Lesson 2-6

Graphing in Four Quadrants

Interactive Study Guide

See pages 41–42 for:
- Getting Started
- Vocabulary Start-Up
- Notes

Essential Question

What happens when you add, subtract, multiply, and divide integers?

Common Core State Standards

Content Standards
Preparation for 7.RP.2a, 7.RP.2b, 7.RP.2d, 8.EE.5

Mathematical Practices
1, 3, 4, 7

Vocabulary
quadrants

What You'll Learn

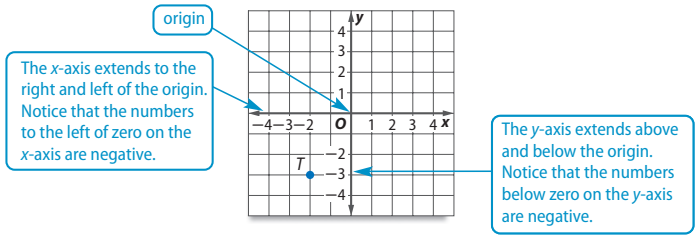
- Graph points on a coordinate plane.
- Graph algebraic relationships.

Real-World Link

Video Games Programmers of 3-D video games use several coordinate systems or spaces to create a game engine. The most commonly used spaces are local space, world space, and camera space. In local space, objects are placed on a coordinate grid at the object's relative origin.

Graph Points

The coordinate system you used in Lesson 1–6 can be extended to include points below and to the left of the origin.

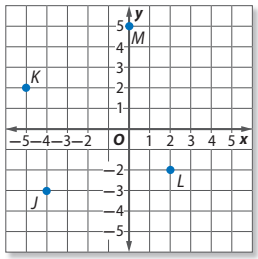


Recall that a point graphed on the coordinate system has an x-coordinate and a y-coordinate. The dot at the ordered pair $(-2, -3)$ is the graph of point T.

Example 1

Tools Tutor

Write the ordered pair that names each point.



a. J
The x-coordinate is -4.
The y-coordinate is -3.
The ordered pair is $(-4, -3)$.

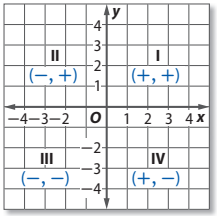
b. L
The x-coordinate is 2.
The y-coordinate is -2.
The ordered pair is $(2, -2)$.

Got It? Do these problems to find out.

1a. M **(0, 5)** **1b.** K **(−5, 2)**

The *x*-axis and the *y*-axis separate the coordinate plane into four regions, called **quadrants**. The quadrants are named I, II, III, and IV.

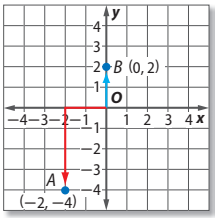
The axes and points on the axes are not located in any of the quadrants.



Example 2

Watch Tools Tutor

Graph and label each point on a coordinate plane. Name the quadrant in which each point lies.



a. $A(-2, -4)$

Start at the origin. Move 2 units left. Then move 4 units down and draw a dot. Point $A(-2, -4)$ is in Quadrant III.

b. $B(0, 2)$

Start at the origin. Since the *x*-coordinate is 0, the point will lie on the *y*-axis. So, move 2 units up. Point $B(0, 2)$ is not in a quadrant. It is on the *y*-axis.

Got It? Do these problems to find out.

2a. $H(4, -3)$ **IV** **2b.** $I(-1, 4)$ **II** **2c.** $J(0, -2)$ **none**

2a–c. See Answer Appendix for graph.

Graph Algebraic Relationships

You can use a coordinate graph to show relationships between two numbers.

Real World

Example 3

Tools Tutor

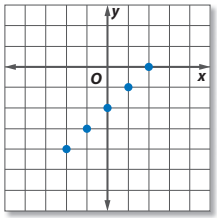
The difference between John and Tarie's golf score is 2. If *x* represents John's score and *y* represents Tarie's score, make a table of possible values for *x* and *y*. Graph the ordered pairs and describe the graph.

Scale
When no numbers are shown on the *x*- or *y*-axis, you can assume that each square is one unit long on each side.

Choose values for *x* and *y* that have a difference of 2. Then graph the ordered pairs.

The points are along a diagonal line that crosses the *x*-axis at $x = 2$.

$x - y = 2$		
x	*y*	(*x*, *y*)
2	0	(2, 0)
1	−1	(1, −1)
0	−2	(0, −2)
−1	−3	(−1, −3)
−2	−4	(−2, −4)



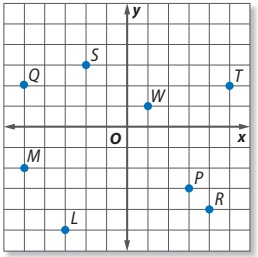
Got It? Do this problem to find out.

3. The sum of two golf scores is 3. If *x* represents one score and *y* represents the other score, make a table of possible values for *x* and *y*. Graph the ordered pairs and describe the graph. **See Answer Appendix.**

Guided Practice

Check

Name the ordered pair for each point graphed at the right. (Example 1)



1. Q **(−5, 2)**
2. P **(3, −3)**
3. T **(5, 2)**
4. M **(−5, −2)**

5–8. See Answer Appendix for graph.

Graph and label each point on a coordinate plane. Name the quadrant in which each point is located. (Example 2)

5. $A(-2, 3)$ **II**
6. $B(4, -1)$ **IV**
7. $C(-3, -2)$ **III**
8. $D(0, -5)$ **None**

9. CCSS **Model with Mathematics** The difference of two temperatures is 4°F. If x represents the first temperature and y represents the second temperature, make a table of possible values for x and y. Graph the ordered pairs and describe the graph. (Example 3) **See Answer Appendix.**