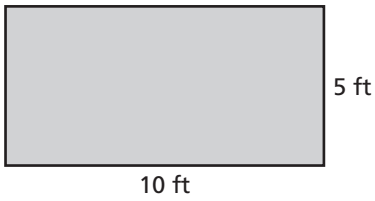
Name_____ Date _____

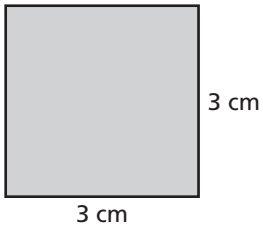
# Chapter 4 Fair Game Review

**Find the area of the square or rectangle.**

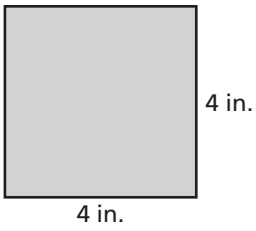
**1.**



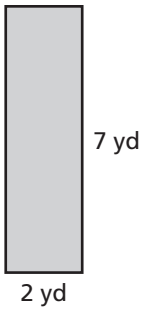

**2.**



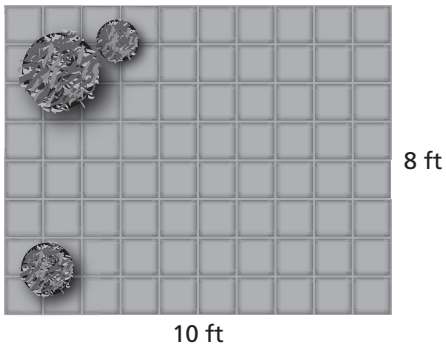

**3.**




**4.**




**5.** Find the area of the patio.

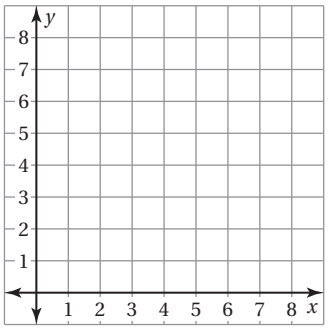


Name _____ Date _____

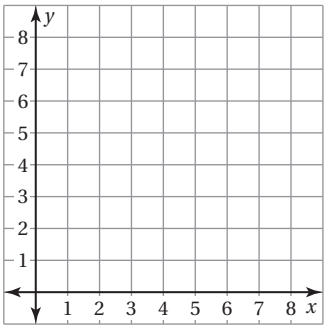
# Chapter 4 Fair Game Review (continued)

