[Objective]
The student will plot ordered pairs containing rational values to identify vertical and horizontal lengths between two points in order to solve real-world problems.

[Prerequisite Skills]
plotting points

[Materials]
Student pages **S218-S232**

[Essential Questions]
1. Describe how we can find the horizontal distance between two points with the same *y*-coordinate.
2. Describe how we can find the vertical distance between two points with the same *x*-coordinate.
3. How can absolute value be used to help find the horizontal or vertical distances between points?

[Words For Word Wall]
quadrants, coordinate plane, absolute value, *x*-coordinates, *y*-coordinates

[Grouping]
Cooperative Pairs (CP), Whole Group (WG), Individual (I)
* For Cooperative Pairs (CP) activities, assign the roles of Partner A and Partner B to students. This allows each student to be responsible for designated tasks within the lesson.

[Levels of Teacher Support]
Modeling (M), Guided Practice (GP), Independent Practice (IP)

[Multiple Representations]
SOLVE, Verbal Description, Pictorial Representation, Graphic Organizer, Graph

[Warm-Up] (IP, WG, I) S218 (Answers on T435.)
- Have students turn to S218 in their books to begin the Warm-Up. Students will be plotting ordered pairs containing rational numbers. Have students complete the activity and then review the answers as a whole group. **{Verbal Description, Pictorial Representation, Graph}**

[Homework]
Take time to go over the homework from the previous night.

[Lesson] [1 – 2 Days (1 day = 80 minutes) – M, GP, WG, CP, IP]

SOLVE Problem (WG, CP, IP) S219 (Answers on T436.)

Have students turn to S219 in their books. The first problem is a SOLVE problem. Students will complete the entire SOLVE problem as it is a review of plotting ordered pairs containing rational numbers, a skill from the previous lesson. **{SOLVE, Graphic Organizer, Verbal Description, Graph}**

Extend the SOLVE Problem – Horizontal and Vertical Distances (M, GP, IP, CP, WG) S220, S221 (Answers on T437, T438.)

M, WG, CP, WG: Have students turn to S220 in their books. Use the following activity to allow students to build an understanding of horizontal and vertical distance when two points share one coordinate. Make sure students know their designation as Partner A or Partner B. **{Pictorial Representation, Verbal Description, Graph}**

MODELING

Extend the SOLVE Problem – Horizontal and Vertical Distances

Step 1: Direct students to the coordinate plane on S220.

- Begin by having students plot and label the points of the rectangle from the SOLVE problem on the previous page onto the new coordinate plane on S220.
- Partner A, what do you notice about *ABCD*? (It is a rectangle, which we identified from the SOLVE problem. There are four right angles and two sets of parallel sides.) Record.
- Partner B, what is similar about the points? (*A* and *D*, as well as *B* and *C* have the same ***x*-coordinates**, while *A* and *B*, as well as *D* and *C* have the same ***y*-coordinates**. All of the points are in Quadrant I.) Record.
- Have students turn to page S221.
- Partner A, what do you notice about Points *A* and *B*? (They are on the same horizontal line, or they both have the same *y*-coordinate of 4.6.) Record.
- Partner B, how can we find the horizontal distance between Points *A* and *B*? (Answers may vary. We can count the distance between the points, or we can subtract the *x*-values of both points.) Record.
- Partner A, what is the horizontal distance between Points *A* and *B*? Justify your answer. (3.2 units – We can subtract 0.3 from 3.5 to get 3.2, or we can count from 0.3 up to 3.5 to see that there are 3.2 units in between the points.) Record.
- Partner B, what is the horizontal distance between Points *C* and *D*? Justify your answer. (3.2 units – *ABCD* is a rectangle, so that means that line segment *AB* is equal to line segment *DC*.) Record.

Step 2: Have students look at Question 7.

- Partner A, what do you notice about Points *A* and *D*? (They are on the same vertical line, or they both have the same *x*-coordinate of 0.3.) Record.
- Partner B, how can we find the vertical distance between Points *A* and *D*? (Answers may vary. We can count the distance between the points, or we can subtract the *y*-values of both points.) Record.
- Partner A, what is the vertical distance between Points *A* and *D*? Justify your answer. (3.2 units – We can subtract 1.4 from 4.6 to get 3.2, or we can count from 1.4 up to 4.6 to see that there are 3.2 units in between the points.) Record.
- Partner B, what is the vertical distance between Points *B* and *C*? Justify your answer. (3.2 units – *ABCD* is a rectangle, so that means that line segment *AD* is equal to line segment *BC*.) Record.
- Being as specific as possible, what shape is *ABCD*? Justify your answer. (It is a square. We just found that every side of the shapee measures 3.2 units. This means that it is a square because all of the sides have the same measure.) Record.

Generalizing Strategies for Distance

(M, GP, WG, CP, IP) S222, S223, S224 (Answers on T439, T440, T441.)

M, WG, GP, CP: Have students turn to S222 in their books. Students will be working with more points on the coordinate plane in order to apply absolute value to generalize strategies for finding the distance between two points. Make sure students know their designation as Partner A or Partner B. **{Verbal Description, Pictorial Representation, Graphic Organizer, Graph}**

MODELING

Generalizing Strategies for Distance

Step 1: Direct students' attention to the **coordinate plane** on S222.

- Partner B, what are the coordinates of Point *A*? [(¯4, ¯1)] Record in the table.
- Partner A, what are the coordinates of Point *B*? [(¯4, ¯3)] Record in the table.
- Partner B, what are the coordinates of Point *C*? [(2, ¯3)] Record in the table.

Step 2: Direct students' attention to the graphic organizer on S223.

- Partner A, between which two points are we finding the distance? (Points *A* and *B*)
- Partner *B*, what do you notice about Point *A* and Point *B*? (They have the same *x*-coordinate of ¯4.) Record.

- Partner A, in which **quadrant**(s) are Points *A* and *B* located? (Quadrant III) Record.
- Partner B, what is the distance from *A* to the *x*-axis? (1 unit) Record. (Explain: We can count up 1 unit from *A* to the *x*-axis.)
- Partner A, what is the distance from *B* to the *x*-axis? (3 units) Record. (Explain: We can count up 3 units from *B* to the *x*-axis.)

