Essential Question How can you use ordered pairs to plot points in a coordinate plane?

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1   EXAMPLE: Plotting Points in a Coordinate Plane

Plot the ordered pairs. Connect the points to make a picture. Color the picture when you are done.

|				
1$(-5, 9)$	**2**$(-7, 9)$	**3**$(-8, 8)$	**4**$(-9, 8)$	**5**$(-10, 7)$
6$(-10, 6)$	**7**$(-9, 5)$	**8**$(-8, 4)$	**9**$(-8, 3)$	**10**$(-10, 3)$
11$(-12, 2)$	**12**$(-12, 1)$	**13**$(-11, 0)$	**14**$(-9, 1)$	**15**$(-7, 0)$
16$(-7, -1)$	**17**$(-10, -2)$	**18**$(-10, -3)$	**19**$(-9, -4)$	**20**$(-7, -4)$
21$(-5, -3)$	**22**$(-3, -5)$	**23**$(3, -7)$	**24**$(7, -8)$	**25**$(10, -9)$
26$(11, -8)$	**27**$(10, -6)$	**28**$(7, -6)$	**29**$(6, -3)$	**30**$(4, 1)$
31$(2, 3)$	**32**$(-1, 5)$	**33**$(-2, 6)$	**34**$(-3, 8)$	
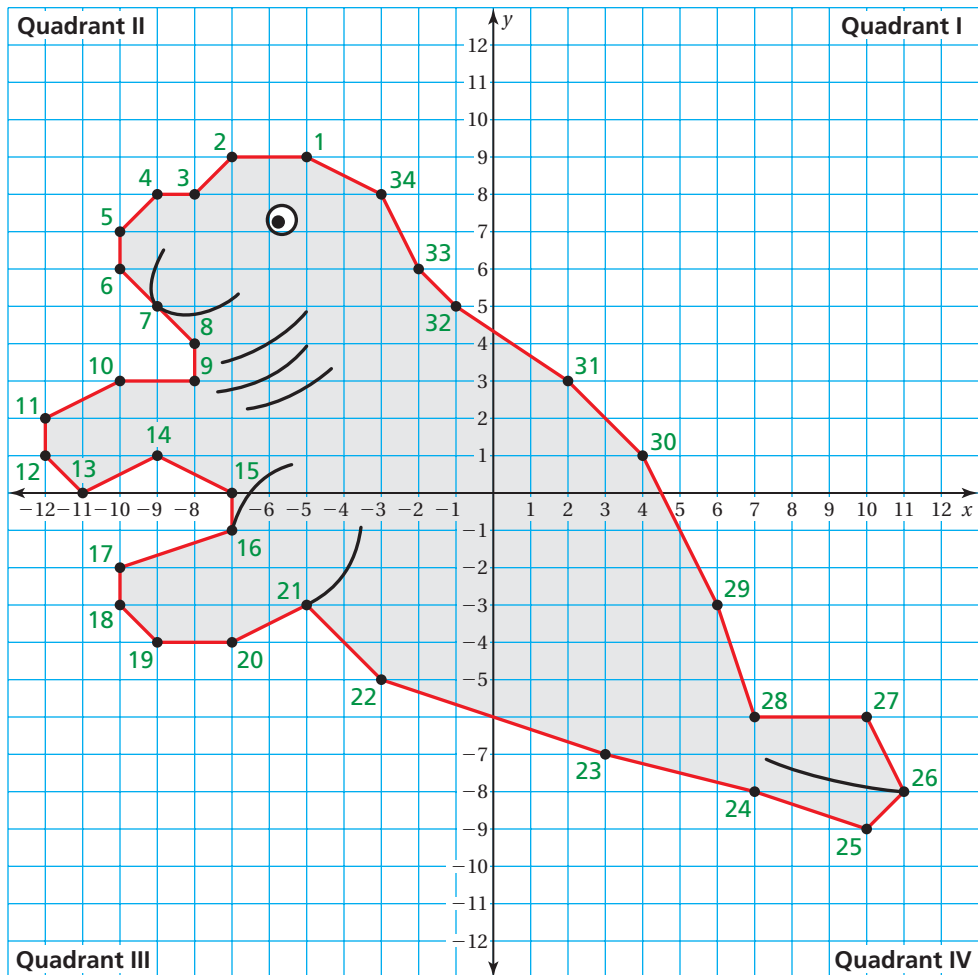
2 ACTIVITY: Plotting Points in a Coordinate Plane

Work with a partner. Plot the ordered pairs. Connect the points to make a picture. Describe and color the picture when you are done.

