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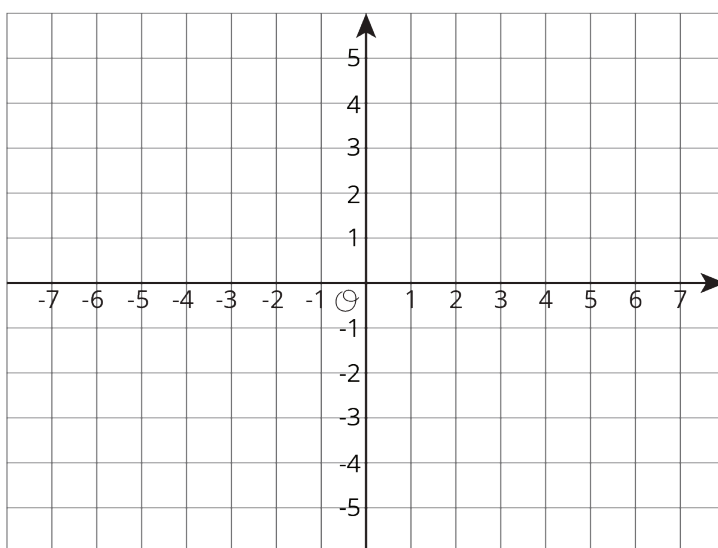
Unit 7, Lesson 14: Distances on a Coordinate Plane

Let's explore distance on the coordinate plane.

14.1: Coordinate Patterns

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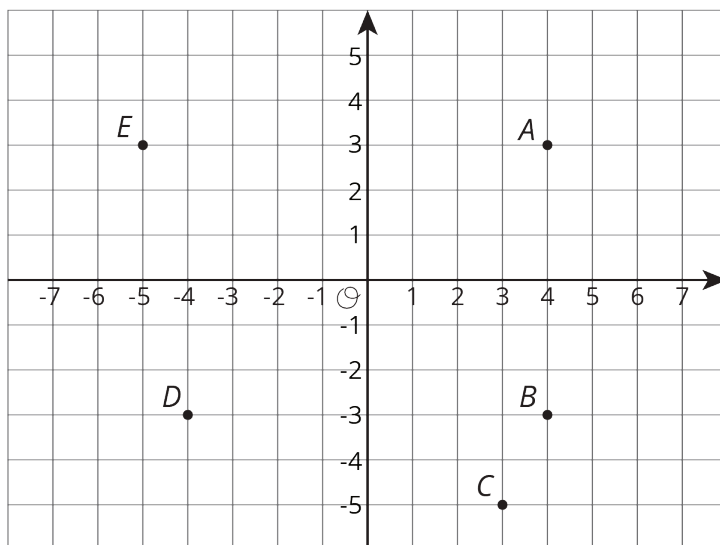
Plot points in your assigned quadrant and label them with their coordinates.



14.2: Signs of Numbers in Coordinates

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1. Write the coordinates of each point.



A =

B =

C =

D =

E =

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2. Answer these questions for each pair of points.

- How are the coordinates the same? How are they different?
- How far away are they from the y -axis? To the left or to the right of it?
- How far away are they from the x -axis? Above or below it?

a. A and B

b. B and D

c. A and D

Pause here for a class discussion.

3. Point F has the same coordinates as point C , except its y -coordinate has the opposite sign.

- a. Plot point F on the coordinate plane and label it with its coordinates.
- b. How far away are F and C from the x -axis?
- c. What is the distance between F and C ?

4. Point G has the same coordinates as point E , except its x -coordinate has the opposite sign.

- a. Plot point G on the coordinate plane and label it with its coordinates.
- b. How far away are G and E from the y -axis?
- c. What is the distance between G and E ?

5. Point H has the same coordinates as point B , except its *both* coordinates have the opposite sign. In which quadrant is point H ?