Step 3: What is the distance from *A* to *B*? (2 units) Record.

- Partner B, how do you know it is 2 units? (We can count from *A* down to *B* and see that it is only 2 units.)
- Partner A, does the distance between *A* and *B* relate to the distances of *A* and *B* to the *x*-axis? Explain your answer. (Yes, if we subtract the distance from *A* to the *x*-axis from the distance from *B* to the *x*-axis, we get the distance from *A* to *B*.) Record.
- Partner B, what are we finding when we identify the distance from a point to an axis? (The axis represents 0 on either a vertical or a horizontal number line. The distance from zero is really the **absolute value** of the coordinate.) Record.

Step 4: Partner A, do the distances in Questions 3 and 4 relate to the numerical coordinates of Points *A* and *B*? Justify your answer. (Yes, the distance from *A* to the *x*-axis is 1, while the *y*-coordinate of *A* is ¯1. The distance from *B* to the *x*-axis is 3 while the *y*-coordinate of *B* is ¯3. We are finding the absolute value of the *y*-coordinates.) Record.

- Partner B, how does the distance from *A* to *B* relate to the answer to Question 8? (The distance from *A* to *B* is the difference between the absolute value of the two *y*-coordinates.) Record.

Step 5: Direct students' attention to the graphic organizer on S224.

- Partner B, between which two points are we finding the distance? (Points *B* and *C*)
- Partner A, what do you notice about Point *B* and Point *C*? (They have the same *y*-coordinate of ¯3.) Record.
- Partner B, in which quadrant(s) are Points *B* and *C* located? (Quadrant III and Quadrant IV) Record.
- Partner A, what is the distance from *B* to the *y*-axis? (4 units) Record. (Explain: We can count to the right 4 units from *B* to the *y*-axis.)
- Partner B, what is the distance from *C* to the *y*-axis? (2 units) Record. (Explain: We can count to the left 2 units from *C* to the *y*-axis.)

Step 6: What is the distance from *B* to *C*? (6 units) Record.

- Partner A, how do you know it is 6 units? (We can count from *B* over to *C* and see that it is 6 units.)
- Partner B, does the distance between *B* and *C* relate to the distances of *B* and *C* to the *y*-axis? Explain your answer. (Yes, if we add the distance from *B* to the *y*-axis to the distance from *C* to the *y*-axis, we get the distance from *B* to *C*.) Record.

- Partner A, what are we finding when we identify the distance from a point to an axis? (The axis represents 0 on either a vertical or a horizontal number line. Therefore, the distance from zero is really the absolute value of the coordinate.) Record.
- Partner B, do the distances in Questions 3 and 4 relate to the numerical coordinates of Points *B* and *C*? Justify your answer. (Yes, the distance from *B* to the *y*-axis is 4, while the *x*-coordinate of *B* is ¯4. The distance from *C* to the *y*-axis is 2, while the *x*-coordinate of *C* is 2. We are finding the absolute value of the *x*-coordinates.) Record.
- Partner A, how does the distance from *B* to *C* relate to the answer to Question 8? (The distance from *B* to *C* is the sum of the absolute value of the two *x*-coordinates.) Record.

Step 7: Direct students' attention to Question 10.

- How can we find the distance between two points in the same quadrant? (If they are in the same quadrant, find the absolute value of each coordinate and subtract the value closer to 0 from the value farther from 0.) Record.
- How can we find the distance between two points in different quadrants? (Find the absolute value of each of the coordinates and then add the two values together.) Record.
- Why do we subtract when the points are in the same quadrant and add when the points are in different quadrants? (When the points are in the same quadrant, they are on the same side of 0. Therefore, by subtracting the value that is closer to 0 from the value that is farther from 0, we arrive at the distance between the two values. When the points are in different quadrants, they are on opposite sides of 0. If we find the absolute value, or distance from 0, for each point, we can figure out how far each point is away from the center and add them together to get the total distance.)

Solving Problems in the Coordinate Plane

(M, GP, WG, CP, IP) S225, S226, S227, S228, S229, S230 (Answers on T442, T443, T444, T445, T446, T447.)

M, WG, GP, CP: Have students turn to S225 in their books. Students will be exploring the coordinate plane through SOLVE problems. Students will complete several SOLVE problems using the activities that are provided below. **{Pictorial Representation, Verbal Representation, Graphic Organizer, Graph}**

MODELING

Solving Problems in the Coordinate Plane

***Teacher Note:** There are several SOLVE Problems for the lesson. The solution is included for each SOLVE problem. The teacher can model one or more problems as needed. You can also have the students work in cooperative learning groups to complete the SOLVE Problems. Here are some suggestions for utilizing the SOLVE Problems as cooperative learning activities.

- Have students work in groups of 4 or 5 and assign them one of the SOLVE problems to complete as a group. Students can then transfer answers to chart paper and present to the whole group.
- Have students work in 5 different groups. Post each SOLVE problem on a chart around the room. Students can start at one poster and complete the S step. After a few minutes, have student groups move to the next poster, read the S step, and then complete the O step.After a few minutes, have students move to the next poster, read the S and O steps, and complete the L step. Continue with this procedure until student groups have returned to their original problem. They can also present their problem to the whole group.
- Have a copy of one of the SOLVE problems at each table or group (5 groups). Have students complete the S Step and then pass the problem on to the next group when you give a signal. Students will continue this process until they get back their original problem.

If time permits... **(CP, IP) S231 (Answers on T448.)**

Have students complete the problems on S231. Encourage students to use the addition and subtraction methods on this page and to use counting as a way to check their solutions.

[Closure]

To wrap up the lesson, go back to the essential questions and discuss them with students.

