Inquiry Lab

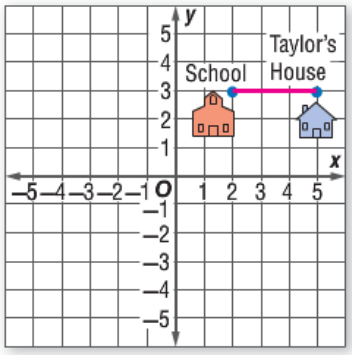
Find Distance on the Coordinate Plane

Content Standards
6.NS.8

Mathematical Practices
1, 3, 4

Inquiry **WHAT is the relationship between coordinates and distance?**

Maps Taylor's house and school are each shown on the map. What is the distance between the two points?



What do you know? I can use the map to find the location of Taylor's house and the school.

What do you need to find? the distance between Taylor's house and the school

Investigation 1

Find the distance between Taylor's house and the school.

Step 1 Find the coordinates of Taylor's house.
(5, 3)

Step 2 Find the coordinates of the school.
(2, 3)

Step 3 Draw a line between the points. The line is horizontal, so the *y*-coordinates are the same.

Step 4 To find the distance, count the number of units between the *x*-coordinates.

Location	*x*-coordinate
house	5
school	2

So, there are 3 units between Taylor's house and the school.

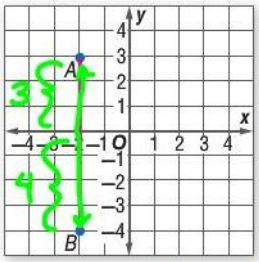
Investigation 2

Find the distance between point *A* and point *B* on the coordinate plane.

A & B are in different quadrants.

Step 1 Determine the coordinates for point *A*.

(−2, 3)



Step 2 Determine the coordinates for point *B*.

(−2, −4)

$|3| + |-4|$

$1 = 3 + 4 = 7$

same x-coordinate, so use the y-coordinates!

Step 3 Draw a line between the points. The line is vertical, so the *x*-coordinates are the same.

Step 4 Count the number of units between each *y*-coordinate and the *x*-axis.

Point	*y*-coordinate	Distance from *x*-axis
A	3	3
B	−4	4

Step 5 To find the distance between the two points, add the distance from the *x*-axis to each point.

3 + 4 = 7

So, the distance between point *A* and point *B* is 7 units.

Collaborate

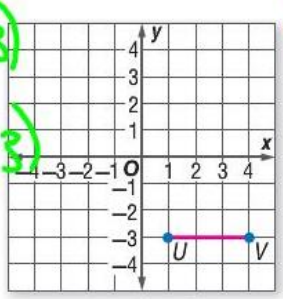
CCSS **Model with Mathematics** **Work with a partner. Draw a line between each pair of points. Find the distance between each pair of points.**

1. 3 units

U(1, −3)

V(4, −3)

Show your work.



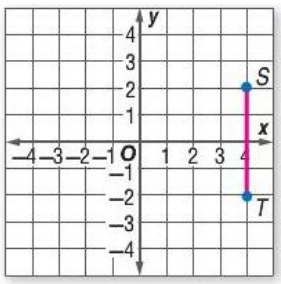
Same quadrant

$|1| = 1$

$|4| = 4$

$4 - 1 = 3$

2. 4 units



different quadrants

S(4, 2) T(4, −2)

$|2| + |-2| =$

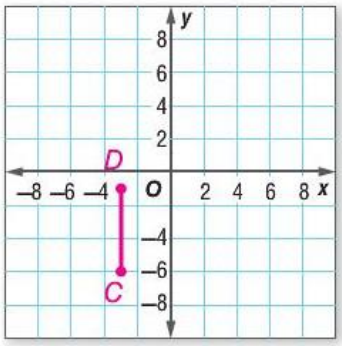
$2 + 2 = 4$

Collaborate

Model with Mathematics **Work with a partner. Plot each pair of points on the coordinate plane. Find the distance between each pair of points.**

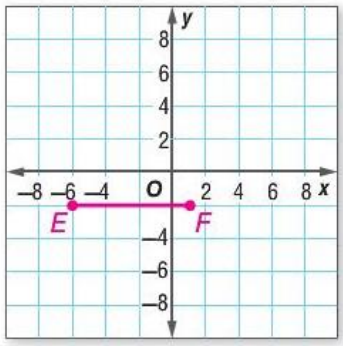
3. $C(-3, -6)$, $D(-3, -1)$ **5 units**

Show your work.



