

1.6 The Coordinate Plane

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



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(4, 12) | 2(9, 9) | 3(12, 4) | 4(12, -3) | 5(10, -9) |
| 6(9, -10) | 7(7, -9) | 8(2, -11) | 9(-1, -11) | 10(-3, -10) |
| 11(-4, -8) | 12(-11, -10) | 13(-12, -9) | 14(-11, -8) | 15(-11, -6) |
| 16(-12, -5) | 17(-11, -4) | 18(-4, -6) | 19(-3, -3) | 20(-4, 0) |
| 21(-8, 2) | 22(-8, 3) | 23(-5, 8) | 24(-1, 11) | |



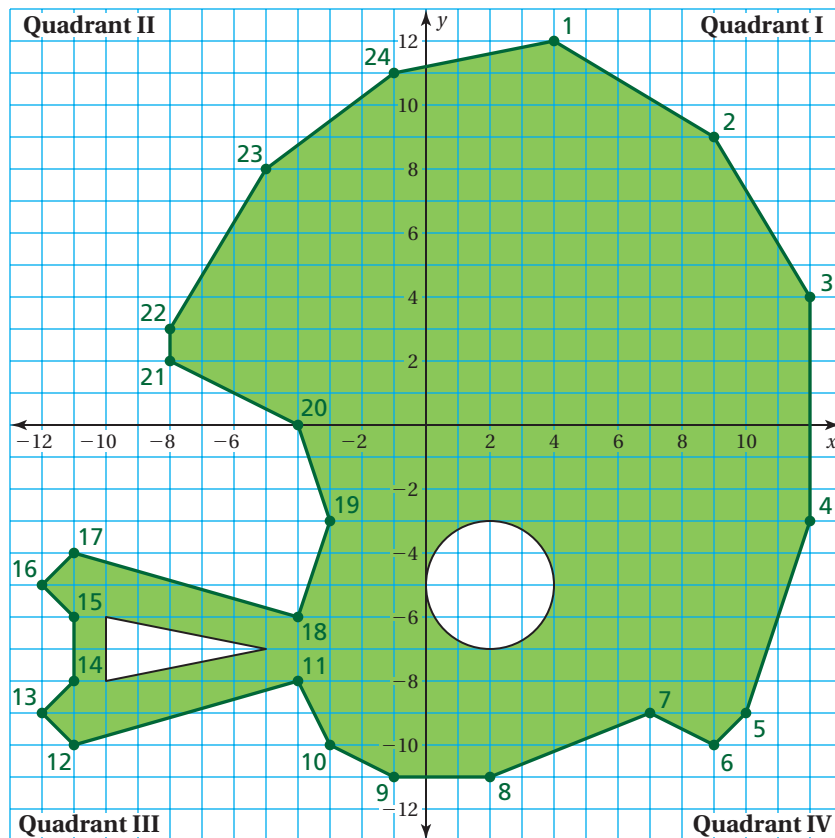
Wildcats



Chiefs



Bulldogs



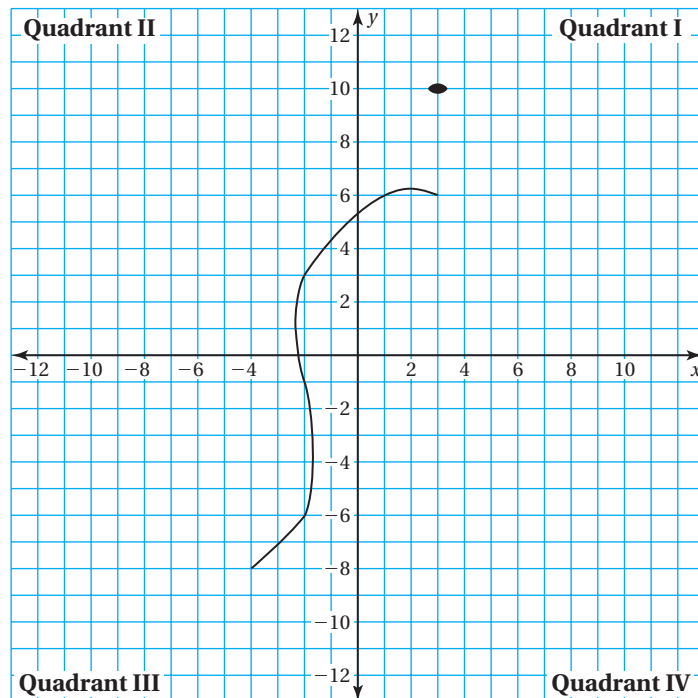
2

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 (6, 9)	2 (4, 11)	3 (2, 12)	4 (0, 11)	5 (-2, 9)
6 (-6, 2)	7 (-9, 1)	8 (-11, -3)	9 (-7, 0)	10 (-5, -1)
11 (-5, -5)	12 (-4, -8)	13 (-6, -10)	14 (-3, -9)	15 (-3, -10)
16 (-4, -11)	17 (-4, -12)	18 (-3, -11)	19 (-2, -12)	20 (-2, -11)
21 (-1, -12)	22 (-1, -11)	23 (-2, -10)	24 (-2, -9)	25 (1, -9)
26 (2, -8)	27 (2, -10)	28 (1, -11)	29 (1, -12)	30 (2, -11)
31 (3, -12)	32 (3, -11)	33 (4, -12)	34 (4, -11)	35 (3, -10)
36 (3, -8)	37 (4, -6)	38 (6, 0)	39 (9, -3)	40 (9, -1)