- Describe how we can find the horizontal distance between two points with the same *y*-coordinate. *(If two points have the same y-coordinate, that means we can count the horizontal distance between the two points. If the points are in the same quadrant, another option is to subtract the absolute value of their x-coordinates, and if the points are in different quadrants, we can add the absolute value of their x-coordinates to find the distance.)*
- Describe how we can find the vertical distance between two points with the same *x*-coordinate. *(If two points have the same x-coordinate, that means we can count the vertical distance between the two points. If the points are in the same quadrant, another option is to subtract the absolute value of their y-coordinates, and if the points are in different quadrants, we can add the absolute value of their y-coordinates to find the distance.)*
- How can absolute value be used to help find the horizontal or vertical distances between points? *(When two points are in the same quadrant, finding the absolute value of their coordinates and subtracting will arrive at the distance between the two points. If two points are in different quadrants, then finding the sum of the absolute value of their coordinates will arrive at the distance between the two points.)*

[Homework] Assign S232 for homework. (Answers on T449.)

[Quiz Answers] T450 – T451

1. **A** 2. **B** 3. **D** 4. **C** 5. **A** 6. **A** 7. **C** 8. **C** 9. **D** 10. **B**

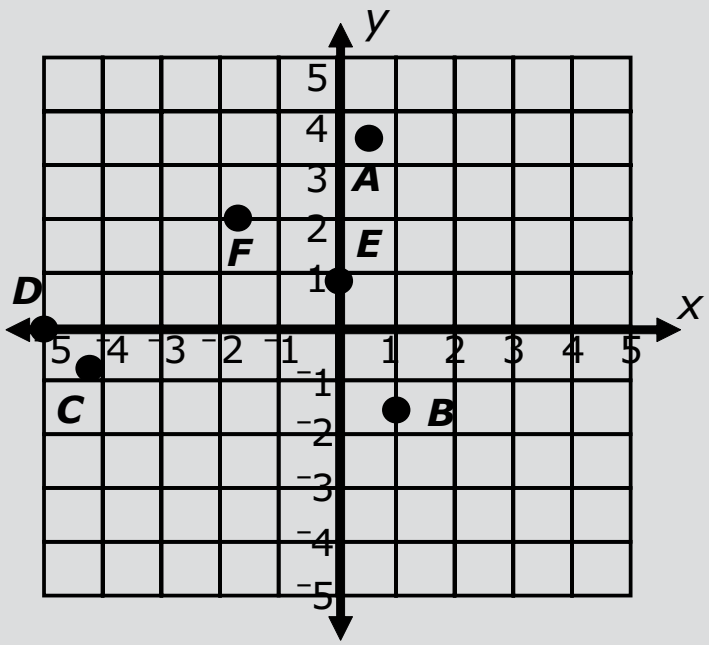
The quiz can be used at any time as extra homework or to see how students progress with solving real-world problems in the coordinate plane.

Here is the key to **S218**.

Warm–Up

Directions: Plot and label the following ordered pairs on the coordinate plane below.

A: $\left(\frac{1}{2}, 3.5\right)$	B: $\left(1, \frac{-3}{2}\right)$	C: $\left(-4.3, \frac{-5}{6}\right)$
D: $\left(-5, 0\right)$	E: $\left(0, \frac{4}{5}\right)$	F: $\left(-1\frac{3}{5}, 2\right)$



Here is the key to **S219**.

Directions: Complete the following SOLVE problem with your partner.

~~Laura is creating string art on the wall of her living room~~. | ~~She uses a coordinate plane to help plan her design~~.| She currently has nails in the wall at the points (3.5, 1.4), (0.3, 1.4), (0.3, 4.6), and (3.5, 4.6). | What shape does Laura create with the nails?

S Underline the question.

This problem is asking me to find **the shape that Laura creates with the nails.**

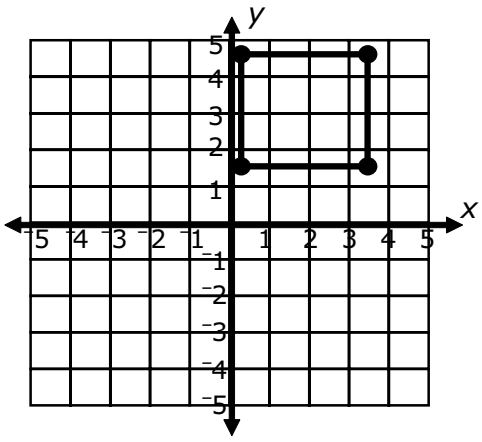
O Identify the facts.
Eliminate the unnecessary facts.
List the necessary facts. **Nails at Points: (3.5, 1.4), (0.3, 1.4), (0.3, 4.6), (3.5, 4.6)**

L Write in words what your plan of action will be. **Plot the values of the ordered pairs on a coordinate plane and identify the shape that the four points create.**

Choose an operation or operations. **N/A**

V Estimate your answer. **A quadrilateral**

Carry out your plan.



The shape is a rectangle.

E Does your answer make sense? (Compare your answer to the question.) **Yes, because we identified the shape that is created on the coordinate plane.**

Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because it matches my estimate of a quadrilateral.**

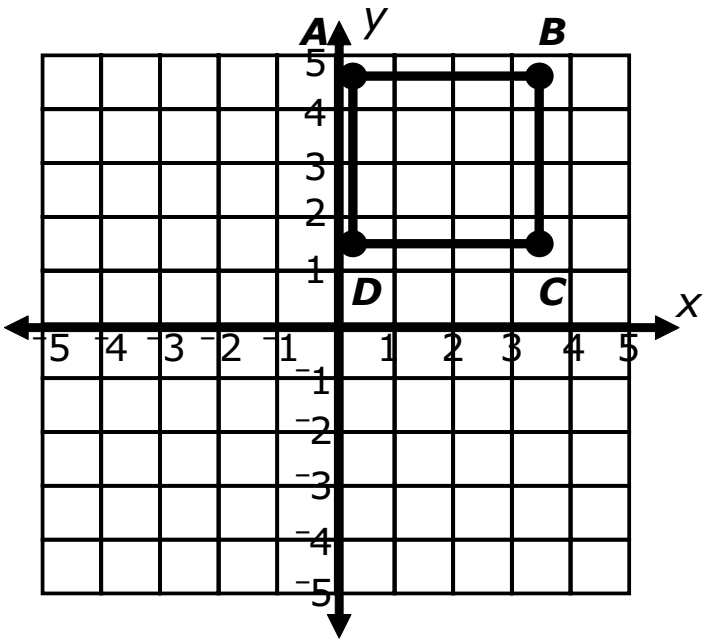
Is your answer accurate? (Check your work.) **Yes**

Write your answer in a complete sentence. **The shape Laura creates is a rectangle.**

Here is the key to **S220**.

