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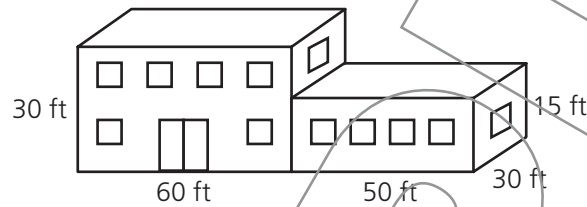
# 34 Volume of Irregular Figures



## Introduction

Some figures are made of more than one rectangular prism. Find the volume of these irregular figures by finding the sum of the volumes of each part of the figure.

The diagram below shows a town library. What is the volume of the town library?



Find the volume of each part of the building. The left and right portions of the building have the same width of 30 feet.

The left part is 60 feet long, 30 feet wide, and 30 feet high. The volume of this part is  $60 \times 30 \times 30 = 54,000$  cubic feet.

The right portion is 50 feet long, 30 feet wide, and 15 feet high. The volume of this part is  $50 \times 30 \times 15 = 22,500$  cubic feet.

Find the sum of the volumes:  $54,000 + 22,500 = 76,500$  cubic feet

The volume of the library is 76,500 cubic feet.

$$\begin{aligned} \text{Volume} &= \text{length} \\ &\times \text{width} \times \text{height} \\ \text{Volume} &= \text{Base} \times \\ &\text{height} \end{aligned}$$

### Think About It



If you know the total volume of an irregular figure and the volume of part of the figure, how can you find the volume of the other part of the figure?

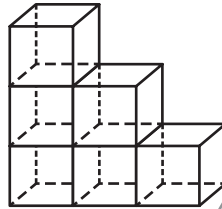
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The volume of an irregular figure is made up of volumes of each part of the figure.

- Becky has the bookshelf shown in her bedroom.



The shelf is made of a set of cubes with sides of 10 inches each. What is the total volume of the bookshelf?

What formula can be used to find the volume of each cube?

\_\_\_\_\_

What is the volume of each cube? \_\_\_\_\_

How many equally-sized cubes are in the bookshelf? \_\_\_\_\_

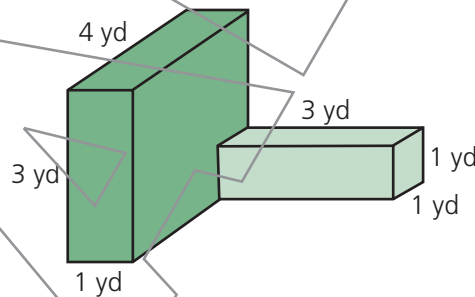
Write an expression that can be used to find the volume of the bookshelf.

\_\_\_\_\_

What is the volume of the entire bookshelf? \_\_\_\_\_

Volume is always measured in cubic units.

- Look at this figure.



How many rectangular prisms make up this irregular figure? \_\_\_\_\_

What is the length of the dark green figure? \_\_\_\_\_ What is the

width? \_\_\_\_\_ What is the height? \_\_\_\_\_

How can you break this figure into rectangular prisms?

What is the area of the base of the dark green figure? \_\_\_\_\_

Multiply the area of the base by the height to find the volume.

\_\_\_\_\_

What is the length of the light green figure? \_\_\_\_\_ What is the width? \_\_\_\_\_ What is the height? \_\_\_\_\_

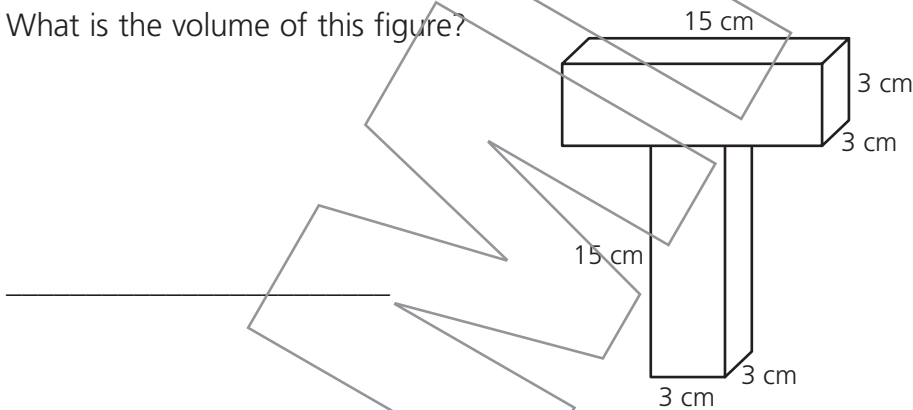
What is the volume of the light green figure? \_\_\_\_\_

How can you combine the volumes of these figures to find the volume of the entire figure? \_\_\_\_\_

What is the volume of the irregular figure? \_\_\_\_\_

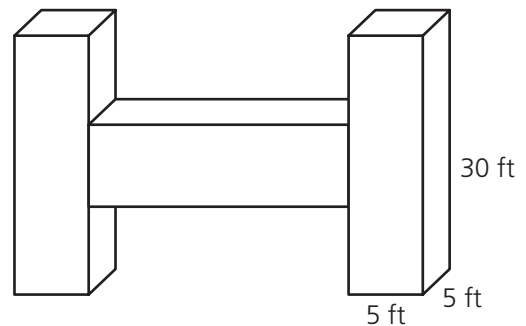
**Use what you know about volume to answer these questions.**

- 1** What is the volume of this figure?



\_\_\_\_\_

- 2** The three parts of the figure are equal in size. What is the volume of the figure?



