

## 1.8 Area and Volume

**1. Area:** The area of a flat object is the amount of surface that the object has. Formulas for the area of some common shapes are given below. You must be able to recall and use these formulas. Units for all areas are always square units, such as  $\text{in}^2$ ,  $\text{ft}^2$ ,  $\text{m}^2$ , etc.

Square:  $A = (\text{side})(\text{side}) = s^2$

Rectangle:  $A = (\text{length})(\text{width}) = lw$

Parallelogram:  $A = (\text{base})(\text{height}) = bh$

Example: Find the area of each figure. Write the formula first, plug in the known values, and then perform the computations to find the area.

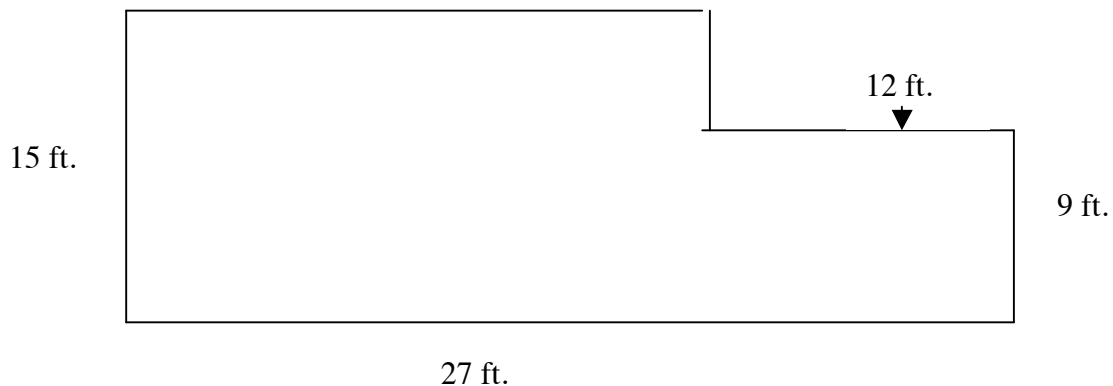
a. A square with side 10 cm.

b. A parallelogram with base 15 in. and height 4 in.

c. A rectangle with length 7 yd. and width 9 yd.

**2. Areas of Composite Figures:** Some figures that are not squares, rectangles or parallelograms can be broken into pieces each of which is a square, rectangle or parallelogram. These figures are called composite figures. The area of the composite figure can be found by adding together the areas of the pieces.

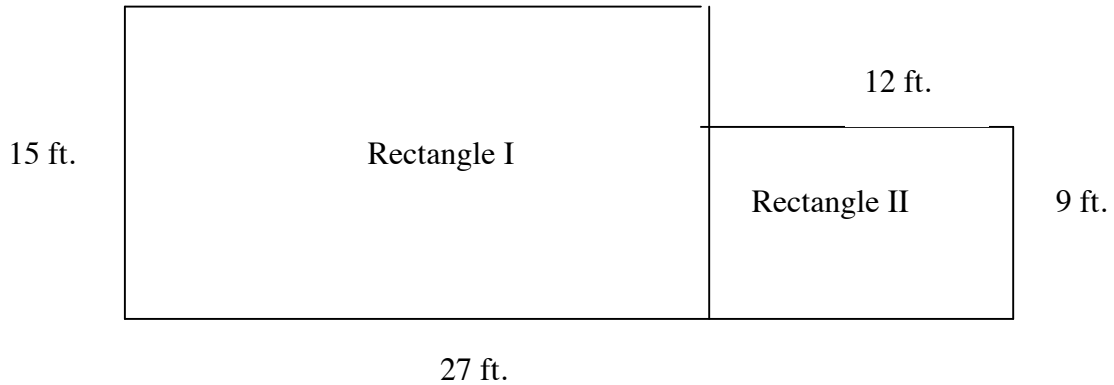
Example: Find the area of the composite figure given below. Be sure to use proper format for showing your work: write the formula(s), plug in the known numbers and then compute the area.