Directions: Complete this page with your teacher and partner.

Let's recreate the four points and the shape of the figure from the SOLVE problem on the previous page. Starting from the top left corner and moving clockwise, let's label the points *A* – *D*.



1. What do you notice about *ABCD*? **It is a rectangle, which we identified from the SOLVE problem. It looks like it could be a square. There are four right angles and two sets of parallel sides.**

2. What is similar about the points? ***A* and *D*, as well as *B* and *C* have the same *x*-coordinates, while *A* and *B*, as well as *D* and *C* have the same *y*-coordinates. All of the points are in Quadrant I.**

Here is the key to **S221**.

Directions: Complete this page with your teacher and partner.

3. What do you notice about Points *A* and *B*? **They are on the same horizontal line, or they both have the same *y*-coordinate of 4.6.**

4. How can we find the horizontal distance between Points *A* and *B*? **We can count the distance between the points, or we can subtract the *x*-values of both points.**

5. What is the horizontal distance between Points *A* and *B*? Justify your answer. **3.2 units – We can subtract 0.3 from 3.5 to get 3.2, or we can count from 0.3 up to 3.5 to see that there are 3.2 units between the points.**

6. What is the horizontal distance between Points *C* and *D*? Justify your answer. **3.2 units – *ABCD* is a rectangle, so that means that line segment *AB* is equal to line segment *DC*.**

7. What do you notice about Points *A* and *D*? **They are on the same vertical line, or they both have the same *x*-coordinate of 0.3.**

8. How can we find the vertical distance between Points *A* and *D*? **Answers may vary. We can count the distance between the points, or we can subtract the *y*-values of both points.**

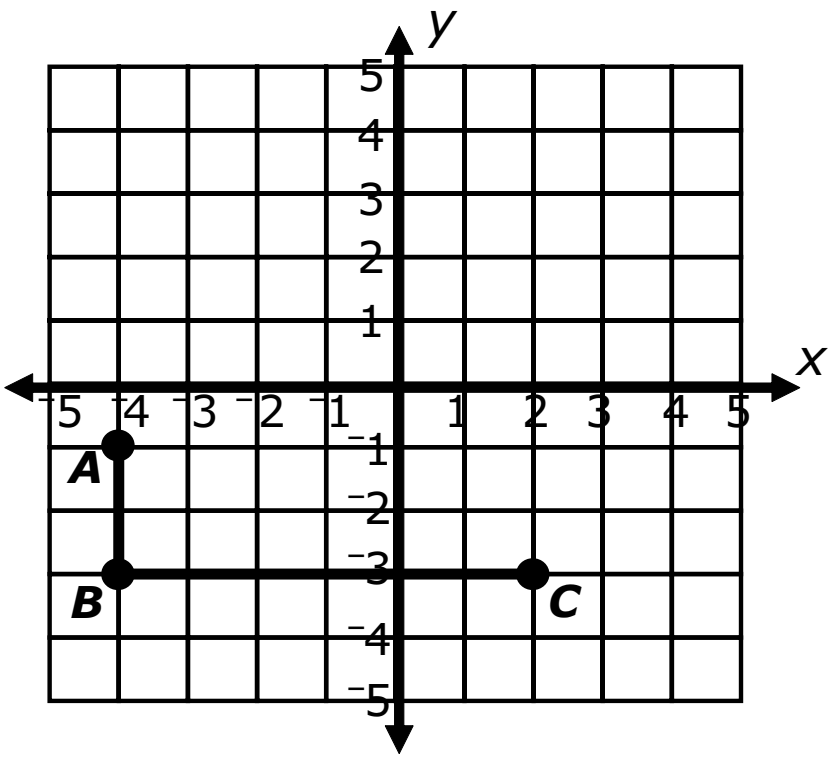
9. What is the vertical distance between Points *A* and *D*? Justify your answer. **3.2 units – We can subtract 1.4 from 4.6 to get 3.2, or we can count from 1.4 up to 4.6 to see that there are 3.2 units in between the points.**

10. What is the vertical distance between Points *B* and *C*? Justify your answer. **3.2 units – *ABCD* is a rectangle, so that means that line segment *AD* is equal to line segment *BC*.**

11. Being as specific as possible, what shape is *ABCD*? Justify your answer. **It is a square. We just found that every side of the shape measures 3.2 units. This means that it is a square because all of the sides have the same measure.**

Here is the key to **S222**.

Directions: Complete this page with your teacher and partner.



Identify the ordered pairs of the three points plotted above. Continue to the next page to answer the questions about these points.

Point *A*	**(-4, -1)**
Point *B*	**(-4, -3)**
Point *C*	**(2, -3)**

Here is the key to **S223**.

Directions: Complete this page with your teacher and your partner.

<table>
<tr><th colspan="3">Point A to Point B</th></tr>
<tr><td colspan="3">1. What do you notice about Point A and Point B? They have the same x-coordinate of ¯4.