**Plot the ordered pair in a coordinate plane.**

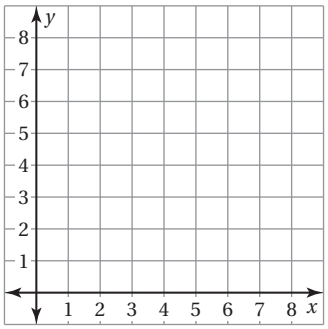
**6.** $(2, 3)$



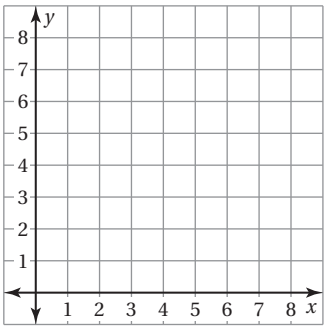

**7.** $(6, 5)$



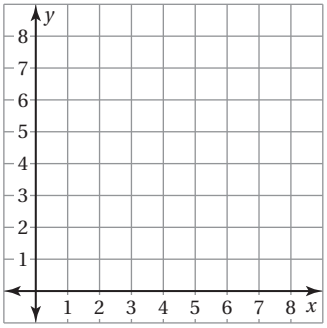

**8.** $(1, 7)$



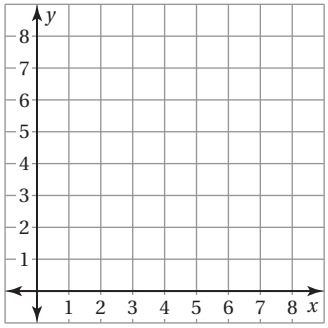

**9.** $(4, 4)$




**10.** $(5, 2)$




**11.** $(3, 1)$



Name_____ Date _____

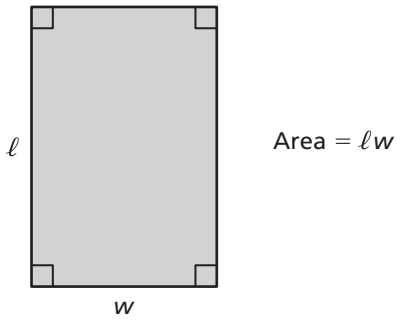
# 4.1 Areas of Parallelograms

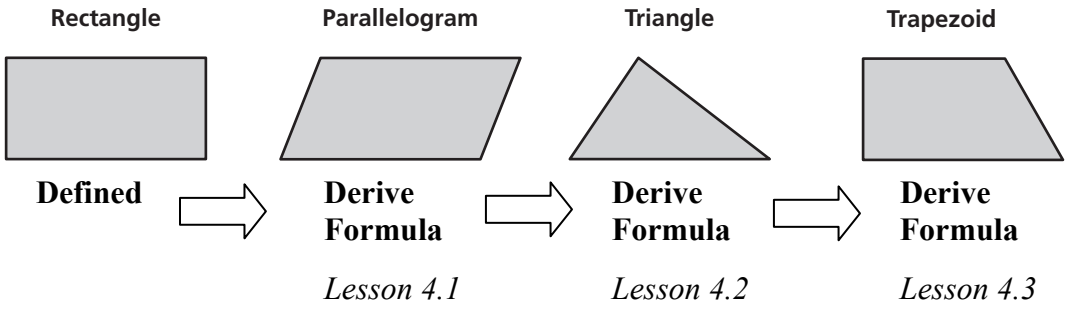
**For use with Activity 4.1**

**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.*

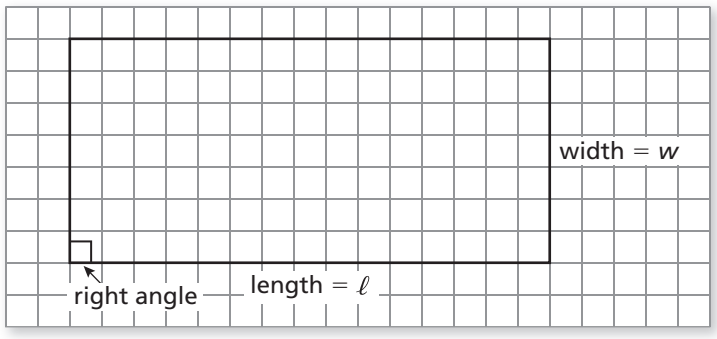



## 1 ACTIVITY: Deriving the Area Formula of a Parallelogram

**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.

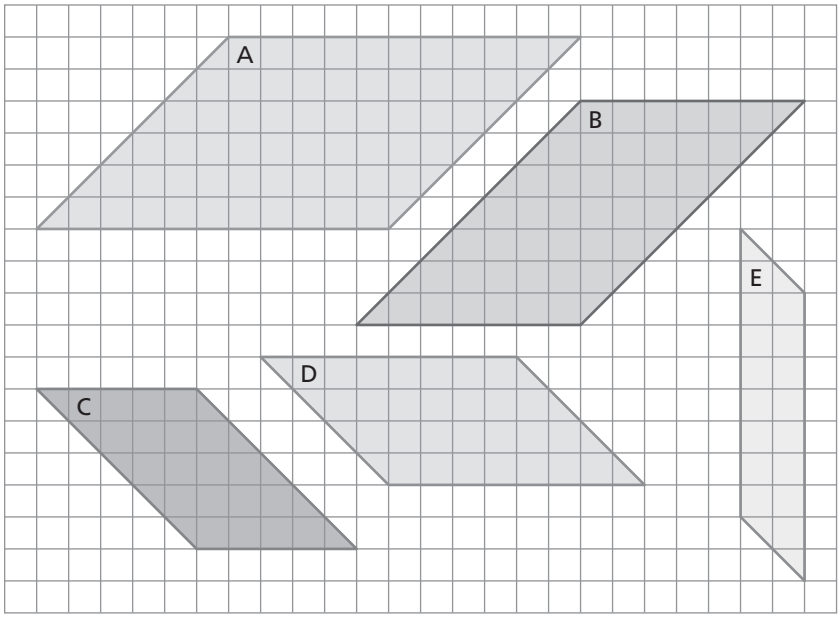



$A$ = _____

**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.

## 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.

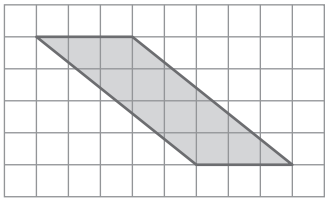
## 4.1 Areas of Parallelograms (continued)