\_\_\_\_\_

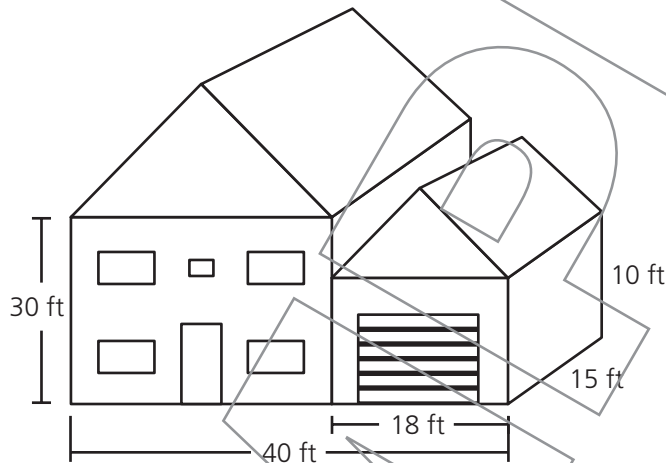
**Solve the following problems.**

- Paula made a custom cage for her rabbit. She attached a 2-ft by 3-ft by 3-ft cage to a larger cage that measures 4-ft by 4-ft by 3-ft. What is the volume of the custom cage?

How many rectangular prisms make up this cage?

**Answer** \_\_\_\_\_ cubic feet

- A real estate agent has this diagram of a house.



How can you use the measurements that are given to find any missing measurements?

If the house and garage have the same depth, what is the volume of the rectangular portions of the house? Explain how you found your answer.

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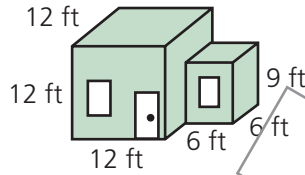


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**Solve the following problems.**

- Ivan and his dad plan to build the workshop shown here. It consists of a large studio and a small tool room. If they need at least 2,100 cubic feet for the workshop, will the workshop be big enough? Why, or why not?




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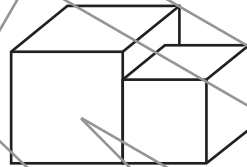


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- A stage prop was made of two wooden boxes, each of which is a cube.



The height of the larger cube is 8 inches. The area of the base of the smaller cube is 36 square inches.

**Part A** What are the dimensions of each part of the prop?

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**Part B** What is the total volume of the prop? Explain how you found your answer.

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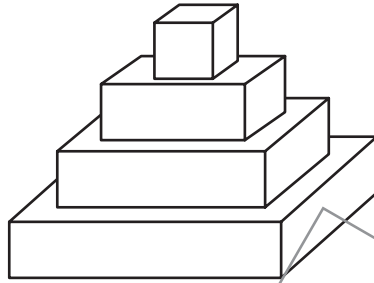


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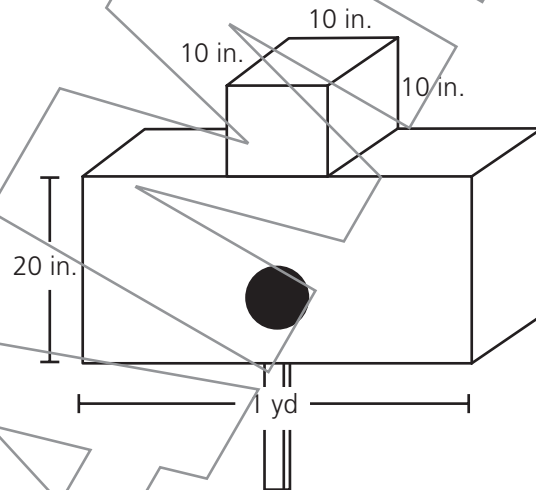
- 3 A Mayan pyramid is made of rectangular prisms. This model of a Mayan pyramid is in a gift shop.



The bottom tier of the pyramid is a rectangular prism that is 4 inches long, 4 inches wide, and 1 inch high. If each tier is 1 inch high and has a length and width that is 1 inch shorter than the tier below it, what is the volume of the pyramid?

**Answer** \_\_\_\_\_ cubic inches

- 4 Ella has a birdhouse in her backyard like the one shown.

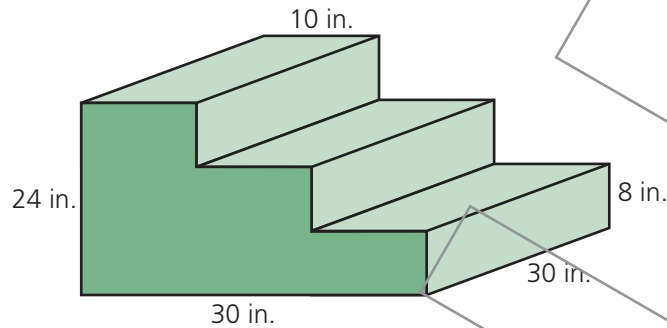


What is the volume of the birdhouse?

**Answer** \_\_\_\_\_ cubic inches



- 5** Mrs. Song is replacing the wooden steps leading to her house with steps made of concrete. The plans for the new steps are shown below.



**Part A** Explain how to find the volume of the new steps.

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**Part B** What volume of concrete will be used to make the steps? Show your work.

**Answer** \_\_\_\_\_ cubic inches

- 6** A small cube is stacked on top of a larger cube. The small cube has a side length of 5 yards. The large cube has a side length that is 2 yards longer than the small cube. What is the volume of the stacked cubes?

**Answer** \_\_\_\_\_ cubic yards