

# Polygons in the Coordinate Plane

Name: \_\_\_\_\_

## Prerequisite: Find Distance on a Coordinate Plane

**Study the example showing how to solve a measurement problem using a shape on a coordinate plane. Then solve problems 1–9.**

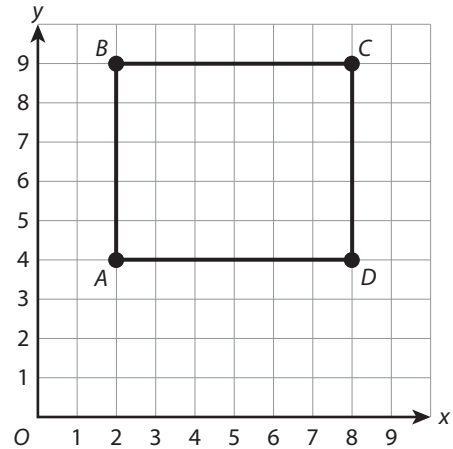
### Example

Mr. Hiroshi plans to tile the floor of his family room. He draws a rectangle on the coordinate plane to represent the floor. What is the area of the floor in square units?

The area of a rectangle is length  $\times$  width. You can count units to find the length and the width.

The length of  $\overline{AB}$  is 5 units. The length of  $\overline{BC}$  is 6 units. The area of rectangle  $ABCD$  is  $5 \times 6$ , or 30 square units.

You can also use ordered pairs to find the horizontal distance and the vertical distance between points on the coordinate plane.



**1** Write the ordered pair for each point.  
 $A$  (\_\_\_\_\_)  $B$  (\_\_\_\_\_)  $C$  (\_\_\_\_\_)  $D$  (\_\_\_\_\_)

**2** Explain how to use the  $x$ -coordinates of point  $A$  and point  $D$  to find the distance between the two points.

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**3** Explain how to use the  $y$ -coordinates of point  $C$  and point  $D$  to find the distance between the two points.

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**4** Find the lengths of these sides using the coordinates of their endpoints.

$\overline{AD}$  \_\_\_\_\_  $\overline{CD}$  \_\_\_\_\_

**5** What is the perimeter of rectangle  $ABCD$ ? Explain how you found the perimeter.

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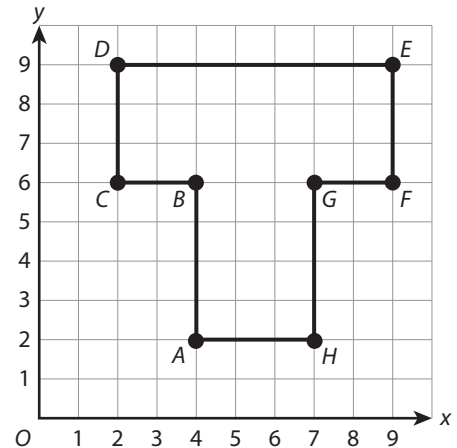
Solve.

Use the shape on the coordinate plane to solve problems 6–8.

- 6 What are the coordinates of each point on the shape?  
A(\_\_\_\_\_) B(\_\_\_\_\_) C(\_\_\_\_\_) D(\_\_\_\_\_)  
E(\_\_\_\_\_) F(\_\_\_\_\_) G(\_\_\_\_\_) H(\_\_\_\_\_)

- 7 Find the area of the shape. Explain how you found your answer.

**Show your work.**



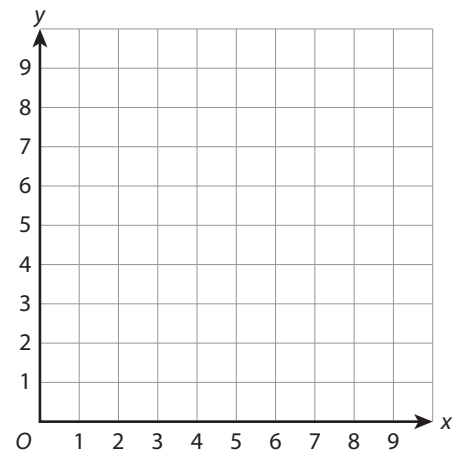
Solution: \_\_\_\_\_

- 8 Find the perimeter of the shape.

**Show your work.**

Solution: \_\_\_\_\_

- 9 Use the coordinate plane to draw a rectangle with an area of 24 square units. Label the corners of the rectangle  $W$ ,  $X$ ,  $Y$ , and  $Z$ . Explain how you know that the area of the rectangle is 24 square units.



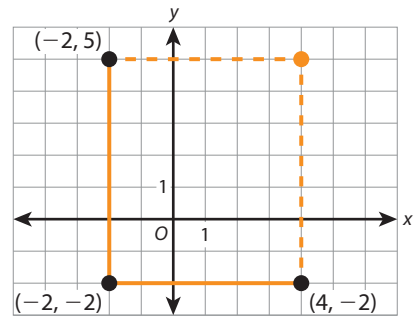
## Find Missing Coordinates and Dimensions

**Study the example problem showing how to find missing coordinates and dimensions of a rectangle. Then solve problems 1–9.**

### Example

Ms. Issa is planning to build a rectangular fishpond in her garden. A drawing shows three corners of the pond with coordinates  $(4, -2)$ ,  $(-2, -2)$ , and  $(-2, 5)$ . Where is the fourth corner?

