11 Solve Problems in the Coordinate Plane

The coordinate plane can be used to solve real-world and mathematical problems. For example, maps use coordinate planes to show the locations of real-world places.

You can use a coordinate plane to find the distance between two points or objects with the same *x*- or *y*-coordinate. When the different coordinates are in the same quadrant, subtract their absolute values. When they are in different quadrants, add their absolute values.

Example 1

Each unit on the coordinate plane represents a city block. What is the distance from the museum to the bus station?
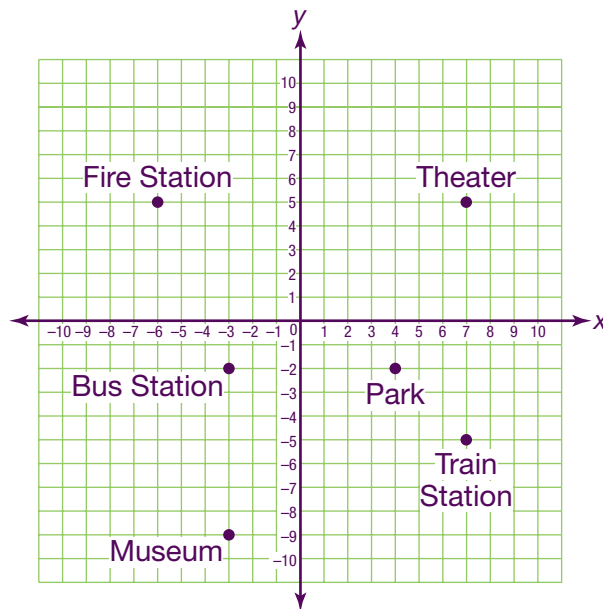
> The museum is located at $(-3, -9)$, and the bus station is at $(-3, -2)$. Since they have the same *x*-coordinate and are in the same quadrant, subtract the absolute values of their *y*-coordinates.
>
> Museum: $|-9| = 9$
>
> Bus station: $|-2| = 2$
>
> $9 - 2 = 7$

The distance from the museum to the bus station is 7 blocks.

Example 2

Use the coordinate plane in Example 1. What is the distance from the theater to the fire station?

> The theater is located at $(7, 5)$, and the fire station is at $(-6, 5)$. Since they both have the same *y*-coordinate and are in different quadrants, add the absolute values of their *x*-coordinates.
>
> Theater: $|7| = 7$
>
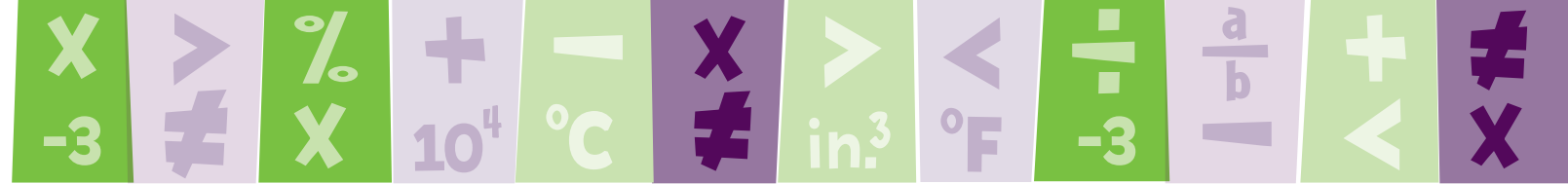> Fire station: $|-6| = 6$
>
> $7 + 6 = 13$

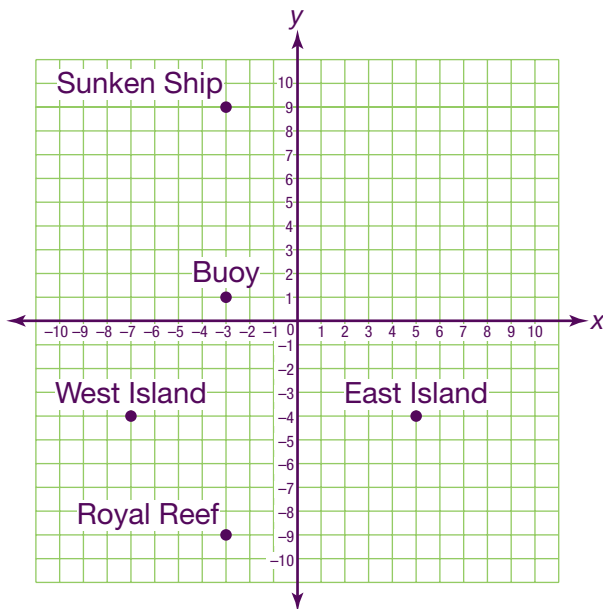The distance from the theater to the fire station is 13 blocks.

APPLY

Think of at least two uses of the coordinate plane in your everyday life.

Guided Practice

The coordinate plane below shows a ship captain's map. Each unit on the map represents 1 mile.

What is the distance from the sunken ship to the buoy?

Step 1 Identify whether the points have the same *x*- or *y*-coordinates.

The sunken ship is located at _____, and the buoy is at _____.

They have the same _____-coordinate.

Step 2 Identify whether the points are in the same quadrant or different quadrants.

The sunken ship is located in Quadrant _____.

The buoy is located in Quadrant _____.

Step 3 Add or subtract the absolute values of the *y*-coordinates. ← - - - - - - -

THINK

If the points are in the same quadrant, subtract to find the distance between them.

Sunken Ship: |_____| = _____

Buoy: |_____| = _____

_____ − _____ = _____

The distance from the sunken ship to the buoy is _____ miles.