

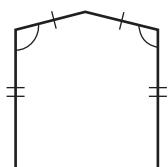
Name _____

Polygons

A **polygon** is a closed plane figure formed by three or more line segments that meet at points called vertices. You can classify a polygon by the number of sides and the number of angles that it has.

Congruent figures have the same size and shape. In a **regular polygon**, all sides are congruent and all angles are congruent.

Classify the polygon below.



Polygon	Sides	Angles	Vertices
Triangle	3	3	3
Quadrilateral	4	4	4
Pentagon	5	5	5
Hexagon	6	6	6
Heptagon	7	7	7
Octagon	8	8	8
Nonagon	9	9	9
Decagon	10	10	10

How many sides does this polygon have? 5 sides

How many angles does this polygon have? 5 angles

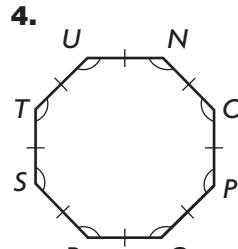
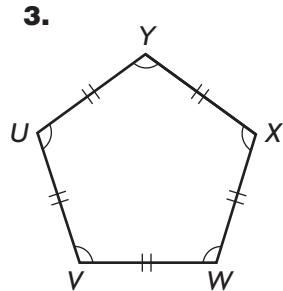
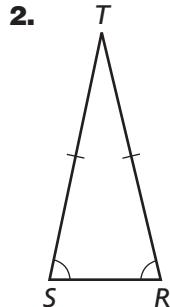
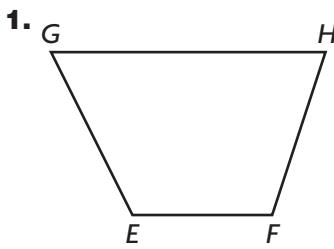
Name the polygon. pentagon

Are all the sides congruent? no

Are all the angles congruent? no

So, the polygon above is a pentagon. It is *not* a regular polygon.

Name each polygon. Then tell whether it is a *regular polygon* or *not a regular polygon*.



Polygon Practice

Write the number of sides and the number of angles that each polygon has. Then match each description to one of the polygons drawn below. Label the polygon with the exercise number of the description that matches the polygon.

1. regular decagon

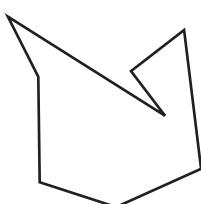
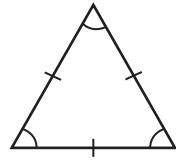
3. regular hexagon

5. regular octagon

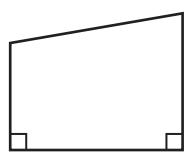
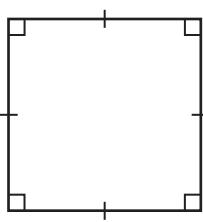
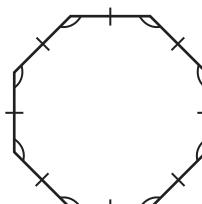
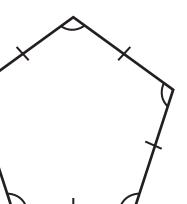
7. regular pentagon

9. regular quadrilateral

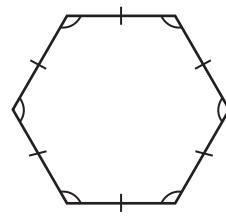
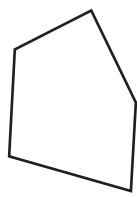
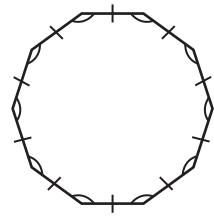
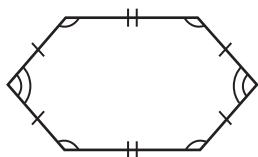
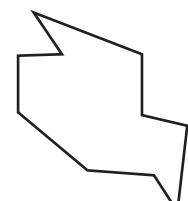
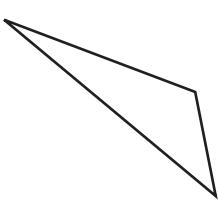
11. regular triangle



12. triangle that is not regular



10. quadrilateral that is not regular



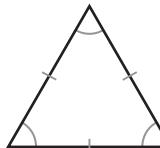
Triangles

You can classify triangles by the length of their sides and by the measure of their angles. **Classify each triangle.**

Use a ruler to measure the side lengths.

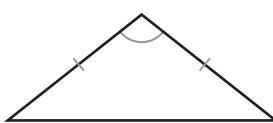
- **equilateral triangle**

All sides are the same length.



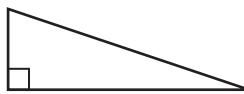
- **isosceles triangle**

Two sides are the same length.



- **scalene triangle**

All sides are different lengths.



Use the corner of a sheet of paper to classify the angles.

- **acute triangle**

All three angles are acute.

- **obtuse triangle**

One angle is obtuse. The other two angles are acute.

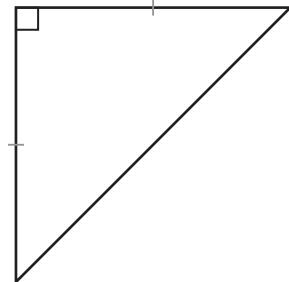
- **right triangle**

One angle is right. The other two angles are acute.

Classify the triangle according to its side lengths.

It has two congruent sides.

The triangle is an isosceles triangle.