You can graph the information given and then sketch the rectangle.



- 1** What are the coordinates of the fourth corner?

\_\_\_\_\_

- 2** How did you locate the fourth corner to sketch the rectangle?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- 3** Explain how to use counting to find the distance between  $(-2, -2)$  and  $(4, -2)$ .

\_\_\_\_\_

- 4** Explain how to use absolute value to find the distance between  $(-2, -2)$  and  $(-2, 5)$ .

\_\_\_\_\_  
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- 5** Explain how to find the area of the pond.

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**Solve.**

**Use the following situation to solve problems 6–8.**

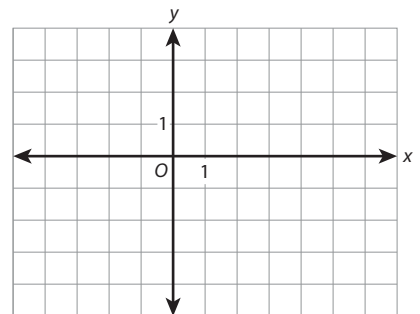
Mrs. Rockwell is buying a rectangular lot on which to build a new home. Three corners of the lot are at  $(5, -3)$ ,  $(-2, -3)$ , and  $(-2, 2)$  on the coordinate plane.

- 6** Graph the three corners on the coordinate plane. What is the ordered pair for the fourth corner of the lot?

\_\_\_\_\_

- 7** What is the perimeter of the lot?

**Show your work.**



*Solution:* \_\_\_\_\_

- 8** Mr. Brown bought a lot that is half as long and twice as wide as Mrs. Rockwell's lot. How does the area of his lot compare to the area of Mrs. Rockwell's lot? Explain how you know.

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\_\_\_\_\_  
\_\_\_\_\_

- 9** Nadim wants to build a square pen for his rabbits. He plots two corners on a coordinate plane at  $(3, -3)$  and  $(-3, 3)$ . Abe says that he should plot another corner at  $(3, 3)$ . Does this make sense? Explain why or why not.

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## Find Area on a Coordinate Plane

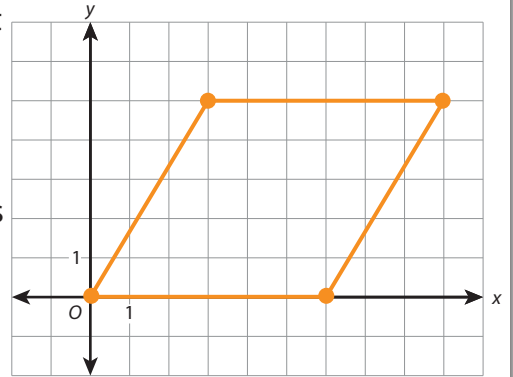
**Study the example problem showing how to find the area of a polygon on a coordinate plane. Then solve problems 1–7.**

### Example

A floor plan for a building shows corners of the building at  $(0, 0)$ ,  $(6, 0)$ ,  $(9, 5)$ , and  $(3, 5)$ . What is the shape of the floor of the building? How can you find the area of the floor?

You can graph the information given and connect the points to find the shape of the floor. The connected points form a parallelogram, so the floor is a parallelogram.

You can find the area of the floor by multiplying its base times its height since it is a parallelogram.



- 1 What is the base length of the parallelogram in the example? How did you find the base length?  
\_\_\_\_\_
- 2 What is the height of the parallelogram in the example? How did you find the height?  
\_\_\_\_\_
- 3 Find the area.  
\_\_\_\_\_
- 4 Katerine divided the parallelogram into two congruent triangles and a rectangle in order to find its area. Does her method work? If so, show that it works. If not, explain why not.  
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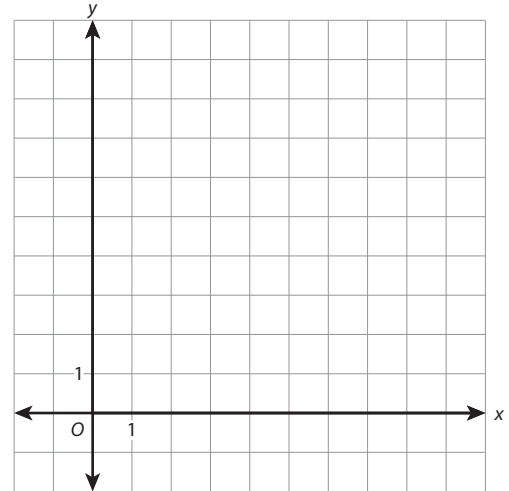
Solve.

Use the following situation to solve problems 5–6.

Madeline plotted these points to represent the corners of a vegetable garden:  $(0, 0)$ ,  $(6, 0)$ ,  $(3, 7)$ .

- 5 Draw the shape on the coordinate plane. What shape is the garden? Find the area of the garden.