1 $(1, 11)$ **2** $(-4, 9)$ **3** $(-5, 7)$ **4** $(-6, 6)$ **5** $(-6, 5)$ **6** $(-3, 2)$

7 $(-4, 1)$ **8** $(-8, 3)$ **9** $(-9, 2)$ **10** $(-9, 1)$ **11** $(-5, -1)$ **12** $(-4, -4)$

13 $(-5, -6)$ **14** $(-7, -5)$ **15** $(-8, -6)$ **16** $(-8, -7)$ **17** $(-4, -10)$ **18** $(-2, -6)$

19 $(-1, -6)$ **20** $(0, -11)$ **21** $(5, -9)$ **22** $(5, -8)$ **23** $(4, -7)$ **24** $(2, -8)$

25 $(2, -5)$ **26** $(4, -2)$ **27** $(9, -1)$ **28** $(9, 0)$ **29** $(8, 1)$ **30** $(4, 0)$

31 $(3, 1)$ **32** $(7, 4)$ **33** $(7, 5)$ **34** $(6, 6)$ **35** $(5, 8)$
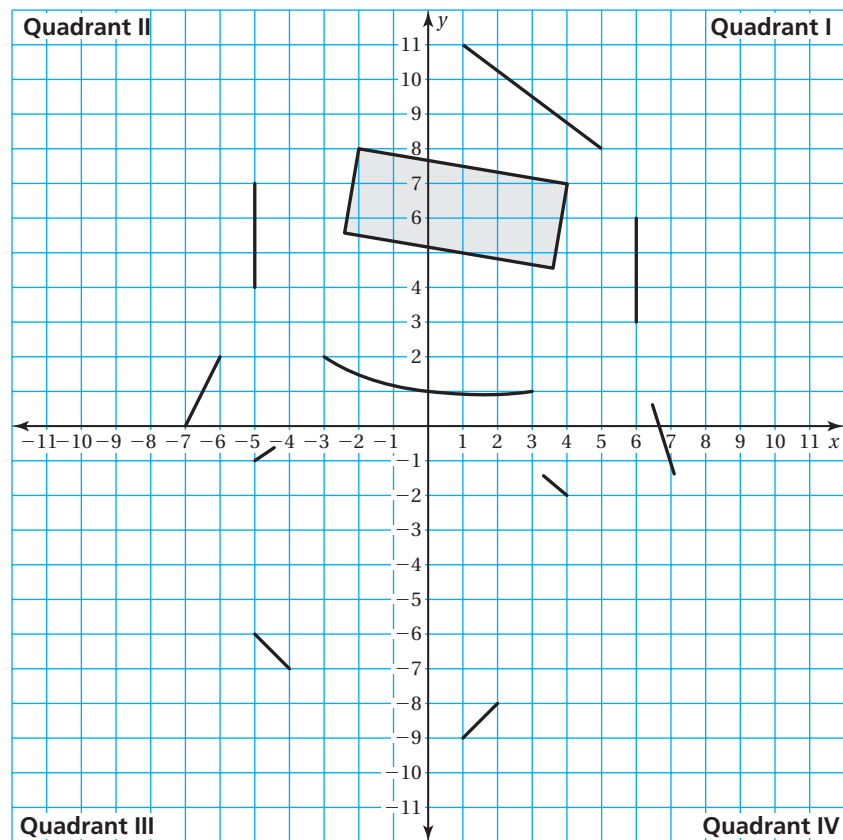
What Is Your Answer?

3. IN YOUR OWN WORDS How can you use ordered pairs to plot points in a coordinate plane?

4. Make up your own "dot-to-dot" picture. Use at least 20 points. Your picture should have at least two points in each quadrant.

Practice

Use what you learned about the coordinate plane to complete Exercises 15–18 on page A46.
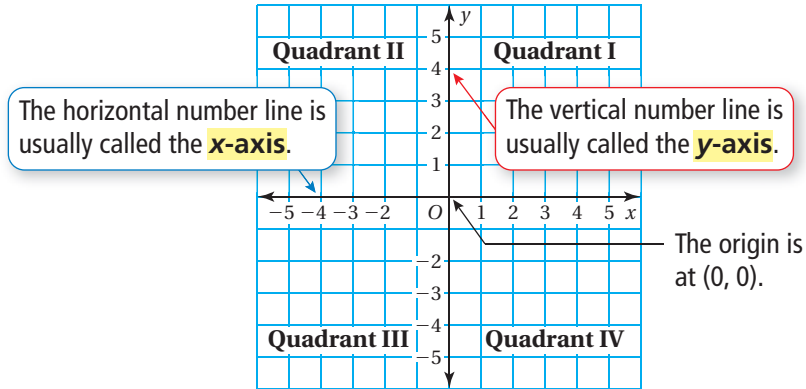
Key Vocabulary 🔊

origin, *p. A44*
quadrant, *p. A44*
x-axis, *p. A44*
y-axis, *p. A44*

🔑 **Key Idea**

The Coordinate Plane

A coordinate plane is formed by the intersection of a horizontal number line and a vertical number line. The number lines intersect at the **origin** and separate the coordinate plane into four regions called **quadrants**.