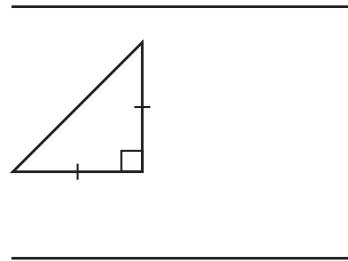
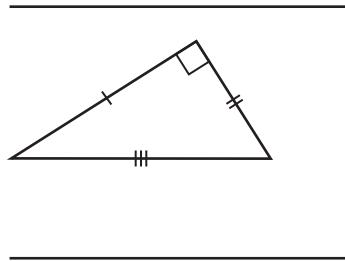
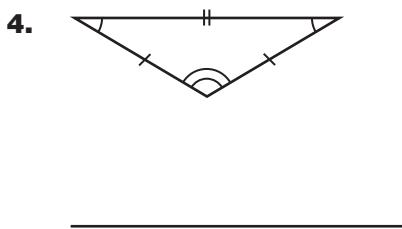
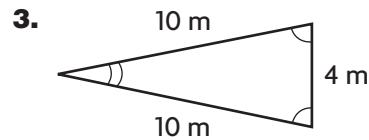
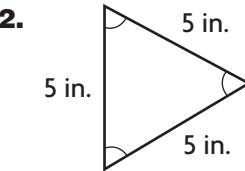
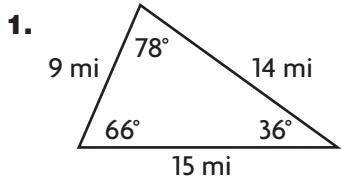
Classify the triangle according to its angle measures.

It has one right angle.

The triangle is a right triangle.

Classify each triangle. Write *isosceles*, *scalene*, or *equilateral*.

Then write *acute*, *obtuse*, or *right*.



A Triangular Challenge

Classify each triangle as *isosceles*, *scalene*, or *equilateral* and as *acute*, *right*, or *obtuse*. The sum of the angle measures in a triangle is always 180° . You can use a protractor to help you draw the triangle in the space provided.

Who Am I?

Draw Me

1. I have two congruent sides. I also have two congruent angles that measure 45° each.

I am a(n) _____ triangle.

2. I have three congruent sides. I also have three congruent angles.

I am a(n) _____ triangle.

3. I have no congruent sides. One of my angles has a measure of 100° .

I am a(n) _____ triangle.

4. Two of my angles measure 30° each. My two shorter sides are congruent.

I am a(n) _____ triangle.

5. My 3 angles have measures of 38° , 52° , and 90° . My 3 sides are all different lengths.

I am a _____ triangle.

Quadrilaterals

You can use this chart to help you classify quadrilaterals.

quadrilateral
4 sides

trapezoid
quadrilateral
at least one pair of parallel sides

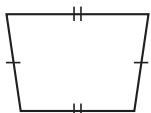
parallelogram
trapezoid
opposite sides are parallel
opposite sides are congruent

rectangle
parallelogram
4 right angles
2 pairs of perpendicular sides

rhombus
parallelogram
4 congruent sides

square
rhombus
rectangle

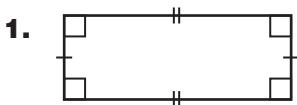
Classify the figure.

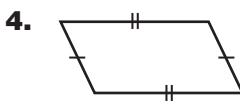


The figure has 4 sides, so it is a *quadrilateral*. The figure has exactly one pair of parallel sides, so it is a *trapezoid*.

quadrilateral, trapezoid

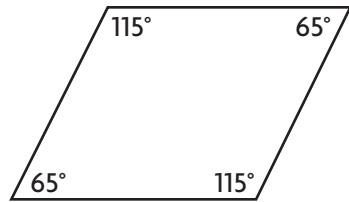
Classify the quadrilateral in as many ways as possible. Write *quadrilateral*, *trapezoid*, *parallelogram*, *rectangle*, *rhombus*, or *square*.





A Quadrilateral Challenge

The sum of the angle measures in a quadrilateral is always 360° . You can use subtraction to find unknown angle measures. Each set of angle measures below represents three known angle measures in a quadrilateral. Write and solve an equation to find the unknown measure of the fourth angle.



$$65^\circ + 115^\circ + 65^\circ + 115^\circ = 360^\circ$$

Known Angle Measures**Unknown Angle Measure****1.** 90°

Add the given angle measures.

 90°

$$90^\circ + 90^\circ + 90^\circ = 270^\circ$$

 90° Subtract the sum from 360° .

$$360^\circ - 270^\circ = 90^\circ$$

2. 112° 56°

 84°

3. 120° 90°

 90°

4. 55° 55°

 125°

5. 135° 45°

 135°

6. 90° 55°

 135°

7. 85° 90°

 130°

Name _____

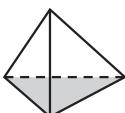
Three-Dimensional Figures

A **polyhedron** is a solid figure with faces that are polygons. You can identify a polyhedron by the shape of its faces.

A **pyramid** is a polyhedron with one polygon base. The lateral faces of a pyramid are triangles that meet at a common vertex.

triangular pyramid

The base and faces are triangles.

**rectangular pyramid**

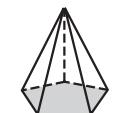
The base is a rectangle.

**square pyramid**

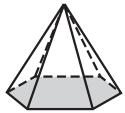
The base is a square.

**pentagonal pyramid**

The base is a pentagon.

**hexagonal pyramid**

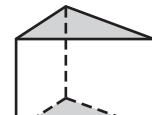
The base is a hexagon.