2. In which quadrant(s) are Points A and B located? Quadrant III</td></tr>
<tr><td>3. What is the distance from A to the x-axis?
1 unit</td><td>4. What is the distance from B to the x-axis?
3 units</td><td>5. What is the distance from A to B?
2 units</td></tr>
<tr><td colspan="3">6. Does the distance between A and B relate to the distances of A and B to the x-axis? Explain your answer. Yes, if we subtract the distance from A to the x-axis from the distance from B to the x-axis, we get the distance from A to B.</td></tr>
<tr><td colspan="3">7. What are we finding when we identify the distance from a point to an axis? The axis represents 0 on either a vertical or a horizontal number line. The distance from zero is really the absolute value of the coordinate.</td></tr>
<tr><td colspan="3">8. Do the distances in Questions 3 and 4 relate to the numerical coordinates of Points A and B? Justify your answer. Yes, the distance from A to the x-axis is 1, while the y-coordinate of A is ¯1. The distance from B to the x-axis is 3, while the y-coordinate of B is ¯3. We are finding the absolute value of the y-coordinates.</td></tr>
<tr><td colspan="3">9. How does the distance from A to B relate to the answer to Question 8? The distance from A to B is the difference between the absolute value of the two y-coordinates.</td></tr>
</table>

Here is the key to **S224**.

Directions: Complete this page with your teacher and your partner.

Point *B* to Point *C*		
1. What do you notice about Point *B* and Point *C*? **They have the same *y*-coordinate of ¯3.** **2.** In which quadrant(s) are Points *B* and *C* located? **Quadrant III and Quadrant IV**		
3. What is the distance from *B* to the *y*-axis? **4 units**	**4.** What is the distance from *C* to the *x*-axis? **2 units**	**5.** What is the distance from *B* to *C*? **6 units**
6. Does the distance between *B* and *C* relate to the distances of *B* and *C* to the *y*-axis? Explain your answer. **Yes, if we add the distance from *B* to the *y*-axis to the distance from *C* to the *y*-axis, we get the distance from *B* to *C*.**		
7. What are we finding when we identify the distance from a point to an axis? **The axis represents 0 on either a vertical or a horizontal number line. The distance from zero is really the absolute value of the coordinate.**		
8. Do the distances in Questions 3 and 4 relate to the numerical coordinates of Points *B* and *C*? Justify your answer. **Yes, the distance from *B* to the *y*-axis is 4, while the *x*-coordinate of *B* is ¯4. The distance from *C* to the *y*-axis is 2, while the *x*-coordinate of *C* is 2. We are finding the absolute value of the *x*-coordinates.**		
9. How does the distance from *B* to *C* relate to the answer to Question 8? **The distance from *B* to *C* is the sum of the absolute value of the two *x*-coordinates.**		
10. How can we find the distance between two points in the same quadrant? **If they are in the same quadrant, find the absolute value of each coordinate and subtract the value closer to 0 from the value farther from 0.**		
11. How can we find the distance between two points in different quadrants? **Find the absolute value of each of the coordinates and then add the two values together.**		

Here is the key to **S225**.

Directions: Complete the following SOLVE problem.

~~Rhonda is using a map to identify the distance she is from the book store.~~ | She is currently located at (⁻3, ⁻4). | She will drive up to the point (⁻3, 2.5) | and finish at (1.3, 2.5). | Plot and label the locations. | If each unit is equivalent to 1 mile, how many miles will Rhonda have to drive to the book store?

S Underline the question.
This problem is asking me to find **the number of miles Rhonda will have to drive to get to the book store.**

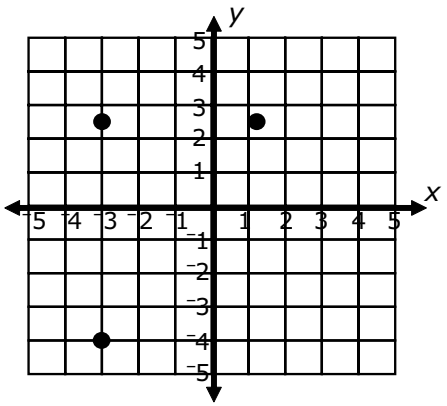
O Identify the facts.
Eliminate the unnecessary facts.
List the necessary facts. **Current Location: (⁻3, ⁻4), Drive up to: (⁻3, 2.5)**
Finish: (1.3, 2.5), plot and label the locations.

L Write in words what your plan of action will be. **Add the absolute value of the *y*-coordinates of the first location and the first stop. Then, add the absolute value of the *x*-coordinates of the first stop and the finishing point. Add these two sums together to get the total distance.**

Choose an operation or operations. **Addition**

V Estimate your answer. **About 11 miles**
Carry out your plan.

|⁻4| + |2.5| = 6.5
|⁻3| + |1.3| = 4.3
6.5 + 4.3 = 10.8



The total distance traveled is 10.8 units, or 10.8 miles.

E Does your answer make sense? (Compare your answer to the question.) **Yes, because we identified the total number of miles for the trip.**
Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because 10.8 miles is close to my estimate of about 11 miles.**
Is your answer accurate? (Check your work.) **Yes**
Write your answer in a complete sentence. **Rhonda will drive a total of 10.8 miles.**

Here is the key to **S226**.

Directions: Complete the following SOLVE problem.

~~Laura continues to make string art in the shape of a quadrilateral~~. | The three nails already in the wall are placed at (1, 1.5), $\left(4\frac{4}{5}, \frac{3}{2}\right)$, and (4.8, ⁻2.3). | Where should Laura place the fourth nail in the wall to be sure all sides have the same length?

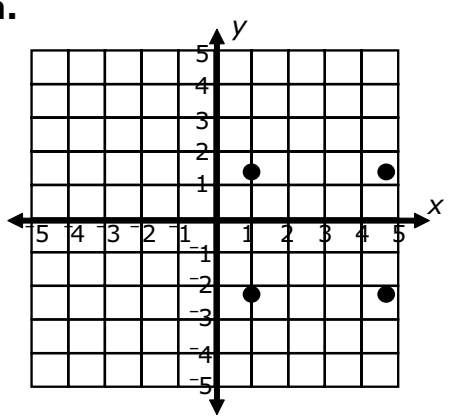
S Underline the question.
This problem is asking me to find **the location of the final nail so that all sides are equal.**

O Identify the facts.
Eliminate the unnecessary facts.
List the necessary facts. **Creating a quadrilateral, nails at: (1, 1.5), $\left(4\frac{4}{5}, \frac{3}{2}\right)$, (4.8, ⁻2.3), All sides are the same length.**

L Write in words what your plan of action will be. **Plot all of the points. Use subtraction to find the difference between the *x*-coordinates of the first two points. Then, use this distance to count and find the location of the fourth point.**
Choose an operation or operations. **Subtraction.**

V Estimate your answer. **Close to (1, ⁻3)**
Carry out your plan.