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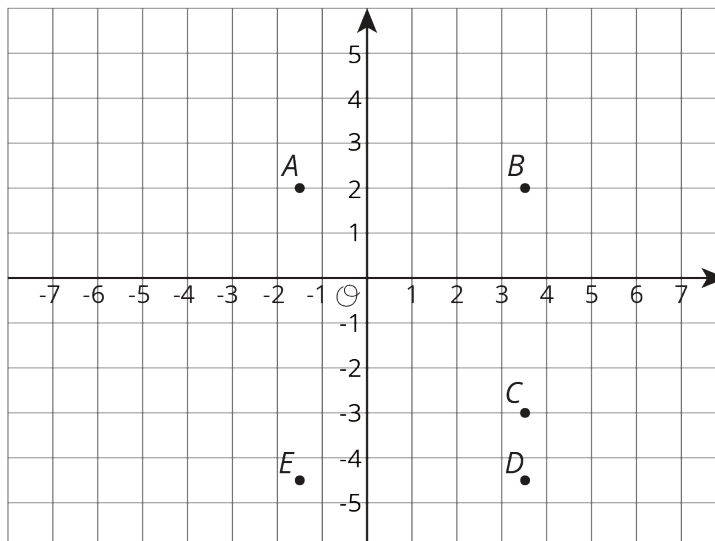
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14.3: Finding Distances on a Coordinate Plane

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1. Label each point with its coordinates.



2. Find the distance between each of the following pairs of points.

- a. Point *B* and *C*
- b. Point *D* and *B*
- c. Point *D* and *E*

3. Which of the points are 5 units from $(-1.5, -3)$?

4. Which of the points are 2 units from $(0.5, -4.5)$?

5. Plot a point that is both 2.5 units from *A* and 9 units from *E*. Label that point *M* and write down its coordinates.

Are you ready for more?

Priya says, "There are exactly four points that are 3 units away from $(-5, 0)$." Lin says, "I think there are a whole bunch of points that are 3 units away from $(-5, 0)$."

Do you agree with either of them? Explain your reasoning.

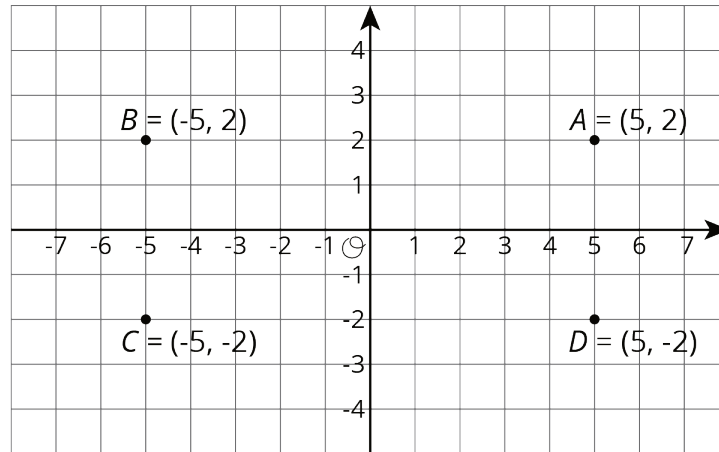
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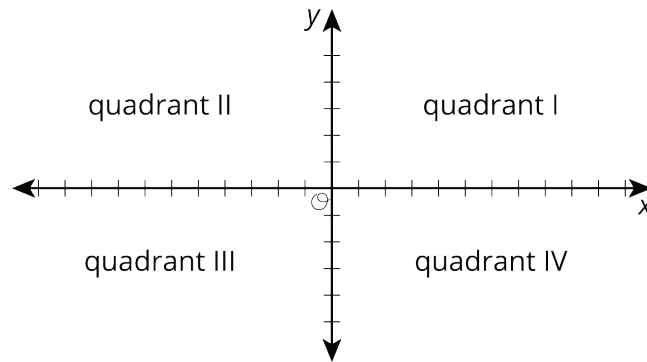
Lesson 14 Summary

The points $A = (5, 2)$, $B = (-5, 2)$, $C = (-5, -2)$, and $D = (5, -2)$ are shown in the plane. Notice that they all have almost the same coordinates, except the signs are different. They are all the same distance from each axis but are in different quadrants.



We can always tell which quadrant a point is located in by the signs of its coordinates.

x	y	quadrant
positive	positive	I
negative	positive	II
negative	negative	III
positive	negative	IV



In general:

- If two points have x -coordinates that are opposites (like 5 and -5), they are the same distance away from the vertical axis, but one is to the left and the other to the right.
- If two points have y -coordinates that are opposites (like 2 and -2), they are the same distance away from the horizontal axis, but one is above and the other below.