Quadrant II   **Quadrant I**

The horizontal number line is usually called the ***x*-axis**.

The vertical number line is usually called the ***y*-axis**.

The origin is at (0, 0).

Quadrant III   **Quadrant IV**

For an ordered pair (x, y), the x-coordinate shows how far to move left or right along the x-axis. The y-coordinate shows how far to move up or down along the y-axis.

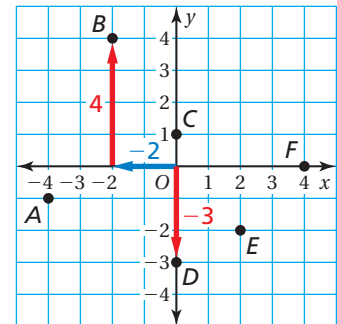**EXAMPLE** **1**   **Writing Ordered Pairs**

Write the ordered pair that corresponds to (a) point *B* and (b) point *D*.

a. Point *B* is 2 units to the left of the origin. So, the x-coordinate is -2. Point *B* is 4 units up. So, the y-coordinate is 4.

∴ The ordered pair $(-2, 4)$ corresponds to point *B*.

b. Point *D* lies on the y-axis. So, the x-coordinate is 0. Point *D* is 3 units down from the origin. So, the y-coordinate is -3.

∴ The ordered pair $(0, -3)$ corresponds to point *D*.

🔴 **On Your Own**

Now You're Ready
Exercises 5–14

Use the graph in Example 1 to write the ordered pair that corresponds to the point.

1. Point *A*   **2.** Point *C*   **3.** Point *E*   **4.** Point *F*

🔊 **Multi-Language Glossary at BigIdeasMath⃝com.**

EXAMPLE **2** **Plotting Ordered Pairs**

Plot the point in a coordinate plane. Then describe its location.
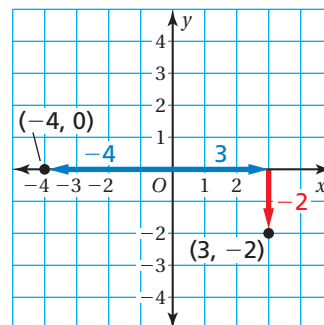
a. $(3, -2)$ b. $(-4, 0)$

a. Start at the origin. Move 3 units right and 2 units down. Then plot the point.

       The point is in Quadrant IV.

b. Start at the origin. Move 4 units left. Then plot the point.

       The point is on the *x*-axis.

On Your Own

Plot the ordered pair in a coordinate plane. Describe the location of the point.

  5. $J(-3, 1)$ **6.** $K(0, -5)$ **7.** $L(-2, -6)$ **8.** $M(8, 0)$

EXAMPLE **3** **Real-Life Application**

Reading

An **archaeologist** studies ancient ruins and objects to learn about people and cultures.

To keep track of where objects are found, an *archaeologist* divides an area using a coordinate plane.
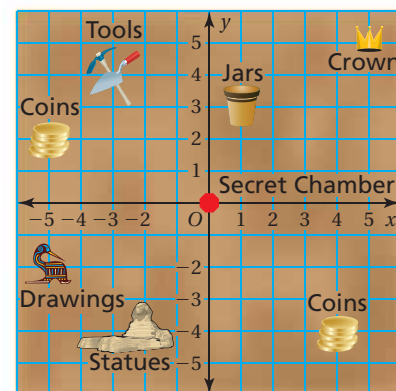
a. Which objects were found at $(-2, -4)$?

Start at the origin. Move 2 units left and 4 units down.

       Statues were found at $(-2, -4)$.

b. In which quadrants were coins found?

       Coins were found in Quadrants II and IV.

On Your Own

In Exercises 9−12, use the map in Example 3.

  9. Which objects were found at $(-3, 4)$?

 10. Which object was found at $(5, 5)$?

 11. In which quadrant were drawings found?

 12. What is located at the origin?

## ✓ Vocabulary and Concept Check

1. VOCABULARY How many quadrants are in a coordinate plane?

2. VOCABULARY Is the point $(-4, 0)$ on the x-axis or the y-axis?

3. WRITING How are the locations of the points $(-3, 1)$ and $(1, -3)$ different?

4. WRITING Describe the x- and y-coordinates of an ordered pair in Quadrant II.

Practice and Problem Solving

Write the ordered pair that corresponds to the point.