$4\frac{4}{5} - 1 = 3\frac{4}{5}$ or 3.8
4.8 - 3.8 = 1
(1, ⁻2.3)



Each side is 3.8 units long. If we move down 3.8 units from (1, 1.5), we end at (1, ⁻2.3).

E Does your answer make sense? (Compare your answer to the question.) **Yes, because we identified the location of the fourth point.**
Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because it is close to our estimate of (1, ⁻3).**
Is your answer accurate? (Check your work.) **Yes**
Write your answer in a complete sentence. **The location of the fourth point is (1, ⁻2.3).**

Here is the key to **S227**.

Directions: Complete the following SOLVE problem.

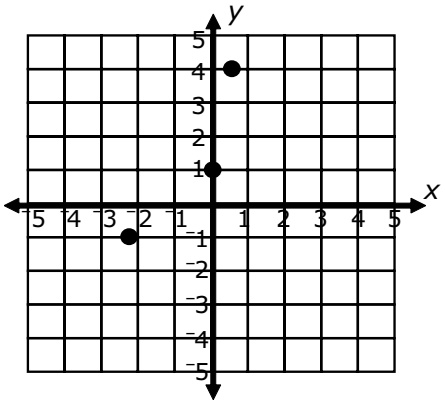
~~Christopher and Jonathan are meeting at a restaurant in town for a business lunch.~~ | Christopher is currently located at (⁻2.2, ⁻1). | Jonathan is working at (0.5, 4).| They are meeting at the restaurant located at (0, 1). | If they can only walk on the gridlines of the coordinate plane, without taking any shortcuts, who has the longer walk?

S Underline the question.
This problem is asking me to find **the person who has the longer walk to the restaurant.**

O Identify the facts.
Eliminate the unnecessary facts.
List the necessary facts. **Christopher: (⁻2.2, ⁻1), Jonathan: (0.5, 4)**
Restaurant: (0, 1)

L Write in words what your plan of action will be. **Plot each of the locations and use addition or subtraction to find the horizontal and vertical distance from each person's location to the restaurant following the gridlines. Then compare distances to identify whose is longer.**
Choose an operation or operations. **Addition, subtraction**

V Estimate your answer. **Christopher**
Carry out your plan.



Jonathan goes down 3 units and left 0.5 units for a total of 3.5 units.
Christopher moves to the right 2.2 and up 2 units for a total of 4.2 units.
Christopher's walk will be longer.

E Does your answer make sense? (Compare your answer to the question.) **Yes, because we identified who has the longer walk.**
Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because their walks are similar but Christopher's is longer.**
Is your answer accurate? (Check your work.) **Yes**
Write your answer in a complete sentence. **Christopher has the longer walk.**

Here is the key to **S228**.

Directions: Complete the following SOLVE problem.

~~Joe is traveling from Pittsburgh to Philadelphia.~~ | The map shows Pittsburgh to be located at ($^-1$, 3.2) | and Philadelphia to be located at $\left(2\frac{1}{10}, 3\frac{1}{5}\right)$. | Each unit on the coordinate plane represents a distance of 100 miles. | <u>What is the distance from Pittsburgh to Philadelphia in miles?</u>

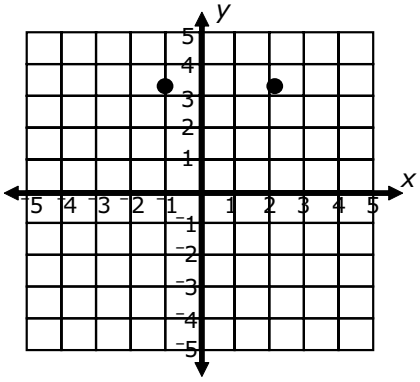
S Underline the question.
This problem is asking me to find **the number of miles from Pittsburgh to Philadelphia.**

O Identify the facts.
Eliminate the unnecessary facts.
List the necessary facts. **Pittsburgh: ($^-1$, 3.2) , Philadelphia: $\left(2\frac{1}{10}, 3\frac{1}{5}\right)$. 1 unit = 100 miles**

L Write in words what your plan of action will be. **Find the distance between the *x*-coordinates by adding the absolute value of each. Then, multiply the total number of units by the distance represented by each unit.**

Choose an operation or operations. **Addition, multiplication**

V Estimate your answer. **Around 300 miles**
Carry out your plan.



Pittsburgh is 1 unit away from the *y*-axis, while Philadelphia is 2.1 units away. In total, a distance of 3.1 units away. 3.1 times 100 = 310 miles total.

E Does your answer make sense? (Compare your answer to the question.) **Yes, because we identified the total number of miles.**
Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because it is close to my estimate of about 300 miles.**
Is your answer accurate? (Check your work.) **Yes**
Write your answer in a complete sentence. **The distance between Pittsburgh and Philadelphia is about 310 miles.**

Here is the key to **S229**.

Directions: Complete the following SOLVE problem.

~~Jennifer is creating patterned paper on a computer program.~~ | The top left of the square is located at (2.6, 4.7). | The bottom right corner of the square is located at (4.1, 3.2). | What is the length of each of the sides of the square?