### 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?



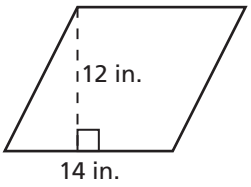
Name _____ Date _____

# 4.1 Practice

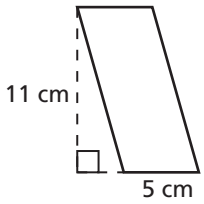
**For use after Lesson 4.1**

**Find the area of the parallelogram.**

**1.**

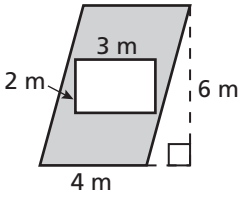



**2.**

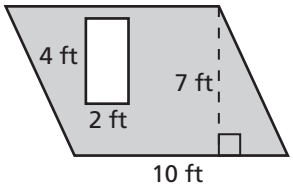



**Find the area of the shaded region.**

**3.**




**4.**




**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?

Name_____ Date _____

# 4.2 Areas of Triangles

**For use with Activity 4.2**

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

## 1 ACTIVITY: Deriving the Area Formula of a Triangle

**Work with a partner.**

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

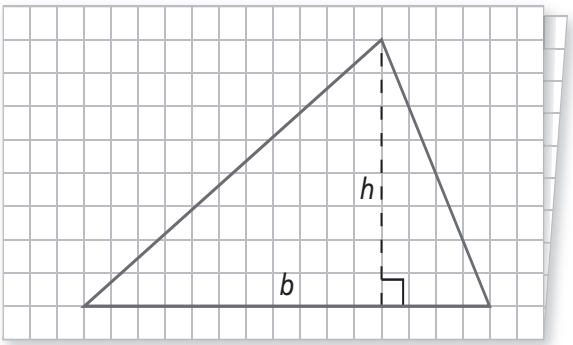
**b.** Draw a diagonal from one corner of your rectangle to the opposite corner. Cut along the diagonal. Compare the area of the rectangle with the area of the two pieces you cut. What do you notice? Use your results to write a formula for the area $A$ of a triangle.

Area = _____ Formula

## 2 ACTIVITY: Deriving the Area Formula of a Triangle

**Work with a partner.**

**a.** Fold a piece of grid paper in half. Draw a triangle so that its base lies on one of the horizontal lines of the paper. Do not use a right triangle. Label the height and the base *inside* the triangle.



fold

**b.** Estimate the area of your triangle by counting unit squares.

Area ≈ _____ Estimate

**c.** Cut out the triangle so that you end up with two identical triangles. Form a quadrilateral whose area you know. What type of quadrilateral is it? Explain how you *know* it is this type.

**d.** Use your results to write a formula for the area of a triangle. Then use your formula to find the exact are of your triangle. Compare this area with your estimate in part (b).

Area = _____ Formula

Area = _____ Exact Area

Name _____ Date _____

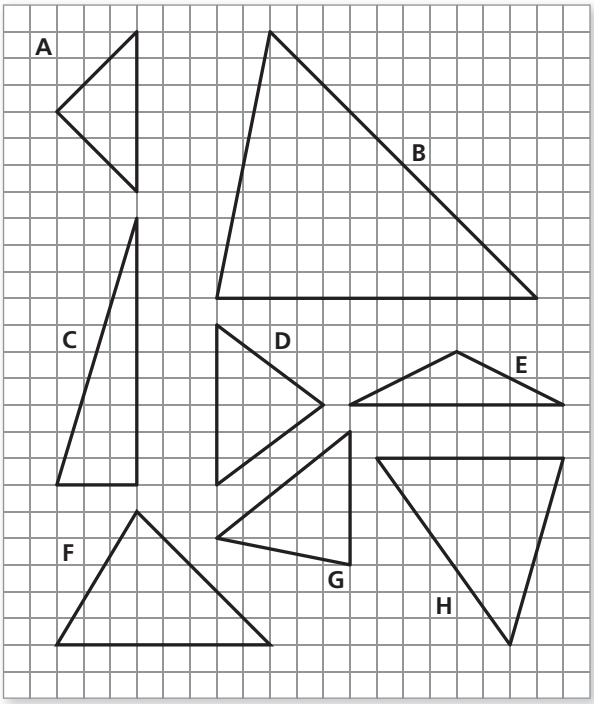
## 4.2 Areas of Triangles (continued)

