

# 4.1

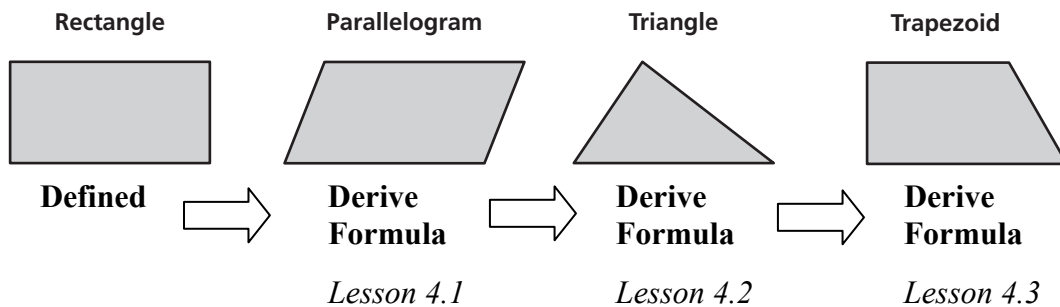
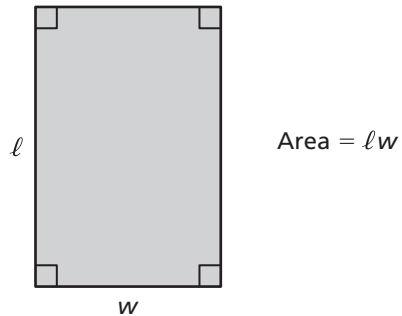
## Areas of Parallelograms

For use with Activity 4.1

**Essential Question** How can you derive a formula for the area of a parallelogram?

A polygon is a closed figure in a plane that is made up of three or more line segments that intersect only at their endpoints. Several examples of polygons are parallelograms, triangles, and trapezoids.

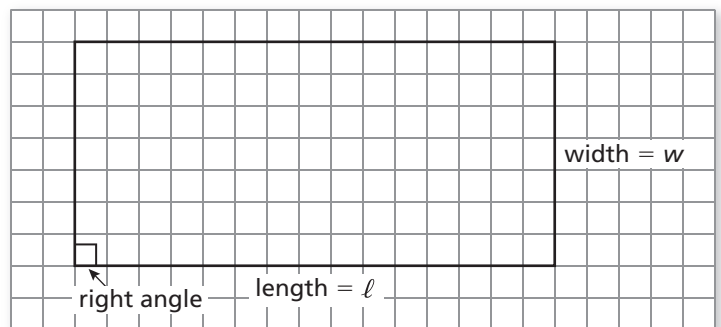
The formulas for the areas of polygons can be derived from one area formula, the area of a rectangle. Recall that the area of a rectangle is the product of its length  $\ell$  and its width  $w$ . The process you use to derive these other formulas is called *deductive reasoning*.



**1 ACTIVITY:** Deriving the Area Formula of a Parallelogram

**Work with a partner.**

- a. Draw *any* rectangle on a piece of grid paper. An example is shown. Label the length and width. Then find the area of your rectangle.



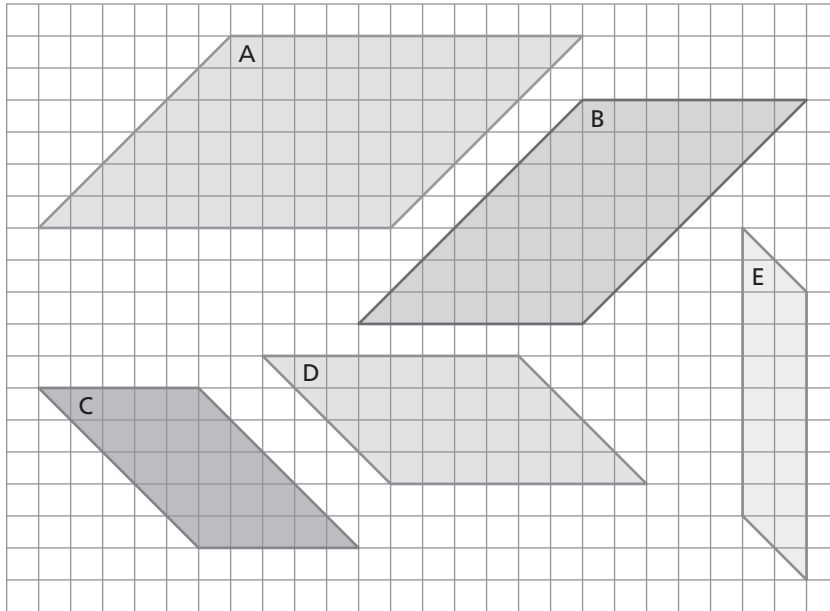
$A =$  \_\_\_\_\_

- b. Cut your rectangle into two pieces to form a parallelogram. Compare the area of the rectangle with the area of the parallelogram. What do you notice? Use your results to write a formula for the area  $A$  of a parallelogram.

**4.1 Areas of Parallelograms (continued)**

**2 ACTIVITY: Finding the Areas of Parallelograms**

Work with a partner.



- a. Find the area of each parallelogram by cutting it into two pieces to form a rectangle.\*
  
- b. Use the formula you wrote in Activity 1 to find the area of each parallelogram. Compare your answers to those in part (a).
  
- c. Count unit squares for each parallelogram to check your results.

\*Cut-outs are available in the back of the Record and Practice Journal.

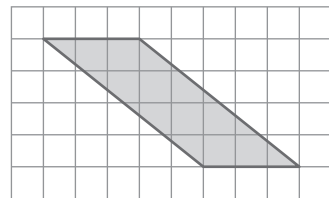
**4.1** Areas of Parallelograms (continued)

**What Is Your Answer?**

3. **IN YOUR OWN WORDS** How can you derive a formula for the area of a parallelogram?

4. **REASONING** The areas of a rectangle and a parallelogram are equal. The length of the rectangle is equal to the base of the parallelogram. What can you say about the width of the rectangle and the height of the parallelogram? Draw a diagram to support your answer.

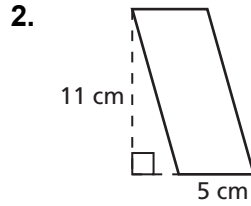
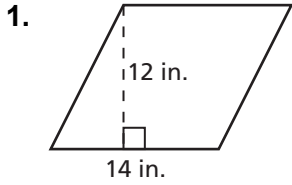
5. What is the height of the parallelogram shown?  
How do you know?



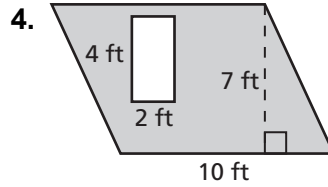
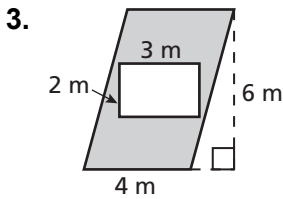
**4.1**

**Practice**  
For use after Lesson 4.1

Find the area of the parallelogram.



Find the area of the shaded region.



5. A stained glass window has an area of 900 square inches.
- a. One window design is made of rectangular stained glass pieces that are 5 inches by 3 inches. How many stained glass pieces are used in the window?
  
  - b. Another window design is made of square stained glass pieces that are 6 inches by 6 inches. How many stained glass pieces are used in the window?