**Show your work.**



Solution: \_\_\_\_\_

\_\_\_\_\_

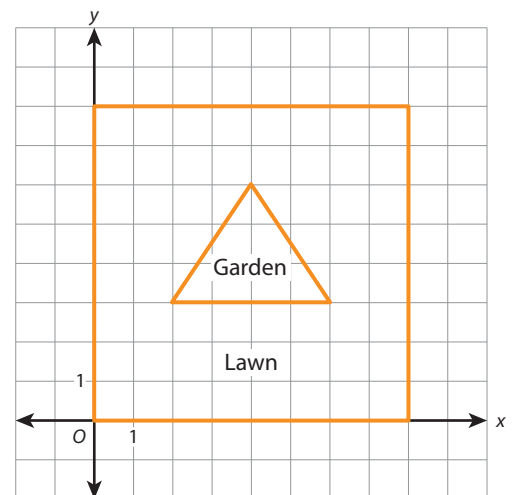
- 6 Suppose Madeline uses  $(6, 7)$  rather than  $(3, 7)$  as the third corner for her garden. How will that change the shape of the garden? How will the areas of the two gardens compare?

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- 7 A flower garden and the lawn around it are shown on the coordinate plane. What is the area of the lawn?

**Show your work.**



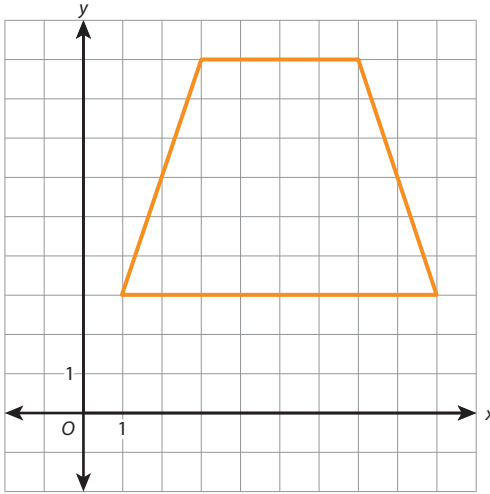
Solution: \_\_\_\_\_

## Polygons in the Coordinate Plane

Solve the problems.

- 1** Find the area of the trapezoid.

**Show your work.**



How can you separate this trapezoid into different shapes?



*Solution:* \_\_\_\_\_

- 2** Three corners of a rectangular park are located at  $(-3, 1)$ ,  $(4, 1)$ , and  $(4, -2)$ .

**Part A**

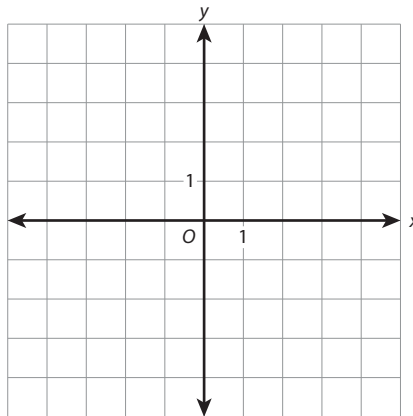
What are the coordinates of the fourth corner?

\_\_\_\_\_

**Part B**

What is the perimeter of the park? Explain how you found your answer.

\_\_\_\_\_  
\_\_\_\_\_



How does plotting points for the three corners help you find the point for the fourth corner?



**Solve.**

**3** Keaton drew a parallelogram on a coordinate plane. Two vertices of the parallelogram were located at  $(1, 1)$  and  $(1, 7)$ . The area of the parallelogram is 18 square units. Tell whether each statement is *True* or *False*.

- a. The x-coordinate of the other two vertices of the parallelogram could be  $-2$ .  True  False
- b. The x-coordinate of the other two vertices of the parallelogram could be  $4$ .  True  False
- c. The parallelogram must be a square.  True  False
- d. The perimeter of this parallelogram could be 18 units.  True  False

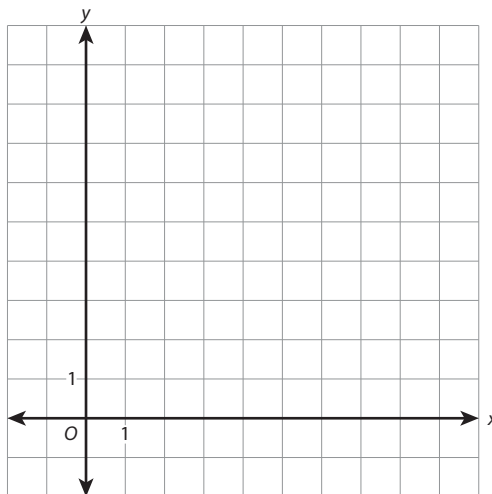
What is the formula for the area of a parallelogram?



**4** Gianna plotted these points and then connected the points in order from  $J$  to  $N$  and then back to  $J$  to show the shape of her room. Draw the room on the coordinate plane. What is the area of Gianna's room?

$J(1, 0)$   $K(1, 6)$   $L(9, 6)$   $M(9, 3)$   $N(6, 3)$

**Show your work.**



What shapes do you see when you plot and connect the points?



*Solution:* \_\_\_\_\_