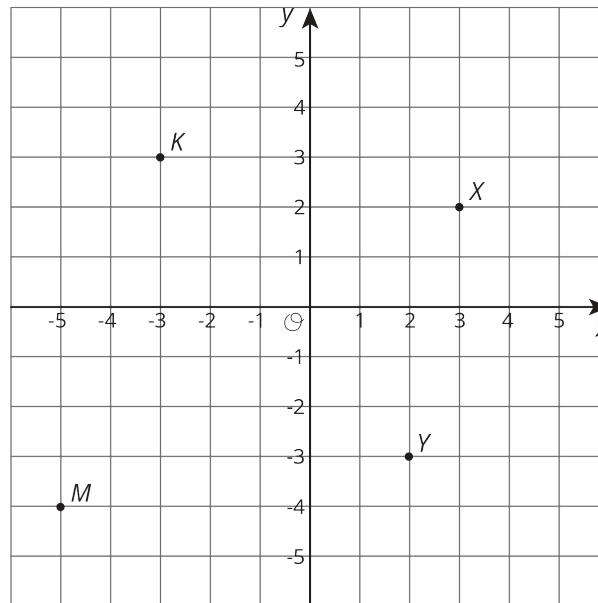
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Unit 7, Lesson 14: Distances on a Coordinate Plane

1. Here are 4 points on a coordinate plane.

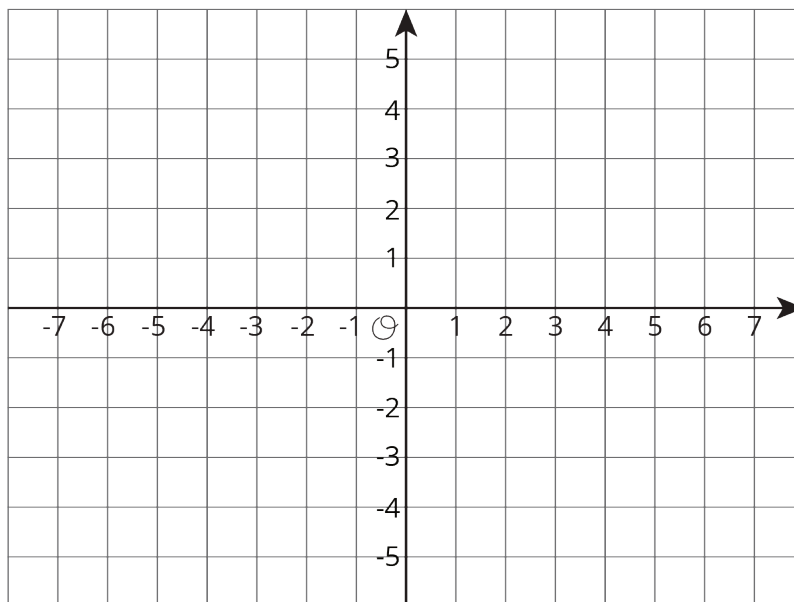


- Label each point with its coordinates.
 - Plot a point that is 3 units from point K . Label it P .
 - Plot a point that is 2 units from point M . Label it W .
2. Each set of points are connected to form a line segment. What is the length of each?
- $A = (3, 5)$ and $B = (3, 6)$
 - $C = (-2, -3)$ and $D = (-2, -6)$
 - $E = (-3, 1)$ and $F = (-3, -1)$
3. On the coordinate plane, plot four points that are each 3 units away from point $P = (-2, -1)$. Write the coordinates of each point.

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4. Noah’s recipe for sparkling orange juice uses 4 liters of orange juice and 5 liters of soda water.

a. Noah prepares large batches of sparkling orange juice for school parties. He usually knows the total number of liters, t , that he needs to prepare. Write an equation that shows how Noah can find s , the number of liters of soda water, if he knows t .

b. Sometimes the school purchases a certain number, j , of liters of orange juice and Noah needs to figure out how much sparkling orange juice he can make. Write an equation that Noah can use to find t if he knows j .

(from Unit 6, Lesson 16)

5. For a suitcase to be checked on a flight (instead of carried by hand), it can weigh at most 50 pounds. Andre’s suitcase weighs 23 kilograms. Can Andre check his suitcase? Explain or show your reasoning. (Note: 10 kilograms \approx 22 pounds)

(from Unit 3, Lesson 4)