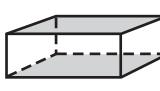
A **prism** is a polyhedron with two congruent polygons as bases. The lateral faces of a prism are rectangles.

triangular prism

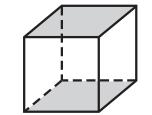
The two bases are triangles.

**rectangular prism**

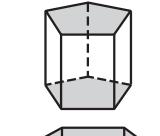
All faces are rectangles.

**square prism or cube**

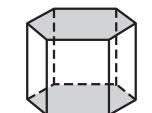
All faces are squares.

**pentagonal prism**

The two bases are pentagons.

**hexagonal prism**

The two bases are hexagons.



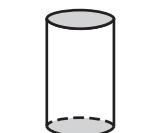
A solid figure with curved surfaces is **not a polyhedron**.

cone

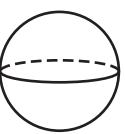
The one base is a circle.

**cylinder**

The two bases are circles.

**sphere**

There is no base.

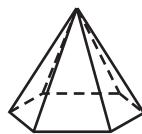


Classify the solid figure. Write *prism*, *pyramid*, *cone*, *cylinder*, or *sphere*.

The solid figure has one base.

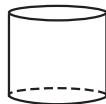
The rest of its faces are triangles.

So, the solid figure is a pyramid.

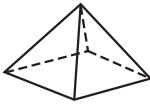


Classify each solid figure. Write *prism*, *pyramid*, *cone*, *cylinder*, or *sphere*.

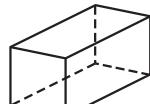
1.



2.



3.

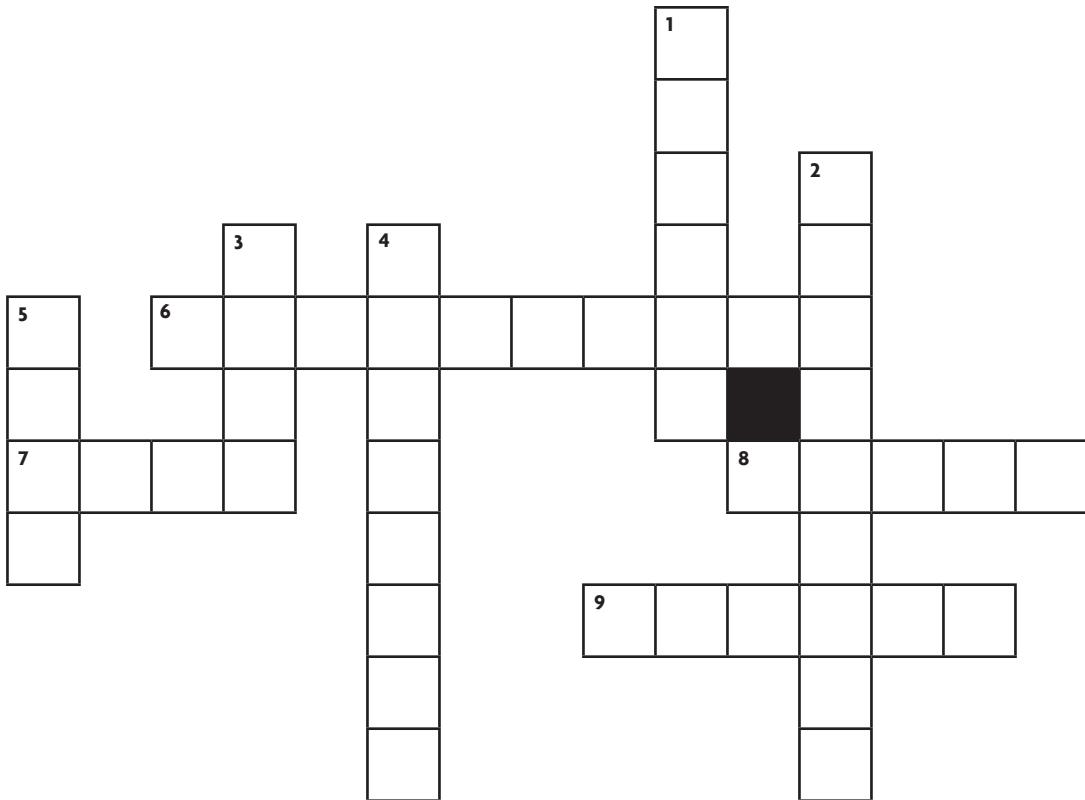


4.



In Fit Shape

Complete the crossword puzzle by filling in the correct term for each clue.



ACROSS

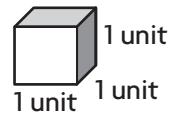
6. A solid figure with faces that are polygons.
7. This solid figure has three pairs of parallel faces, and all faces are congruent.
8. A solid figure that has two congruent polygons as bases and lateral faces that are rectangles.
9. A solid figure without any bases and with only one curved surface.

DOWN

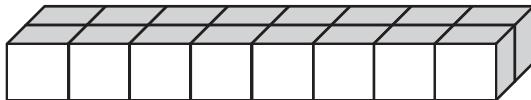
1. A cube has six congruent faces that are all _____.
2. Polygons that have the same shape and size are _____.
3. A solid figure with one circular base and one curved surface.
4. A solid figure that has two circular bases and one curved surface.
5. A flat surface of a solid figure.

Unit Cubes and Solid Figures

A **unit cube** is a cube that has a length, width, and height of 1 unit. You can use unit cubes to build a rectangular prism.



Count the number of cubes used to build the rectangular prism.



