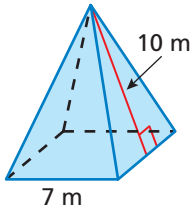
Key Idea

Net of a Square Pyramid

A **square pyramid** is a three-dimensional figure that has one square face and four identical triangular faces.



EXAMPLE 4 Finding the Surface Area of a Square Pyramid



Find the surface area of the square pyramid.

Use a net to find the area of each face.

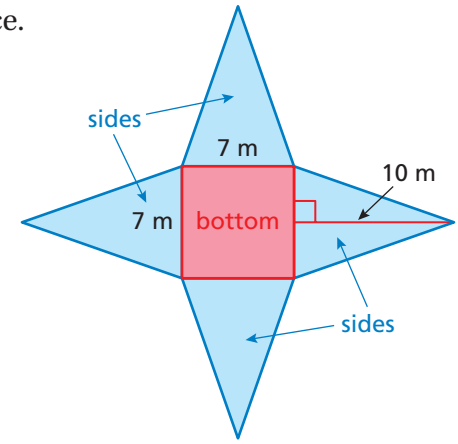
Bottom: $7 \cdot 7 = 49$

Side: $\frac{1}{2} \cdot 7 \cdot 10 = 35$

Side: $\frac{1}{2} \cdot 7 \cdot 10 = 35$

Side: $\frac{1}{2} \cdot 7 \cdot 10 = 35$

Side: $\frac{1}{2} \cdot 7 \cdot 10 = 35$



Find the sum of the areas of the faces.

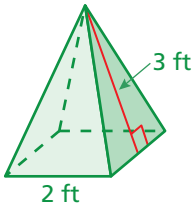
$$\begin{array}{rcl} \text{Surface area} & = & \text{Area of bottom} + \text{Area of a side} + \text{Area of a side} + \text{Area of a side} + \text{Area of a side} \\ S & = & 49 + 35 + 35 + 35 + 35 \\ & = & 189 \end{array}$$

∴ The surface area is 189 square meters.

Practice

Find the surface area of the square pyramid.

10.



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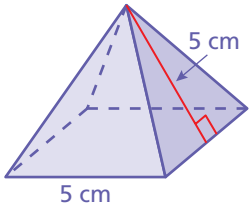

12.