### 3 ACTIVITY: Estimating and Finding the Area of a Triangle

**Work with a partner. Each grid square represents 1 square centimeter.**

- **Use estimation to match each triangle with its area.**
- **Then check your work by finding the exact area of each triangle.**

| *Area* | *Estimate Match* | *Exact Match* |
|---|---|---|
| **a.** $15\ cm^2$ | _____ | _____ |
| **b.** $20\ cm^2$ | _____ | _____ |
| **c.** $9\ cm^2$ | _____ | _____ |
| **d.** $12\ cm^2$ | _____ | _____ |
| **e.** $60\ cm^2$ | _____ | _____ |
| **f.** $12\frac{1}{2}\ cm^2$ | _____ | _____ |
| **g.** $24\frac{1}{2}\ cm^2$ | _____ | _____ |
| **h.** $8\ cm^2$ | _____ | _____ |




*Not drawn to scale*

## 4.2 Areas of Triangles (continued)

### What Is Your Answer?

4. **PARTNER ACTIVITY** Use the centimeter grid paper to create your own "triangle matching activity." Trade with your partner and solve each other's matching activity.

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

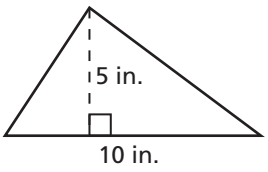
Name _____ Date _____

# 4.2 Practice

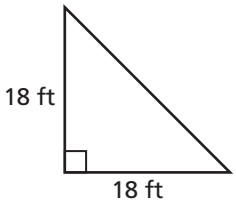
**For use after Lesson 4.2**

**Find the area of the triangle.**

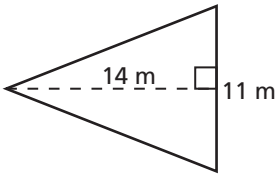
**1.**



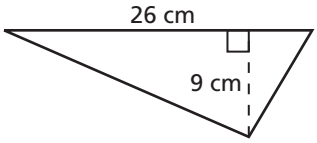

**2.**



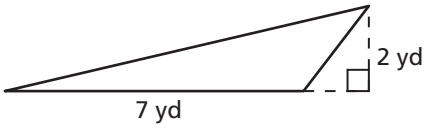

**3.**



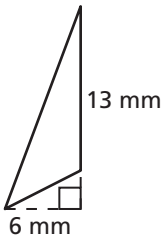

**4.**




**5.**




**6.**




**7.** A triangular bookend has a base of 4 inches and a height of 8 inches. Find the area of the bookend.

Name_____ Date _____

# 4.3 Areas of Trapezoids

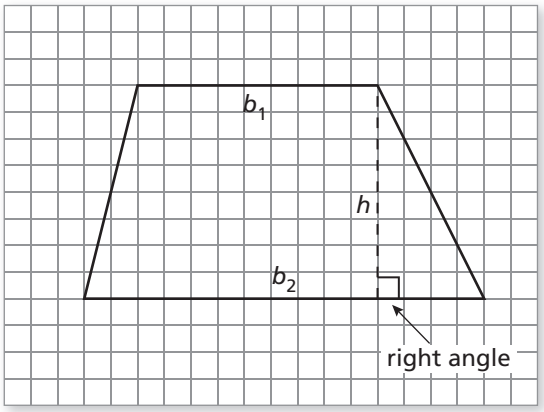
**For use with Activity 4.3**

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

## 1 ACTIVITY: Deriving the Area Formula of a Trapezoid

**Work with a partner. Use a piece of centimeter grid paper.**

**a.** Draw *any* trapezoid so that its base lies on one of the horizontal lines of the paper.



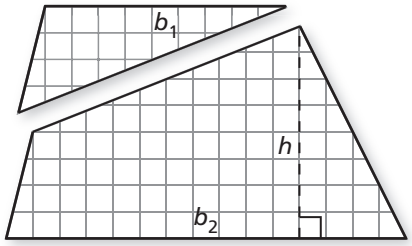

**b.** Estimate the area of your trapezoid (in square centimeters) by counting unit squares.

Area ≈ _____ Estimate

**c.** Label the height and the bases *inside* the trapezoid.

**d.** Cut out the trapezoid. Mark the midpoint of the side opposite the height. Draw a line from the midpoint to the opposite upper vertex.