41 (8, 1)	42 (5, 3)	43 (3, 6)	44 (3, 7)	45 (4, 8)



What Is Your Answer?

- IN YOUR OWN WORDS** How can you use ordered pairs to locate points in a coordinate plane?
- 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 38.

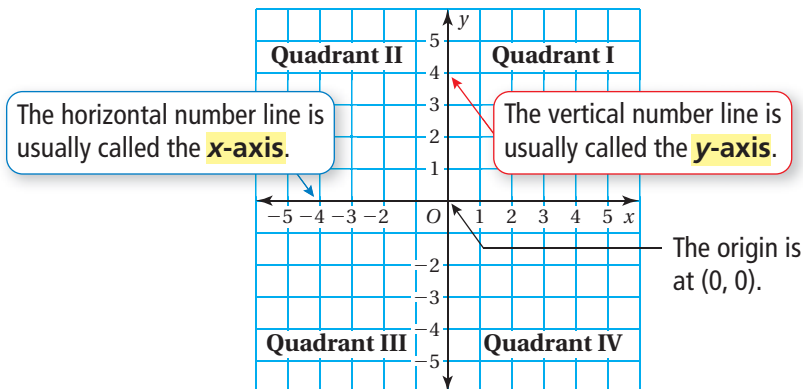
Key Idea

Key Vocabulary

coordinate plane,
p. 36
origin, p. 36
quadrant, p. 36
x-axis, p. 36
y-axis, p. 36

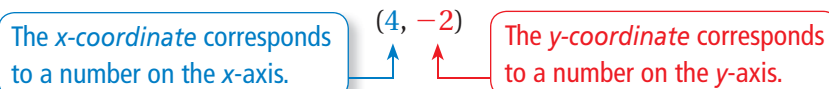
The Coordinate Plane

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**.



An **ordered pair** is a pair of numbers that is used to locate a point in a coordinate plane.

ordered pair



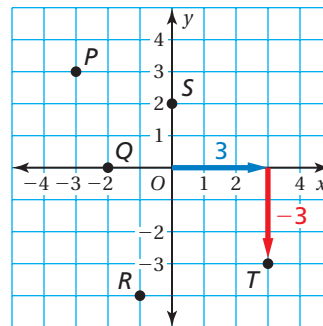
EXAMPLE 1 Standardized Test Practice

Which ordered pair corresponds to point *T*?

- (A) $(-3, -3)$ (B) $(-3, 3)$
(C) $(3, -3)$ (D) $(3, 3)$

Point *T* is 3 units to the **right** of the origin and 3 units **down**. So, the *x*-coordinate is 3 and the *y*-coordinate is -3 .

∴ The ordered pair $(3, -3)$ corresponds to point *T*. The correct answer is (C).



On Your Own

Use the graph in Example 1 to write an ordered pair corresponding to the point.