The length of the prism is made up of 8 unit cubes.

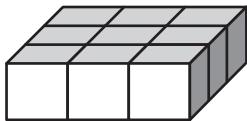
The width of the prism is made up of 2 unit cubes.

The height of the prism is made up of 1 unit cube.

The number of unit cubes used to build the rectangular prism is 16.

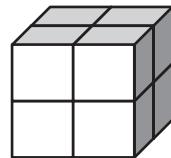
Count the number of unit cubes used to build each solid figure.

1.



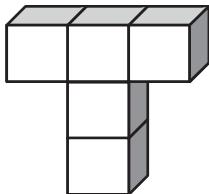
_____ unit cubes

2.



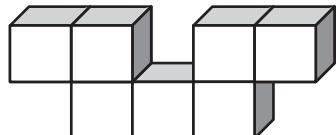
_____ unit cubes

3.



_____ unit cubes

4.

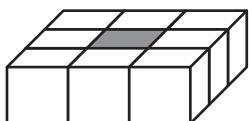


_____ unit cubes

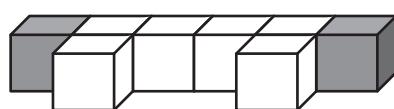
Unit Cubes

For each solid figure, write the fraction of unit cubes that are shaded. Write each fraction in simplest form. Assume that cubes you cannot see are not shaded.

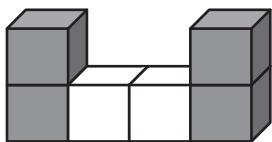
1.



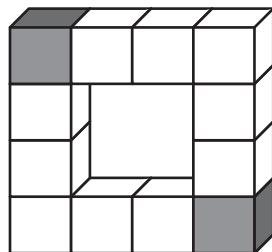
2.



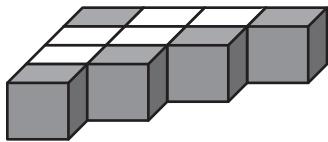
3.



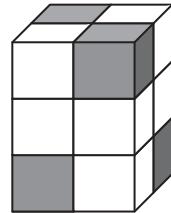
4.



5.



6.

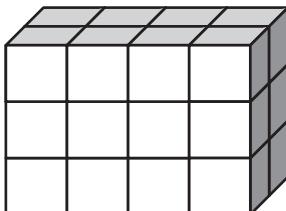


7. **Stretch Your Thinking** In the fraction you wrote for Exercise 1, what does the denominator represent?

Understand Volume

The **volume** of a rectangular prism is equal to the number of unit cubes that make up the prism. Each unit cube has a volume of 1 cubic unit.

Find the volume of the prism. 1 unit cube = 1 cubic inch



Step 1 Count the number of unit cubes in the bottom layer of the prism.

There are 4 unit cubes that make up the length of the first layer.

There are 2 unit cubes that make up the width of the first layer.

There is 1 unit cube that makes up the height of the first layer.

So, altogether, there are 8 unit cubes that make up the bottom layer of the prism.

Step 2 Count the number of layers of cubes that make up the prism.

The prism is made up of 3 layers of unit cubes.

Step 3 Find the total number of cubes that fill the prism.

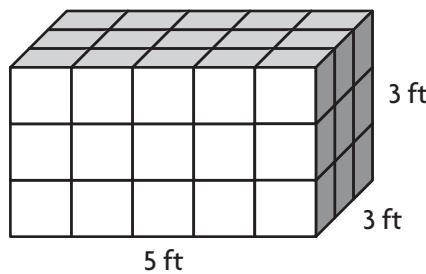
Multiply the number of layers by the number of cubes in each layer.

$$3 \times 8 = \underline{24} \text{ unit cubes}$$

Each unit cube has a volume of 1 cubic inch. So, the volume of the prism is 24×1 , or 24 cubic inches.

Use the unit given. Find the volume.

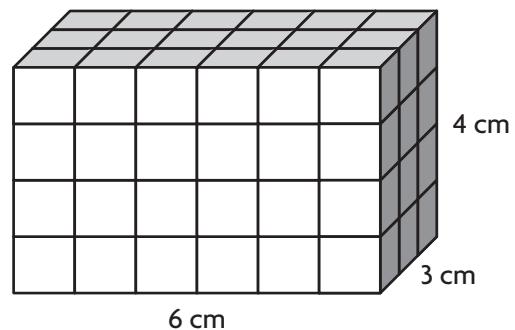
1.



Each cube = 1 cu ft

$$\text{Volume} = \underline{\hspace{2cm}} \text{ cu } \underline{\hspace{2cm}}$$

2.



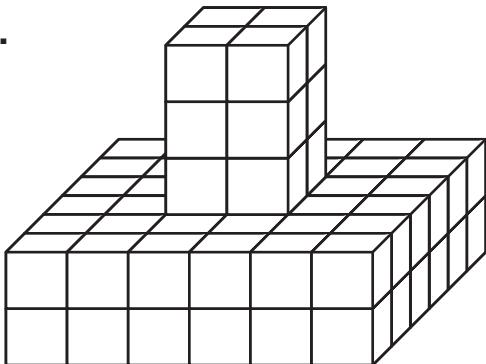
Each cube = 1 cu cm

$$\text{Volume} = \underline{\hspace{2cm}} \text{ cu } \underline{\hspace{2cm}}$$

Volume of Irregular Figures

Use the unit given. Find the volume.

