What You'll Learn

Scan the lesson. List two real-world scenarios where you would use the coordinate plane.

1. ...
2. ...

Real-World Link

Maps The map shows the layout of a small town. The locations of buildings are described in respect to the town hall. Each unit on the grid represents one block.

1. Describe the location of the barber shop in relation to the town hall. Origin (0,0) 5 blocks east (5,0) Barber Shop

2. What building is located 7 blocks east and 5 blocks north of the town hall? (7,5) Firehouse

3. Violeta is at the library. Describe how many blocks and in what direction she should travel to get to the supermarket. 3 blocks east, 3 blocks south

4. Town Hall and the bank are both located on the same vertical number line. The number 0 represents the location of Town Hall on the number line. What number represents the location of the bank? (0, 4)

Essential Question

HOW are integers and absolute value used in real-world situations?

Vocabulary

quadrants

Common Core Learning Standards

Content Standards 6.NS.6, 6.NS.6b, 6.NS.6c

Mathematical Practices 1, 3, 4, 5, 7
**Identify Points and Ordered Pairs**

A coordinate plane is formed when the $x$-axis and $y$-axis intersect at their zero points. The axes separate the coordinate plane into four regions called **quadrants**.

You can use the location on the plane or use the $x$-coordinates and $y$-coordinates to identify the quadrant in which a point is located.

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>$x$-coordinate</th>
<th>$y$-coordinate</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>positive</td>
<td>positive</td>
<td>$(2, 5)$</td>
</tr>
<tr>
<td>II</td>
<td>negative</td>
<td>positive</td>
<td>$(-2, 5)$</td>
</tr>
<tr>
<td>III</td>
<td>negative</td>
<td>negative</td>
<td>$(-2, -5)$</td>
</tr>
<tr>
<td>IV</td>
<td>positive</td>
<td>negative</td>
<td>$(2, -5)$</td>
</tr>
</tbody>
</table>

**Examples**

1. Identify the ordered pair that names point $C$. Then identify the quadrant in which it is located.

   **Step 1** Start at the origin. Move right on the $x$-axis. The $x$-coordinate of point $C$ is $1\frac{1}{2}$.

   **Step 2** Move up the $y$-axis. The $y$-coordinate is 1.

   Point $C$ is located at $(1\frac{1}{2}, 1)$. Both coordinates are positive. So, point $C$ is in Quadrant I.

2. Identify the point located at $(-1\frac{1}{2}, -1)$. Then identify the quadrant in which it is located.

   **Step 1** Start at the origin. Move left on the $x$-axis. The $x$-coordinate is $-1\frac{1}{2}$.

   **Step 2** Move down the $y$-axis. The $y$-coordinate is $-1$.

   Point $B$ is located at $(-1\frac{1}{2}, -1)$. Both coordinates are negative. So, point $B$ is in Quadrant III.
Got It?  Do these problems to find out.

a. Identify the ordered pair that names point A. Then identify the quadrant in which it is located.

b. Identify the point located at (1, −2). Then identify the quadrant in which it is located.

Reflections on the Coordinate Plane

You can use what you know about number lines and opposites to compare locations on the coordinate plane. Consider the number line and coordinate plane below.
The number line shows that −4 and 4 are opposites.

The coordinate plane shows that the points (−4, 0) and (4, 0) are the same distance from the y-axis in opposite directions. So, they are reflected across the y-axis. Notice that the y-coordinates did not change and that the x-coordinates are opposites.

Example

3. Name the ordered pair that is a reflection of (−3, 2) across the x-axis.

To reflect across the x-axis, keep the same x-coordinate, −3, and take the opposite of the y-coordinate. The opposite of +2 is −2.

So, (−3, 2) reflected across the x-axis is located at (−3, −2).

Got It?  Do these problems to find out.

Name the ordered pair that is a reflection of each point across the x-axis.

c. (1, −4)  d. (−2, 5)  e. (−3, −1)
Example

4. Kendall is building a square fence. She places fence posts at the locations indicated on the grid. What is the location of the post that reflects \((-4, 4)\) across the y-axis?

To reflect across the y-axis, keep the same y-coordinate, 4.
The opposite of the x-coordinate, -4, is 4.
So, \((-4, 4)\) reflected across the y-axis is \((4, 4)\).

Got It? Do this problem to find out.

f. Kendall also placed a fence post at \((-4, -4)\). What is the location of the post that reflects \((-4, -4)\) across the y-axis?

Guided Practice

Identify the ordered pair that names each point or the name of each point. Then identify the quadrant in which it is located. (Examples 1 and 2)

1. \((-1 \frac{1}{2}, -2)\)
   - III

2. \((-1 \frac{1}{2}, 0)\)
   - None

3. \((-2, 2 \frac{1}{2})\)
   - II

4. Refer to the diagram of a school. (Examples 3 and 4)
   a. What is located at the reflection of \((-3, -4)\) across the y-axis. What are the coordinates of this location?
      - Gym \((3, -4)\), IV
   b. What is located at the reflection of the science labs across the x-axis? What are the coordinates of this location?
      - Art studio \((-3, 2)\), II

5. Building on the Essential Question How are number lines and the coordinate plane related?

Rate Yourself!
Are you ready to move on?
Shade the section that applies.

YES ? NO

For more help, go online to access a Personal Tutor.

278 Chapter 3 Integers and the Coordinate Plane
Independent Practice

Identify the ordered pair that names each point. Then identify the quadrant in which it is located. (Example 1)

1. R  
2. G  
3. B 

4. T  
5. C  
6. A 

Identify the name of each point. Then identify the quadrant in which it is located. (Example 2)

7. (-2.5, 1.5)  
8. (1, 1.5)  
9. (0.5, -2.5) 

10. (2, -0.5)  
11. (-0.5, 0)  
12. (-1, -1.5) 

13. Use Math Tools Refer to the map of Wonderland Park. (Examples 3 and 4)

a. What is located closest to the origin?

b. Liza is standing at (2, 4). What is located at the reflection of (2, 4) across the x-axis? What are the coordinates of this location?

c. What is located at the reflection of (3, 1) across the y-axis? What are the coordinates of this location?

d. The Pipeline Plunge is reflected across the x-axis. What are the coordinates of its new location?