① **5.** Point A **6.** Point B

7. Point C **8.** Point D

9. Point E **10.** Point F

11. Point G **12.** Point H

13. Point I **14.** Point J
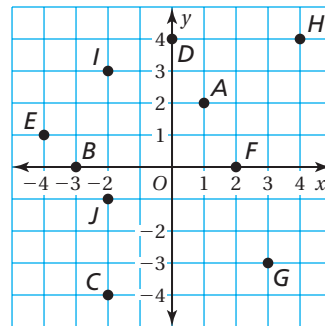
Plot the ordered pair in a coordinate plane. Describe the location of the point.

② **15.** $M(-5, -1)$ **16.** $N(1, 2)$ **17.** $P(6, -3)$ **18.** $Q(0, 3)$

19. $R(7, 5)$ **20.** $S(-3, -5)$ **21.** $T(5, 6)$ **22.** $V(-6, 0)$

23. $W(-8, 5)$ **24.** $X(-3, 4)$ **25.** $Y(2, -4)$ **26.** $Z(6, -8)$

ERROR ANALYSIS **Describe and correct the error in plotting the point.**

27.

✗ To plot $(3, 5)$, start at $(0, 0)$ and move 5 units right and 3 units up.

28.

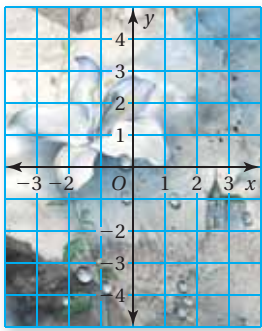✗ To plot $(5, -4)$, start at $(0, 0)$ and move 5 units left and 4 units down.

29. REASONING The coordinates of three vertices of a rectangle are shown in the figure. What are the coordinates of the fourth vertex?
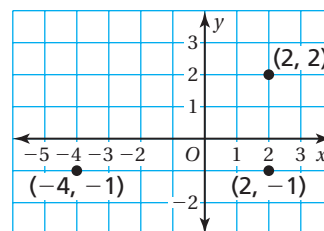
30. **GEOMETRY** Plot and connect the points. Do the points form the vertices of a triangle?

　　a. $(-4, 3)$, $(-3, -1)$, $(5, 0)$　　　　　b. $(4, 2)$, $(0, 0)$, $(-2, -1)$

31. **PAINTING** An artist creating a painting of a picture begins by placing a coordinate plane over the picture. The side length and width of each small square formed in the coordinate plane represents 3 inches in the painting. Find the perimeter and the area of the painting.

32. **REASONING** Copy and move the figure 3 units left and 5 units down. Label the coordinates of the vertices of the new figure.
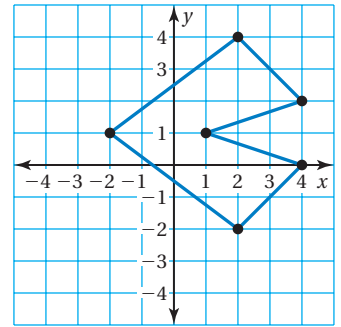
33. **OPEN-ENDED** Two vertices of triangle ABC are $A(-6, -3)$ and $B(2, -3)$. List four possible coordinates of the third vertex so that the triangle has an area of 24 square units.
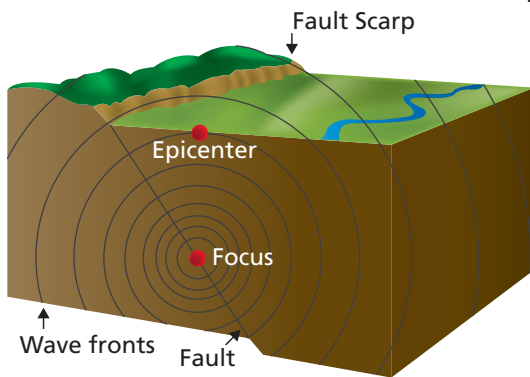
34. **Critical Thinking** The *epicenter* of an earthquake is the point on Earth's surface directly above the underground point where the earthquake originates. Readings from three stations are used to determine the epicenter of an earthquake. Use the readings from stations A, B, and C to find the epicenter. Each unit in the coordinate plane represents 1 mile. (*Hint:* Draw a circle for each station.)

The epicenter is 5 miles away from $A(-1, 1)$.

The epicenter is 5 miles away from $B(-2, -6)$.

The epicenter is 2 miles away from $C(4, -3)$.

Fair Game Review What you learned in previous grades & lessons

Write an equation for the function shown in the table.

35.

Input, x	Output, y
0	3
2	5
4	7
6	9

36.

Input, x	Output, y
0	0
6	1
12	2
18	3

37. **MULTIPLE CHOICE** Which number is the greatest?

　　Ⓐ $-5\dfrac{3}{10}$　　　　Ⓑ $-5\dfrac{7}{10}$　　　　Ⓒ $-5\dfrac{1}{5}$　　　　Ⓓ $-5\dfrac{1}{2}$