- Point *P*
- Point *Q*
- Point *R*
- Point *S*

Now You're Ready
Exercises 5–14

EXAMPLE 2 Plotting Ordered Pairs

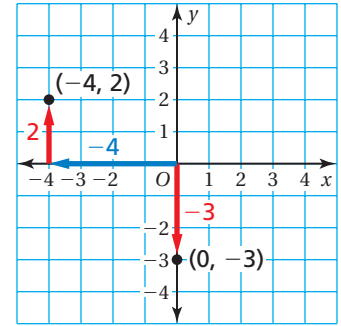
Plot (a) $(-4, 2)$ and (b) $(0, -3)$ in a coordinate plane. Describe the location of each point.

- a. Start at the origin. Move 4 units left and 2 units up. Then plot the point.

∴ The point is in Quadrant II.

- b. Start at the origin. Move 3 units down. Then plot the point.

∴ The point is on the y -axis.



On Your Own

Now You're Ready
Exercises 15–26

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

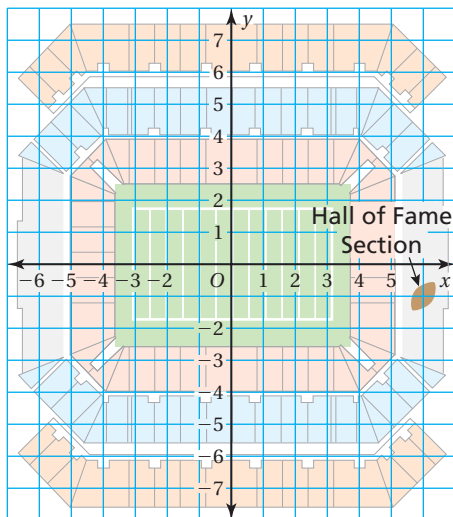
5. $A(2, 3)$

6. $B(-1, 0)$

7. $C(-5, -1)$

8. $D(3, -6)$

EXAMPLE 3 Real-Life Application



You and a friend have tickets to see a football game. You sit in the Hall of Fame Section and your friend sits at $(-4, -2)$.

- a. Write an ordered pair for your location. In which quadrant are you seated?
b. In which quadrant is your friend seated?
c. A fan in Quadrant II is chosen to win a prize. Do you or your friend have a chance to win the prize?

- a. The Hall of Fame Section is 6 units to the right of the origin and 1 unit down. So, your seat is located at $(6, -1)$. You are seated in Quadrant IV.
b. Move 4 units to the left of the origin and 2 units down. Your friend is seated in Quadrant III.
c. You are seated in Quadrant IV and your friend is seated in Quadrant III. So, you and your friend do not have a chance to win the prize.

On Your Own

9. **WHAT IF?** In Example 3, a fan sitting in the level closest to the playing field is chosen to win a prize. Do you or your friend have a chance to win the prize?

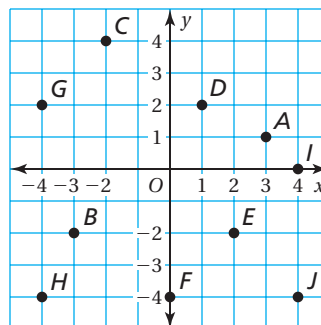
Vocabulary and Concept Check

- VOCABULARY** How many quadrants are in a coordinate plane?
- VOCABULARY** Is the point $(0, -7)$ on the x -axis or the y -axis?
- WRITING** How are the locations of the points $(2, -2)$ and $(-2, 2)$ different?
- WRITING** Describe the characteristics of ordered pairs in each of the four quadrants.

Practice and Problem Solving

Write an ordered pair corresponding 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.