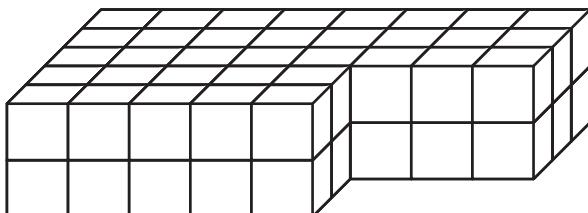
1.



Each cube = 1 cu cm

Volume = _____

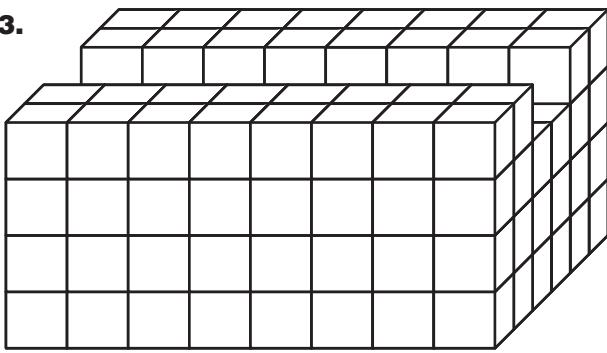
2.



Each cube = 1 cu in.

Volume = _____

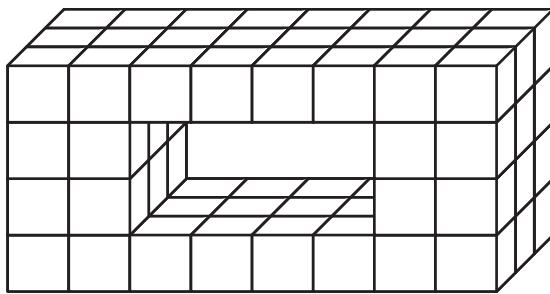
3.



Each cube = 1 cu ft

Volume = _____

4.



Each cube = 1 cu yd

Volume = _____

5.

Write Math



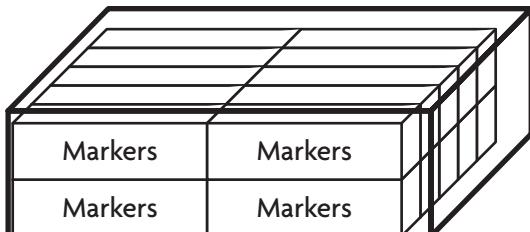
Explain how you found the volume of the figure in Exercise 4.

Name _____

Estimate Volume

You can estimate the volume of a larger box by filling it with smaller boxes.

Mario packs boxes of markers into a large box. The volume of each box of markers is 15 cubic inches. Estimate the volume of the large box.



The volume of one box of markers is 15 cubic inches.

Use the box of markers to estimate the volume of the large box.

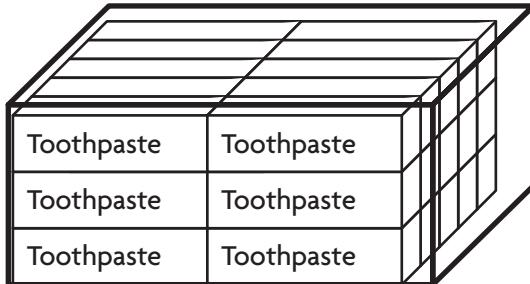
- The large box holds 2 layers of boxes of markers, a top layer and a bottom layer. Each layer contains 10 boxes of markers. So, the large box holds about 2×10 , or 20 boxes of markers.
- Multiply the volume of 1 box of markers by the estimated number of boxes of markers that fit in the large box.

$$\underline{20} \times \underline{15} = \underline{300}$$

So, the volume of the large box is about 300 cubic inches.

Estimate the volume.

1. Each box of toothpaste has a volume of 25 cubic inches.

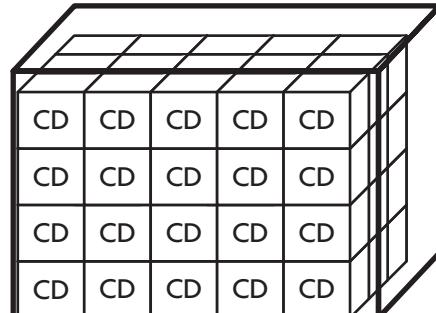


There are _____ boxes of toothpaste in the large box.

The estimated volume of the large box

is _____ \times 25 = _____ cubic inches.

2. Volume of CD case: 80 cu cm



Volume of large box: _____

What Will Fit?

A cubic centimeter is 1 cm long on each edge. A cubic decimeter is 10 cm long on each edge. A cubic meter is 1 m long on each edge.

Estimate the smallest unit cube that will hold each object. Choose from a cubic centimeter, a cubic decimeter, and a cubic meter.

1. a grain of rice _____

2. an orange _____

3. a basketball _____

4. a pebble _____

5. a cell phone _____

6. a textbook _____

7. a key _____

8. a backpack _____

9. a paper clip _____

10. a raisin _____

11. an iron _____

12. a can of paint _____

13. a crayon _____

14. a staple _____

15. a stick of gum _____

16. **Stretch Your Thinking** How many cubic centimeters do you need to fill a cubic decimeter? How many cubic centimeters do you need to fill a cubic meter?

Volume of Rectangular Prisms

Jorge wants to find the volume of this rectangular prism. He can use cubes that measure 1 centimeter on each side to find the volume.

Step 1 The base has a length of 2 centimeters and a width of 3 centimeters. Multiply to find the area of the base.

$$\text{Base} = \underline{2} \times \underline{3}$$

$$\text{Base} = \underline{6} \text{ cm}^2$$

Step 2 The height of the prism is 4 centimeters. Add the number of cubes in each layer to find the volume.