**e.** Cut along the line. You will end up with a triangle and a quadrilateral. Arrange these two figures to form a figure whose area you know.




**f.** Use your result to write a *formula* for the area of a trapezoid.

Area = _____ Formula

**g.** Use your formula to find the area of your trapezoid (in square centimeters).

Area = _____ Exact Area

**h.** Compare this area with your estimate in part (b).

## 2 ACTIVITY: Writing a Math Lesson

**Work with a partner. Use your results from Activity 1 to write a lesson on finding the area of a trapezoid.**

# Area of a Trapezoid

**Key Idea** Use the following steps to find the area of a trapezoid.

**1.**

**2.**

**3.**

Describe steps you can use to find the area of a trapezoid.

**Examples**

Write 2 examples for finding the area of a trapezoid. Include a drawing for each.

**a.**

**b.**

**Exercises**

Write 2 exercises for finding the area of a trapezoid. Include an answer sheet.

**Find the area.**

**1.**

**2.**

## 4.3 Areas of Trapezoids (continued)

### What Is Your Answer?

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

4. In this chapter, you used deductive reasoning to derive new area formulas from area formulas you have already learned. Describe a real-life career in which deductive reasoning is important.

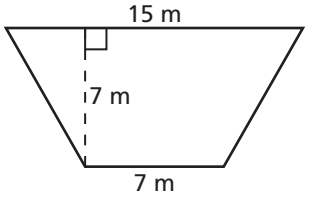
Name _____ Date _____

# 4.3 Practice

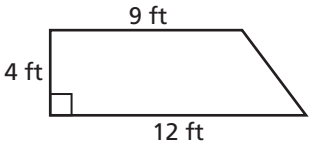
**For use after Lesson 4.3**

**Find the area of the trapezoid.**

**1.**




**2.**

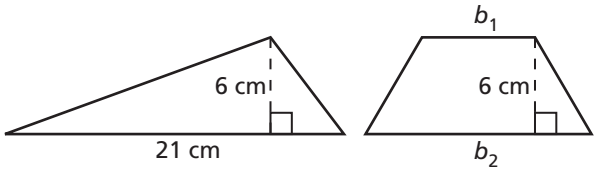



**Find the area of the trapezoid with height $h$ and bases $b_1$ and $b_2$.**

**3.** $h = 10$ yd
$b_1 = 17$ yd
$b_2 = 21$ yd

**4.** $h = 9$ cm
$b_1 = 4.5$ cm
$b_2 = 5.5$ cm

**5.** The triangle and the trapezoid have the same area. Base $b_2$ is twice the length of base $b_1$. What are the lengths of the bases of the trapezoid?