S Underline the question.
This problem is asking me to find **the length of each of the sides of the square.**

O Identify the facts.
Eliminate the unnecessary facts.
List the necessary facts. **Top Left: (2.6, 4.7), Bottom Right: (4.1, 3.2)**

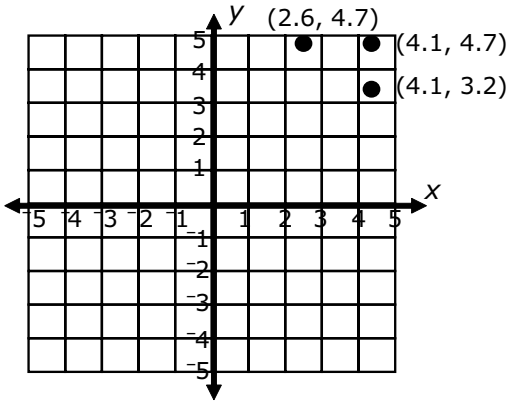
L Write in words what your plan of action will be. **Plot each of the points and identify one other point that would represent a corner of the square. Then use subtraction to identify the distance between two of the points to find the length of one side.**

Choose an operation or operations. **Subtraction**

V Estimate your answer. **About 1.5 units**
Carry out your plan.

4.1 - 2.6 = 1.5

4.7 - 3.2 = 1.5



The distance between the new point and either of the original points is 1.5 units.

E Does your answer make sense? (Compare your answer to the question.) **Yes, because we found the length of each side.**
Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because it matches my estimate of 1.5 units.**
Is your answer accurate? (Check your work.) **Yes**
Write your answer in a complete sentence. **The length of each side is 1.5 units.**

Here is the key to **S230**.

Directions: Complete the following SOLVE problem.

~~Sarah helped Laura with some of the string art on her wall.~~ | Sarah plotted three of the points using nails at the locations $(^{-}2.5, 5)$, $(4, 5)$, and $\left(^{-}2.5, \frac{-3}{2}\right)$. | To create a rectangle, Sarah will place a nail in the wall for the fourth corner. | What will be the length and the width of the rectangle once she places the final nail in the wall?

S Underline the question.
This problem is asking me to find **the length and width of the rectangle after she places the final nail in the wall.**

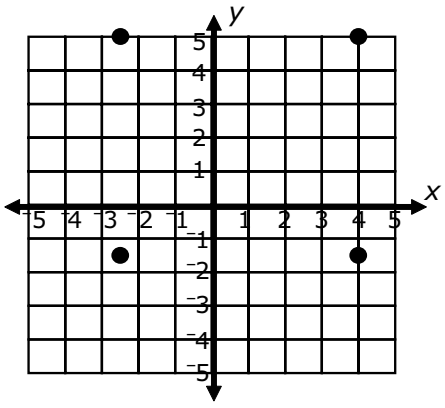
O Identify the facts.
Eliminate the unnecessary facts.
List the necessary facts. **Three Points: $(^{-}2.5, 5)$, $(4, 5)$, $\left(^{-}2.5, \frac{-3}{2}\right)$, Create a rectangle, identify length and width**

L Write in words what your plan of action will be. **Plot all three points and plot the fourth point to make a rectangle. Use counting, subtraction or addition to find the measure of the length and width.**
Choose an operation or operations. **Addition, subtraction**

V Estimate your answer. **Around 6 units by 7 units**
Carry out your plan.

$|4| + |^{-}2.5| = 6.5$

$|5| + |\frac{-3}{2}| = 6\frac{1}{2}$ or 6.5

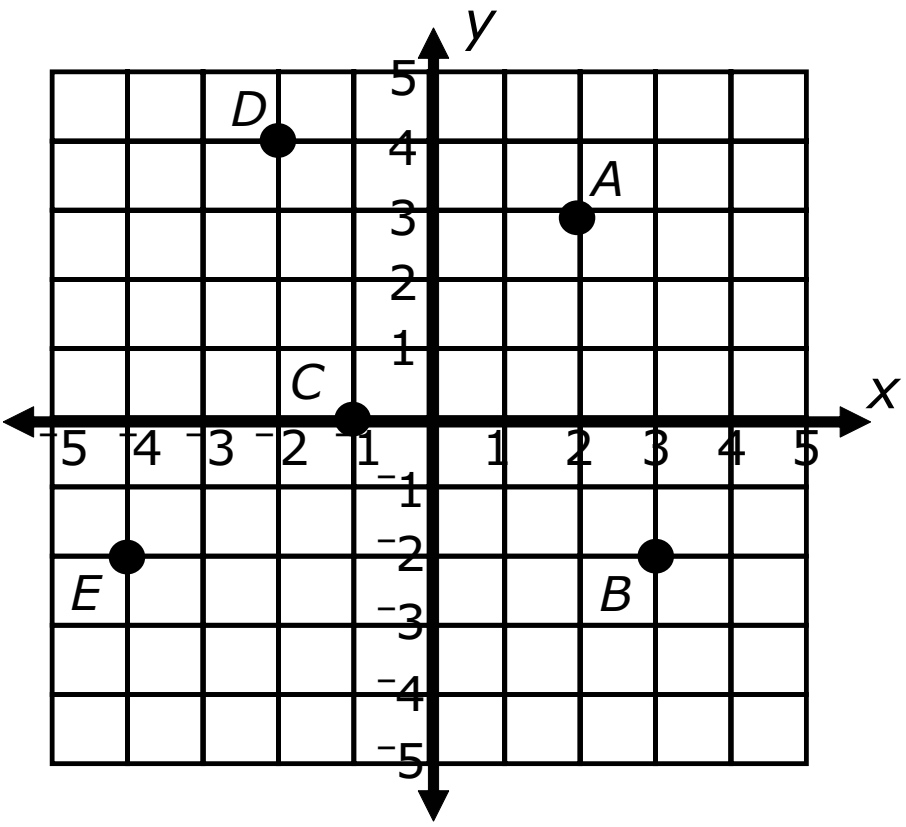


The length and width are both 6.5 units. It is a square.

E Does your answer make sense? (Compare your answer to the question.) **Yes, because we identified the length and width of the rectangle.**
Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because it is close to my estimate of 6 units by 7 units.**
Is your answer accurate? (Check your work.) **Yes**
Write your answer in a complete sentence. **The length and width are both 6.5 units.**

Here is the key to **S231**.

Directions: Complete the questions below.



POINT	LOCATION
Point *A*	Library
Point *B*	School
Point *C*	Store
Point *D*	Post Office
Point *E*	Bakery

If you may only travel using the gridlines, with no other shortcuts, find the distance between the locations in number of units.