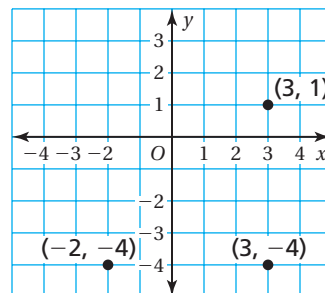
- | | | | | |
|---|-----------------|----------------|----------------|-----------------|
| 2 | 15. $K(4, 3)$ | 16. $L(-1, 2)$ | 17. $M(0, -6)$ | 18. $N(3, -2)$ |
| | 19. $P(2, -4)$ | 20. $Q(-2, 4)$ | 21. $R(-4, 1)$ | 22. $S(7, 0)$ |
| | 23. $T(-4, -5)$ | 24. $U(-2, 5)$ | 25. $V(-3, 8)$ | 26. $W(-5, -1)$ |

ERROR ANALYSIS Describe and correct the error in the solution.

27.  To plot $(4, 5)$, start at $(0, 0)$ and move 5 units right and 4 units up.

28.  To plot $(-6, 3)$, start at $(0, 0)$ and move 6 units right and 3 units down.

29. **REASONING** The coordinates of three vertices of a square are shown in the figure. What are the coordinates of the fourth vertex?
30. **GEOMETRY** The points $D(1, 1)$, $E(1, -2)$, $F(-2, -2)$, and $G(-2, 1)$ are vertices of a figure.
- Draw the figure in a coordinate plane.
 - Find the perimeter of the figure.
 - Find the area of the figure.



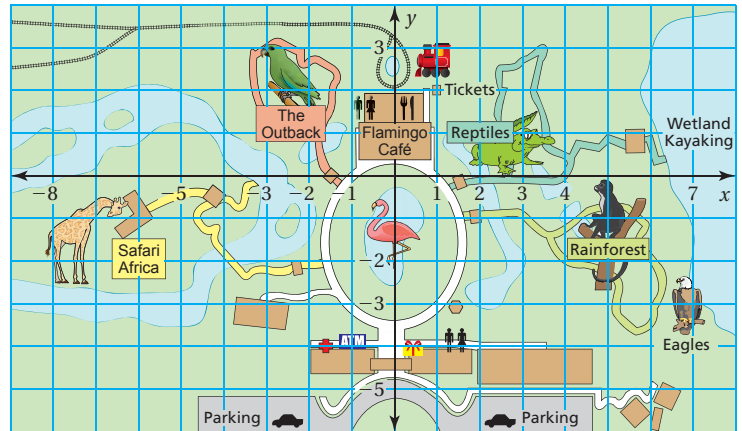
Tell whether the statement is *sometimes*, *always*, or *never* true.

Explain your reasoning.

31. The x -coordinate of a point on the x -axis is zero.
32. The y -coordinate of points in Quadrant III are positive.
33. The x -coordinate of a point in Quadrant II has the same sign as the y -coordinate of a point in Quadrant IV.

200 In Exercises 34–38, use the map of the zoo.

34. Which exhibit is located at $(2, 1)$?
35. Name an attraction on the positive y -axis.
36. Is parking available in Quadrant II? If not, name a quadrant in which you can park.
37. Write two different ordered pairs that represent the location of the Rainforest.
38. Which exhibit is closest to $(-8, -3)$?
39. **NUMBER SENSE** Name the ordered pair that is 5 units right and 2 units down from $(-3, 4)$.



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

40. $A\left(3, -\frac{3}{2}\right)$
41. $B\left(-\frac{5}{2}, \frac{10}{3}\right)$
42. $C(-5.25, -3.5)$
43. $D(-4.75, 0)$

44. **Reasoning** Your school is located at $(2, -1)$, which is 2 blocks east and 1 block south of the center of town. To get from your house to the school, you walk 5 blocks west and 2 blocks north.
 - a. What ordered pair corresponds to the location of your house?
 - b. Is your house or your school closer to the center of town? Explain.



Fair Game Review What you learned in previous grades & lessons

Copy and complete the statement using $<$, $>$, or $=$. (Section 1.5 and Skills Review Handbook)

45. $\frac{-16}{2}$ $\frac{-12}{3}$

46. $2\frac{2}{5}$ $\frac{24}{10}$

47. 3.45 $3\frac{3}{8}$

48. **MULTIPLE CHOICE** What is $\frac{1}{3}$ of $3\frac{1}{2}$? (Skills Review Handbook)

(A) $\frac{1}{2}$

(B) $1\frac{1}{6}$

(C) $1\frac{1}{2}$

(D) $10\frac{1}{2}$