Remember: Each layer has 6 cubes.

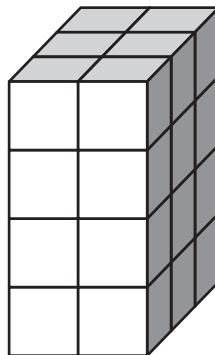
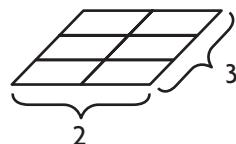
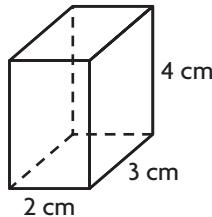
Step 3 Count the cubes. **24** cubes

Multiply the base and the height to check your answer.

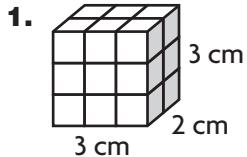
$$\text{Volume} = \underline{6} \times \underline{4}$$

$$\text{Volume} = \underline{24} \text{ cubic centimeters}$$

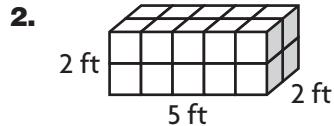
So, the volume of Jorge's rectangular prism is **24** cubic centimeters.



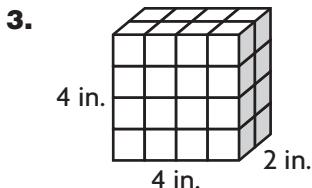
Find the volume.



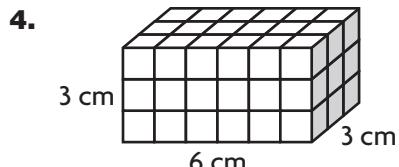
Volume: _____



Volume: _____



Volume: _____



Volume: _____

Unknown Dimensions

Find the unknown dimensions. Use whole numbers only.

1. A rectangular prism has a volume of 96 ft^3 . The area of the base is 24 ft^2 . What is the height of the prism?

3. A rectangular prism has a volume of 175 in^3 . The height of the prism is 7 in. The base is a square. What is the length of a side of the base?

5. A rectangular prism has a volume of 189 cm^3 . The height of the prism is 3 cm. What are the dimensions of the base?

length = _____

width = _____

7. A rectangular prism has a volume of 384 cm^3 . The width is twice the height, and the length is three times the height. What are the dimensions of the prism?

length = _____

width = _____

height = _____

2. A rectangular prism has a volume of 729 ft^3 . The length, width, and height are all the same. What is the length of each side of the prism?

4. A rectangular prism has a volume of 144 cm^3 . The base is a square with a length of 4 cm. What is the height of the prism?

6. A rectangular prism has a volume of 160 cm^3 . The height of the prism is 5 cm. The length is twice the width. What are the dimensions of the base?

length = _____

width = _____

8. A rectangular prism has a volume of 432 in^3 . The height of the prism is 9 in. What are the dimensions of the base?

length = _____

width = _____

9. **Stretch Your Thinking** For Exercise 8, what are other possible dimensions for the base?

Name _____

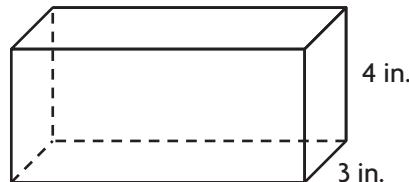
Algebra • Apply Volume Formulas

You can use a formula to find the volume of a rectangular prism.

$$\text{Volume} = \text{length} \times \text{width} \times \text{height}$$
$$V = (l \times w) \times h$$

Find the volume of the rectangular prism.

Step 1 Identify the length, width, and height of the rectangular prism.



length = 9 in. width = 3 in. height = 4 in.

Step 2 Substitute the values of the length, width, and height into the formula.

$$V = (l \times w) \times h$$
$$V = (\underline{9} \times \underline{3}) \times \underline{4}$$

Step 3 Multiply the length by the width.

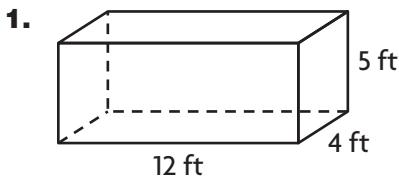
$$V = (9 \times 3) \times 4$$
$$V = \underline{27} \times 4$$

Step 4 Multiply the product of the length and width by the height.

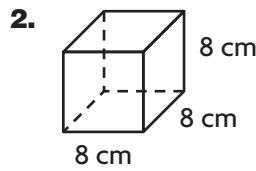
$$V = 27 \times \underline{4}$$
$$V = \underline{108}$$

So, the volume of the rectangular prism is 108 cubic inches.

Find the volume.



$$V = \underline{\hspace{2cm}}$$



$$V = \underline{\hspace{2cm}}$$

What Is the Volume?

The dimensions of a rectangular prism are given.

Find the volume of the prism.

1. length = 2 feet, width = 15 inches, height = 8 inches

$$V = \underline{\hspace{2cm}}$$

2. length = 4 yards, width = 7 feet, height = 3 feet

$$V = \underline{\hspace{2cm}}$$

3. length = 9 centimeters, width = 35 millimeters, height = 7 centimeters

$$V = \underline{\hspace{2cm}}$$

4. length = 1 yard, width = 2 feet, height = 18 inches

$$V = \underline{\hspace{2cm}}$$

5. length = 1 meter, width = 3 decimeters, height = 8 centimeters

$$V = \underline{\hspace{2cm}}$$

6. length = 9 feet, width = 2 yards, height = 36 inches

$$V = \underline{\hspace{2cm}}$$

7. **Stretch Your Thinking** What cubic unit did you use in your answer to Exercise 6? Express the volume in a different cubic unit.