Route	Distance	Route	Distance
Library to Bakery	**11 units**	Bakery to School	**7 units**
Library to Post Office	**5 units**	Bakery to Store	**5 units**
Library to Store	**6 units**	Post Office to School	**11 units**
Library to School	**6 units**	Post Office to Store	**5 units**
Bakery to Post Office	**8 units**	School to Store	**6 units**

Here is the key to **S232**.

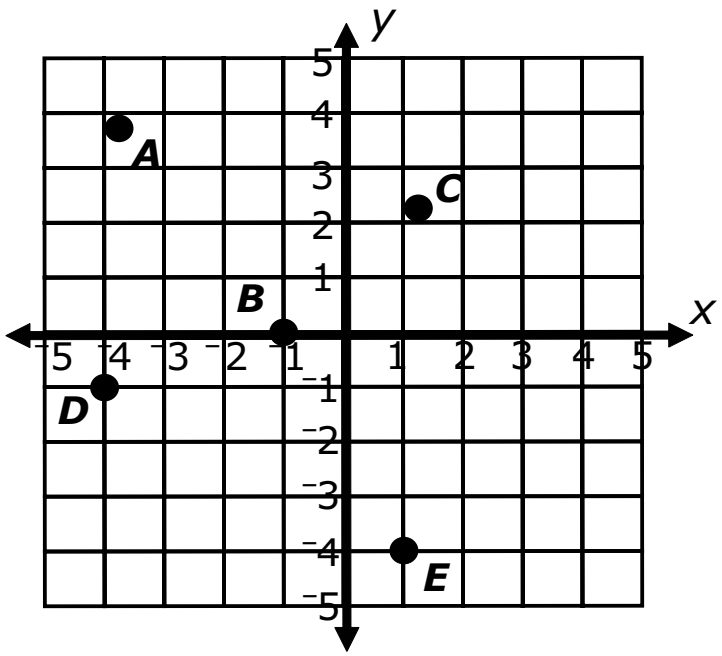
Homework

Name _____ **Date** _____

Directions: Complete the questions below.

Use the coordinate plane below to plot points. Find the distance between each pair of points using vertical and horizontal movement only.

Point A $\left(^{-}3.7, 3\frac{3}{5}\right)$ to Point B $(^{-}1, 0)$	**6.3**	Point B $(^{-}1, 0)$ to Point D $(^{-}4, ^{-}1)$	**4**
Point A $\left(^{-}3.7, 3\frac{3}{5}\right)$ to Point C $\left(1.2, 2\frac{1}{5}\right)$	**6.3**	Point B $(^{-}1, 0)$ to Point E $(1, ^{-}4)$	**6**
Point A $\left(^{-}3.7, 3\frac{3}{5}\right)$ to Point D $(^{-}4, ^{-}1)$	**4.9**	Point C $\left(1.2, 2\frac{1}{5}\right)$ to Point D $(^{-}4, ^{-}1)$	**8.4**
Point A $\left(^{-}3.7, 3\frac{3}{5}\right)$ to Point E $(1, ^{-}4)$	**12.3**	Point C $\left(1.2, 2\frac{1}{5}\right)$ to Point E $(1, ^{-}4)$	**6.4**
Point B $(^{-}1, 0)$ to Point C $\left(1.2, 2\frac{1}{5}\right)$	**4.4**	Point D $(^{-}4, ^{-}1)$ to Point E $(1, ^{-}4)$	**8**



Lesson 19: Solving Problems in the Coordinate Plane

Name _____ Date _____

Quiz

1. When two points are in the same quadrant and their *x*-coordinates are the same, to find the distance between the two points,

A. subtract the absolute value of their *y*-coordinates.

B. subtract the absolute value of their *x*-coordinates.

C. add the absolute value of their *y*-coordinates.

D. add the absolute value of their *x*-coordinates.

---

2. When two points are in the same quadrant and their *y*-coordinates are the same, to find the distance between the two points,

A. subtract the absolute value of their *y*-coordinates.

B. subtract the absolute value of their *x*-coordinates.

C. add the absolute value of their *y*-coordinates.

D. add the absolute value of their *x*-coordinates.

---

3. When two points are in different quadrants and their *y*-coordinates are the same, to find the distance between the two points,

A. subtract the absolute value of their *y*-coordinates.

B. subtract the absolute value of their *x*-coordinates.

C. add the absolute value of their *y*-coordinates.

D. add the absolute value of their *x*-coordinates.

---

4. When two points are in different quadrants and their *x*-coordinates are the same, to find the distance between the two points,

A. subtract the absolute value of their *y*-coordinates.

B. subtract the absolute value of their *x*-coordinates.

C. add the absolute value of their *y*-coordinates.

D. add the absolute value of their *x*-coordinates.

---

5. What is the distance between (3.5, 2.2) and (3.5, ¯1.5)?

A. 3.7 units

B. ¯3.7 units

C. 0.7 units

D. ¯0.7 units

---

6. What is the distance between ($^-1$, $^-1.5$) and (3.5, $^-1.5$)?

A. 4.5 units
B. $^-4.5$ units
C. 2.5 units
D. $^-2.5$ units

---

7. What is the distance between $\left(^-4, 3\frac{1}{2}\right)$ and $\left(^-4, \frac{-2}{5}\right)$?

A. 3.1 units
B. $^-3.1$ units
C. 3.9 units
D. $^-3.9$ units

---

8. What is the distance between $\left(^-2, \frac{-2}{5}\right)$ and $\left(^-4, \frac{-2}{5}\right)$?

A. 6 units
B. $^-6$ units
C. 2 units
D. $^-2$ units

---

9. What is the distance between ($^-1$, $^-1.5$) and $\left(^-4, 3\frac{1}{2}\right)$?

A. 5 units
B. 3 units
C. 2 units
D. 8 units

---

10. What is the distance between $\left(^-2, \frac{-2}{5}\right)$ and (3.5, $^-1.5$)?

A. 4.4 units
B. 6.6 units
C. 1.5 units
D. 1.2 units