Name_____ Date _____

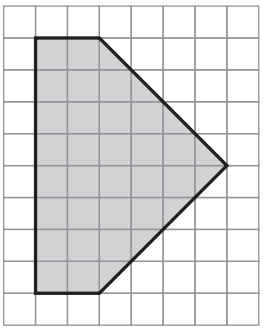
**Extension 4.3**

# Practice

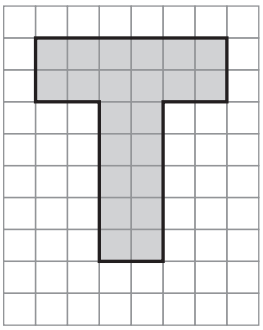
**For use after Extension 4.3**

**Find the area of the shaded figure.**

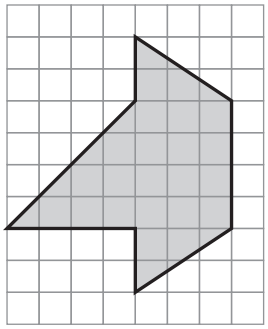
**1.**



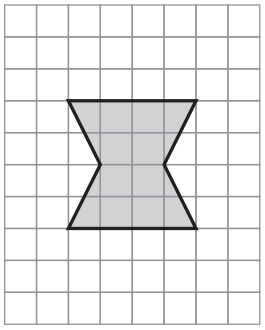
**2.**



**3.**



**4.**

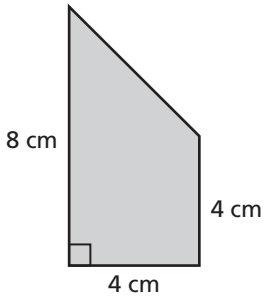


Name _____ Date _____

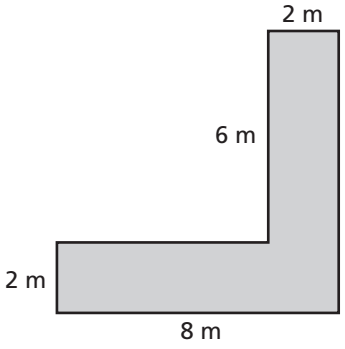
**Extension 4.3** **Practice (continued)**

**Find the area of the figure.**

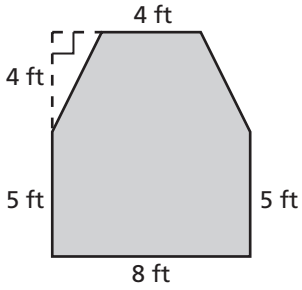
**5.**



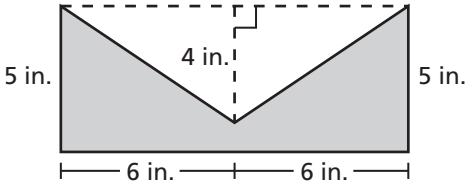

**6.**




**7.**




**8.**




**9.** You add a 4-foot-by-4-foot section of land to a 6-foot-by-8-foot garden. Find the area of the new garden.

Name_____ Date _____

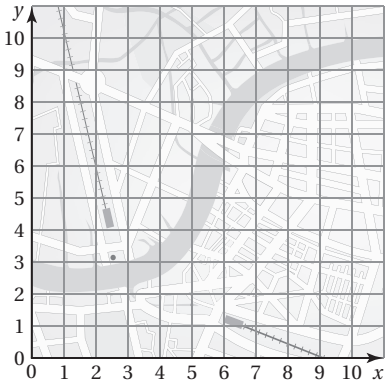
# 4.4 Polygons in the Coordinate Plane

**For use with Activity 4.4**

**Essential Question** How can you find the lengths of line segments in a coordinate plane?

## 1 ACTIVITY: Finding Distances on a Map

**Work with a partner. The coordinate grid shows a portion of a city. Each square on the grid represents one square mile.**




**a.** A public library is located at (4, 5). City Hall is located at (7, 5). Plot and label these points.

**b.** How far is the public library from City Hall?

**c.** A stadium is located 4 miles from the public library. Give the coordinates of several possible locations of the stadium. Justify your answers by graphing.

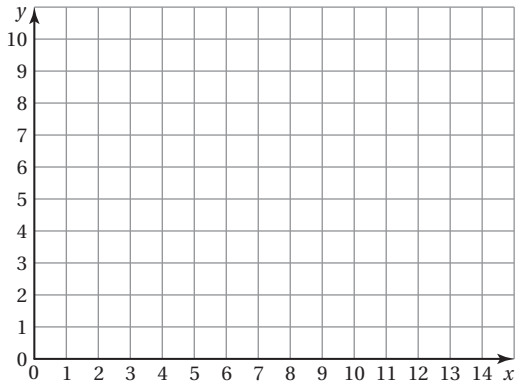
**d.** Connect the three locations of the public library, City Hall, and the stadium using your answers in part (c). What shapes are formed?

## 2 ACTIVITY: Graphing Polygons

**Work with a partner. Plot and label each set of points in the coordinate plane. Then connect each set of points to form a polygon.**

Rectangle: $A(2, 3)$, $B(2, 10)$, $C(6, 10)$, $D(6, 3)$

Triangle: $E(8, 3)$, $F(14, 8)$, $G(14, 3)$



Name _____ Date _____

## 4.4 Polygons in the Coordinate Plane (continued)

### 3 ACTIVITY: Finding Distances in a Coordinate Plane

**Work with a partner.**

**a.** Find the length of each horizontal line segment in Activity 2.

**b.** **STRUCTURE** What relationship do you notice between the lengths of the line segments in part (a) and the coordinates of their endpoints? Explain.