Problem Solving • Compare Volumes

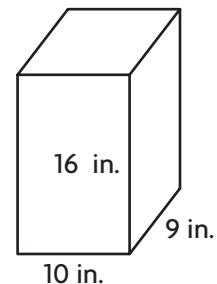
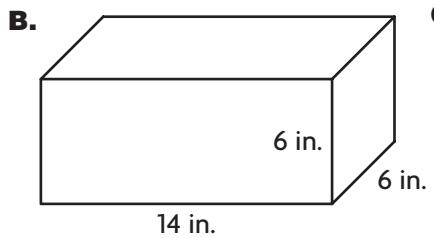
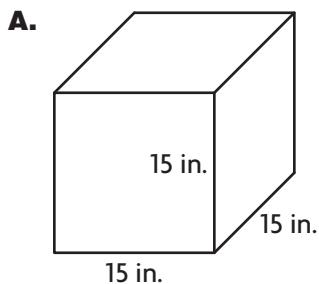
A company makes aquariums that come in three sizes of rectangular prisms. The length of each aquarium is three times its width and depth. The depths of the aquariums are 1 foot, 2 feet, and 3 feet. What is the volume of each aquarium?

Read the Problem	Solve the Problem																
<p>What do I need to find? I need to find the <u>volume</u> of each aquarium.</p>	<p>Think: The depth of an aquarium is the same as the height of the prism formed by the aquarium</p>																
<p>What information do I need to use? I can use the formula for volume, $V = l \times w \times h$, or $V = B \times h$. I can use <u>1 ft, 2 ft, and 3 ft</u> as the depths. I can use the clues <u>the length is three times the width and depth</u>.</p>	<table border="1" data-bbox="920 774 1363 1046"> <thead> <tr> <th data-bbox="920 774 1015 858">Length (ft)</th><th data-bbox="1015 774 1110 858">Width (ft)</th><th data-bbox="1110 774 1205 858">Depth, or Height (ft)</th><th data-bbox="1205 774 1363 858">Volume (cu ft)</th></tr> </thead> <tbody> <tr> <td data-bbox="920 858 1015 920">3</td><td data-bbox="1015 858 1110 920">1</td><td data-bbox="1110 858 1205 920">1</td><td data-bbox="1205 858 1363 920">3</td></tr> <tr> <td data-bbox="920 920 1015 983">6</td><td data-bbox="1015 920 1110 983">2</td><td data-bbox="1110 920 1205 983">2</td><td data-bbox="1205 920 1363 983">24</td></tr> <tr> <td data-bbox="920 983 1015 1046">9</td><td data-bbox="1015 983 1110 1046">3</td><td data-bbox="1110 983 1205 1046">3</td><td data-bbox="1205 983 1363 1046">81</td></tr> </tbody> </table>	Length (ft)	Width (ft)	Depth, or Height (ft)	Volume (cu ft)	3	1	1	3	6	2	2	24	9	3	3	81
Length (ft)	Width (ft)	Depth, or Height (ft)	Volume (cu ft)														
3	1	1	3														
6	2	2	24														
9	3	3	81														
<p>How will I use the information? I will use the <u>volume formula</u> and a <u>table</u> to list all of the possible combinations of lengths, widths, and depths.</p>	<p>So, the volumes of the aquariums are 3 cubic feet, 24 cubic feet, and 81 cubic feet.</p>																

1. Jamie needs a bin for her school supplies. A blue bin has a length of 12 inches, a width of 5 inches, and a height of 4 inches. A green bin has a length of 10 inches, a width of 6 inches, and a height of 5 inches. What is the volume of the bin with the greatest volume?
2. Suppose the blue bin that Jamie found had a length of 5 inches, a width of 5 inches, and a height of 12 inches. Would one bin have a greater volume than the other? **Explain.**

The Gift of Volume

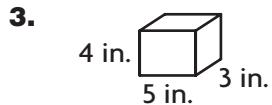
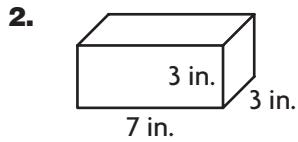
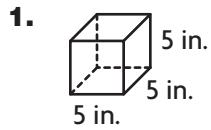
Leah and Wayne are sending presents in the mail. Boxes A, B, and C are shipping boxes. Find the volume of each shipping box. Then solve each problem below.



Volume of A: _____

Volume of B: _____

Volume of C: _____



Volume: _____

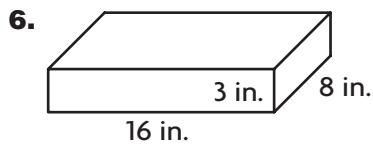
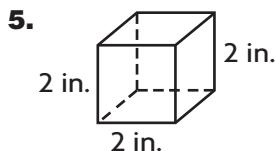
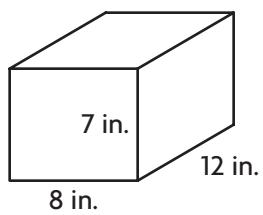
Volume: _____

Volume: _____

How many of these boxes can fit into Box A?

How many of these boxes can fit into Box B?

How many of these boxes can fit into Box C?