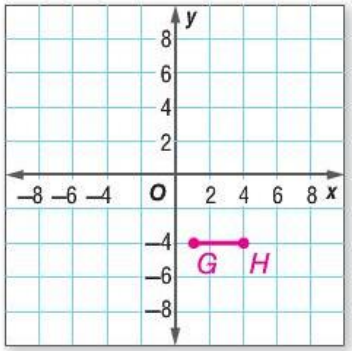
same Q
$|-6| = 6$
$|-1| = 1$
$6 - 1 = 5$

4. $E(-6, -2)$, $F(1, -2)$ **7 units**



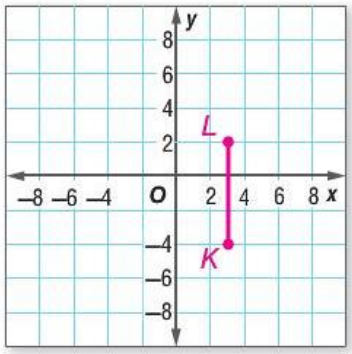
different Q
$|-6| + |1|$
$6 + 1 = 7$

5. $G(1, -4)$, $H(4, -4)$ **3 units**



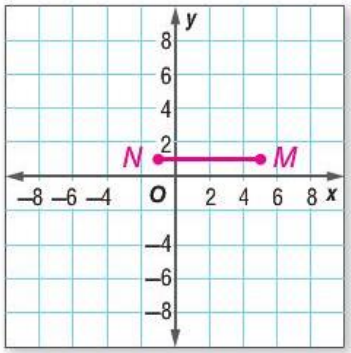
same Q
$|1| = 1$
$|4| = 4$
$4 - 1 = 3$

6. $K(3, -4)$, $L(3, 2)$ **6 units**



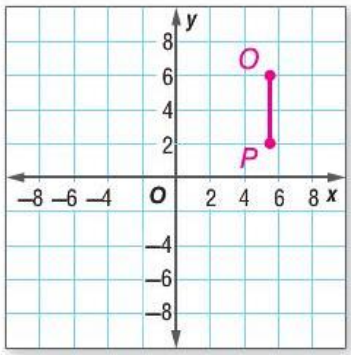
different Q
$|-4| = 4$
$|2| = 2$
$4 + 2 = 6$

7. $M(5, 1)$, $N(-1, 1)$ **6 units**



different Q
$|5| = 5$
$|-1| = 1$
$5 + 1 = 6$

8. $O\left(5\frac{1}{2}, 6\right)$, $P\left(5\frac{1}{2}, 2\right)$ **4 units**



same Q
$|6| = 6$
$|2| = 2$
$6 - 2 = 4$

With a partner to complete the table below. Use your answers from Exercises 3–6. The first one is done for you.

	Exercise	Coordinates Used	Horizontal or Vertical Line?	Same or Different Quadrant?	Line Length
	2	2 and −2	horizontal	different	4 units
9.	3	**−6 and −1**	**vertical**	**same**	**5 units**
10.	4	**−6 and 1**	**horizontal**	**different**	**7 units**
11.	5	**1 and 4**	**horizontal**	**same**	**3 units**
12.	6	**−4 and 2**	**vertical**	**different**	**6 units**

13. Compare your answers from Exercises 11 and 12. What is the relationship between the coordinates used and the length of each line?

In Exercise 11, you could add the absolute values of −6 and 1 to find the length of the line. In Exercise 12, you could subtract the absolute values of 4 and 1 to find the length of the line.

14. Name the coordinates of two points that have the same *x*-coordinates and are 8 units apart. **(2, 5) and (2, −3)**

15. CCSS **Reason Inductively** Use absolute value to write a rule for determining the distance between two points on a coordinate plane that have the same *x*-coordinate. **The distance can be found by finding the absolute value of the difference between their *y*-coordinates if both are positive or if both are negative. If one *y*-coordinate is positive and the other is negative, add the absolute values.**

Reflect

16. CCSS **Model with Mathematics** Write and solve a real-world problem that involves determining distance on a coordinate plane. **A map shows Amita's house at (5, −7) and the library at (5, 3). Each unit on the map is equal to one mile. What is the distance between Amita's house and the library? 10 miles**

17. Inquiry WHAT is the relationship between coordinates and distance?

To find the distance between two points on a horizontal line, use their *x*-coordinates. To find the distance between two points on a vertical line, use their *y*-coordinates.