**c.** Find the length of each vertical line segment in Activity 2.

**d.** **STRUCTURE** What relationship do you notice between the lengths of the line segments in part (c) and the coordinates of their endpoints? Explain.

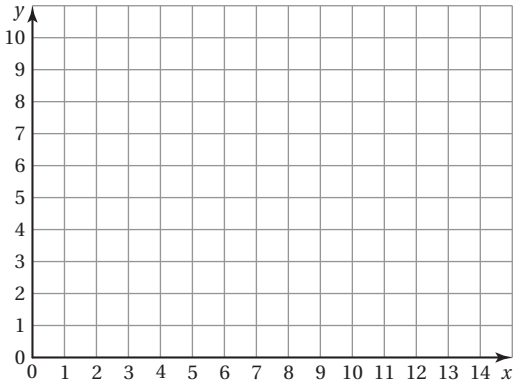
**e.** Plot and label the points below in the coordinate plane. Then connect each pair of points with a line segment. Use the relationships you discovered in parts (b) and (d) above to find the length of each line segment. Show your work.

$S(3, 1)$ and $T(14, 1)$

$U(9, 8)$ and $V(9, 0)$

$W(0, 7)$ and $X(0, 10)$

$Y(1, 9)$ and $Z(7, 9)$




**f.** Check your answers in part (e) by counting grid lines.

## 4.4 Polygons in the Coordinate Plane (continued)

### What Is Your Answer?

**4. IN YOUR OWN WORDS** How can you find the lengths of line segments in a coordinate plane? Give examples to support your explanation.

**5.** Do the methods you used in Activity 3 work for diagonal line segments? Explain why or why not.

**6.** Use the Internet or some other reference to find an example of how "finding distances in a coordinate plane" is helpful in each of the following careers.

**a.** Archaeologist

**b.** Surveyor

**c.** Pilot

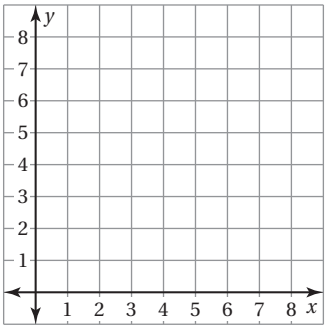
Name _____ Date _____

# 4.4 Practice

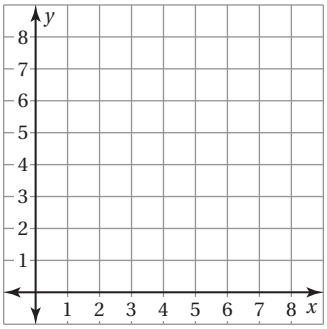
**For use after Lesson 4.4**

**Plot and label each pair of points in the coordinate plane. Find the area of the polygon.**

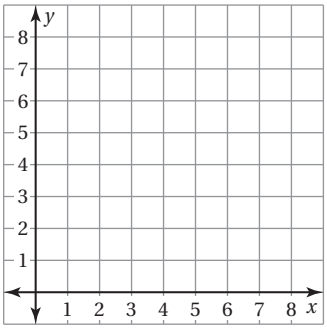
**1.** $A(2, 2)$, $B(2, 6)$, $C(5, 2)$



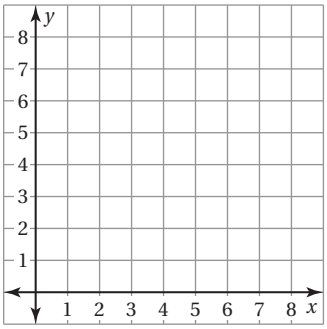

**2.** $D(3, 2)$, $E(3, 7)$, $F(6, 2)$, $G(6, 7)$




**3.** $H(3, 3)$, $I(3, 7)$, $J(7, 7)$, $K(7, 3)$




**4.** $L(1, 2)$, $M(3, 5)$, $N(5, 5)$, $O(7, 2)$




**5.** The vertices of a sandbox are $P(12, 14)$, $Q(12, 17)$, $R(16, 17)$, and $S(16, 14)$. The coordinates are measured in feet. What is the perimeter of the sandbox?