Volume: _____

Volume: _____

Volume: _____

After Leah packs this present in Box A, what is the volume left to pack other presents?

After Leah packs 10 of these presents in Box B, what is the volume left to pack other presents?

After Wayne packs 3 of these presents in Box C, what is the volume left to pack other presents?

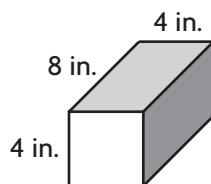
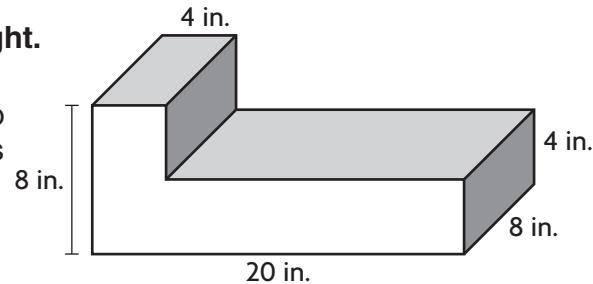
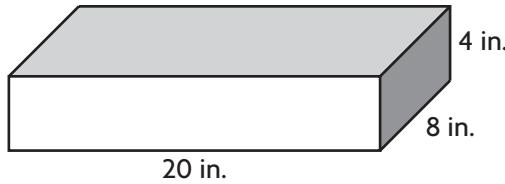
Name _____

Find Volume of Composed Figures

A composite figure is a solid made up of two or more solids. To find the volume of a composite figure, first find the volume of each solid that makes up the figure. Then find the sum of the volumes of the figures.

Find the volume of the composite figure at right.

Step 1 Break apart the composite figure into two rectangular prisms. Label the dimensions of each prism.

Prism 1**Prism 2**

Step 2 Find the volume of each prism.

Prism 1

$$V = (l \times w) \times h$$

$$V = \underline{4} \times \underline{8} \times \underline{4}$$

$$V = 128 \text{ in.}^3$$

Prism 2

$$V = (l \times w) \times h$$

$$V = \underline{20} \times \underline{8} \times \underline{4}$$

$$V = 640 \text{ in.}^3$$

Step 3 Find the sum of the volumes of the two prisms.

$$\text{Volume of Prism 1} + \text{Volume of Prism 2} = \text{Volume of Composite Figure}$$

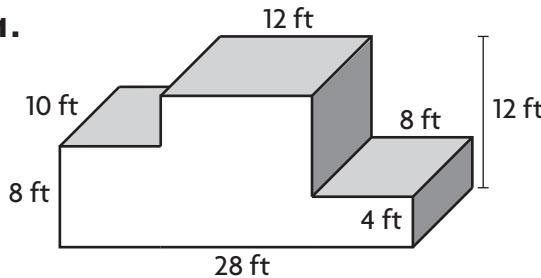
$$\underline{128 \text{ in.}^3} + \underline{640 \text{ in.}^3} = \text{Volume of Composite Figure}$$

$$\underline{768 \text{ in.}^3} = \text{Volume of Composite Figure}$$

So, the volume of the composite figure is 768 in. ³

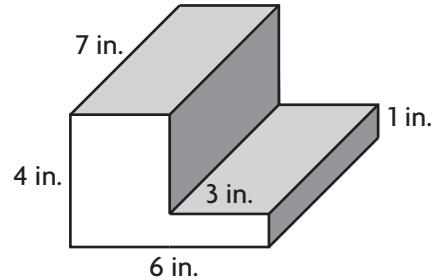
Find the volume of the composite figure.

1.



$$V = \underline{\hspace{2cm}}$$

2.

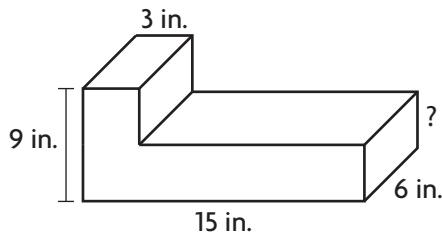


$$V = \underline{\hspace{2cm}}$$

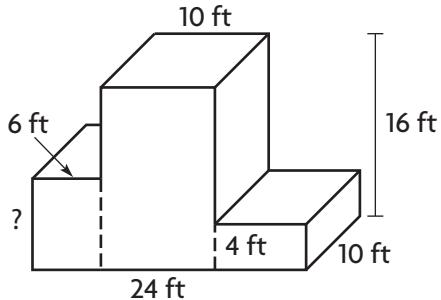
Finding Unknown Side Lengths

The volume of each composite figure is given. Find the unknown side length.

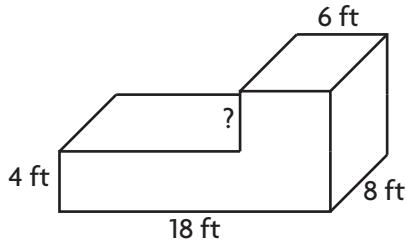
1. Volume = 378 in.³



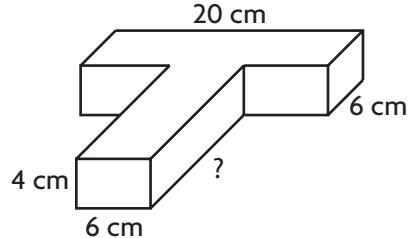
2. Volume = 2,400 ft³



3. Volume = 768 ft³



4. Volume = 864 cm³



5. **Write Math**  **Explain** how you found the unknown side length of the composite figure in Exercise 3.