This figure has \_\_\_\_\_ sides. Notice that the lengths of two of the sides are not given. Locate the horizontal sides. There are \_\_\_\_\_ horizontal sides. The sum of the two short horizontal sides must equal the length of the longest horizontal side. The longest horizontal side has length \_\_\_\_\_. One of the shorter horizontal sides has length \_\_\_\_\_. What is the length of the third horizontal side? \_\_\_\_\_

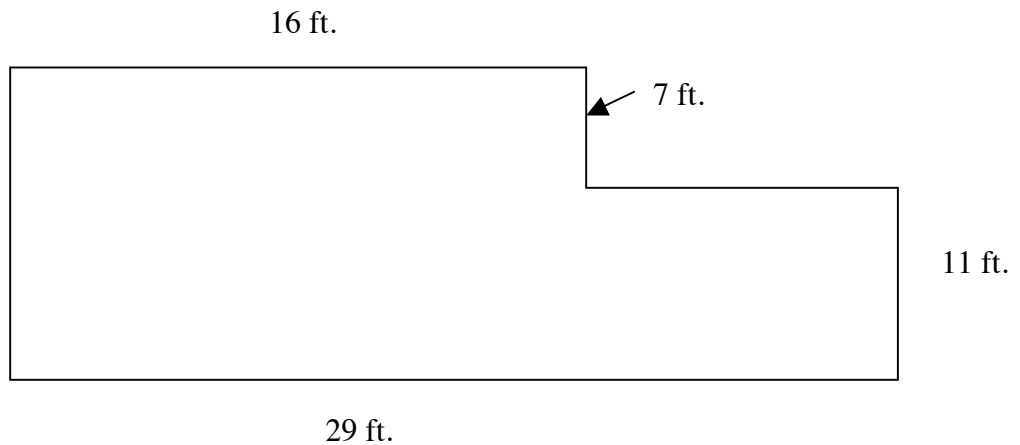
Now, use this same principle to find the vertical side that does not have a given length.

Now that we know the lengths of all six sides, we must break the figure up into squares, rectangles and/or parallelograms and find the area of each piece. The sum of these areas is the area of the given figure.



$$\text{Area} = \text{Area Rectangle I} + \text{Area Rectangle II}$$

Example: Find the area of the given composite figure. Use the proper format for showing your work.

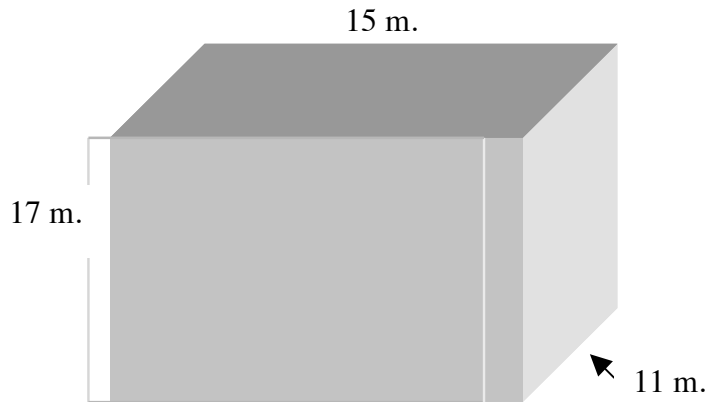


**3. Volume:** Volume is the measure of the space enclosed by a solid. A rectangular solid is a solid in which opposite sides are parallel and in which sides meet at right angles. The formula for the volume of a rectangular solid is:

$$V = (\text{length})(\text{width})(\text{height}) = lwh$$

The units of volume are always cubic units, such as  $\text{in}^3$ ,  $\text{ft}^3$ ,  $\text{m}^3$ , etc. If you look at any corner of a rectangular solid, there are three edges that come into that corner. Name any one of these edges the length, another the width and the third the height.

Example: Find the volume of the rectangular solid. Be sure to use proper format for showing your work: write the formula(s), plug in the known numbers and then compute the area.



Solids can be composed of several rectangular solids that are “stacked” together. To find the volume of such a composite figure, break it up into pieces that are rectangular solids, find the volume of the rectangular solids, and add those volumes together to find the volume of the composite solid.

Example: Find the volume. Be sure to use proper format for showing your work: write the formula(s), plug in the known numbers and then compute the area.

