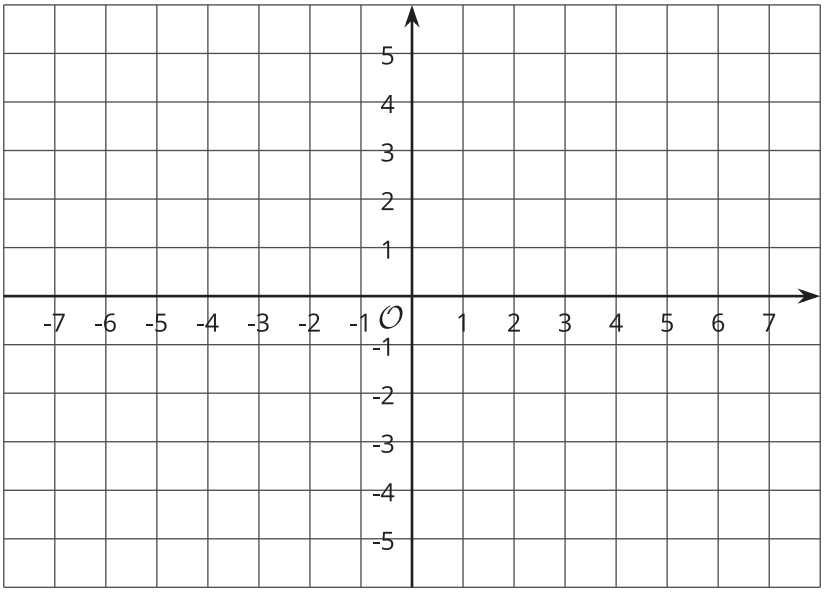
Distances in the Coordinate Plane

Let's explore distance on the coordinate plane.

14.1 Coordinate Patterns

Plot at least 3 points in your assigned quadrant, and label them with their coordinates.



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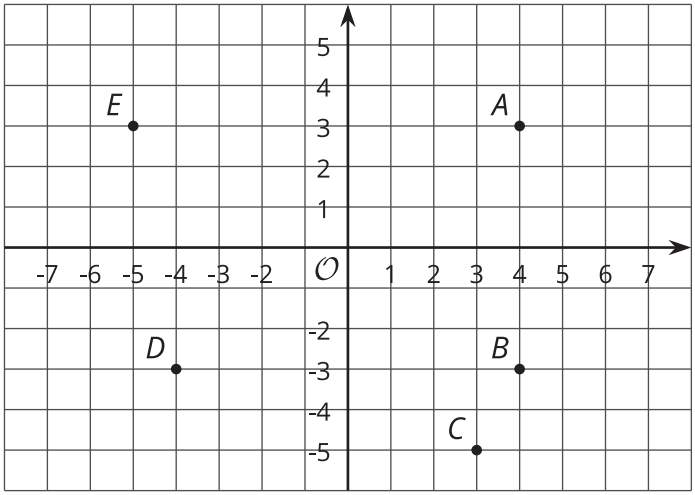
14.2 Signs of Numbers in Coordinates

1. Write the coordinates of each point.



A :

B :

C :

D :

E :

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

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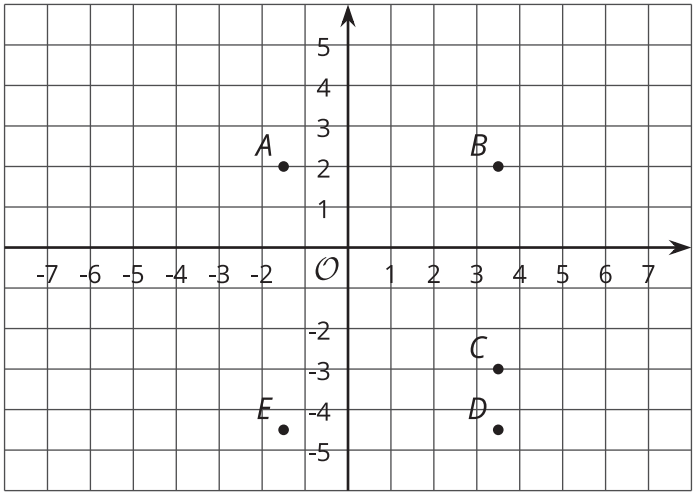
3. Point F has the same coordinates as point C, except its y-coordinate has the opposite sign.
   a. Plot point F in the coordinate plane, and label it with its coordinates.
   b. How far away are F and C from the x-axis?
4. Point G has the same coordinates as point E, except its x-coordinate has the opposite sign.
   a. Plot point G in the coordinate plane, and label it with its coordinates.
   b. How far away are G and E from the y-axis?
5. Point H has the same coordinates as point B, except both coordinates have opposite signs. In which quadrant is point H?

14.3 Finding Distances in a Coordinate Plane

1. Label each point with its coordinates.



2. Find the distance between each pair of points.
   a. Points B and C
   b. Points D and B
   c. Points 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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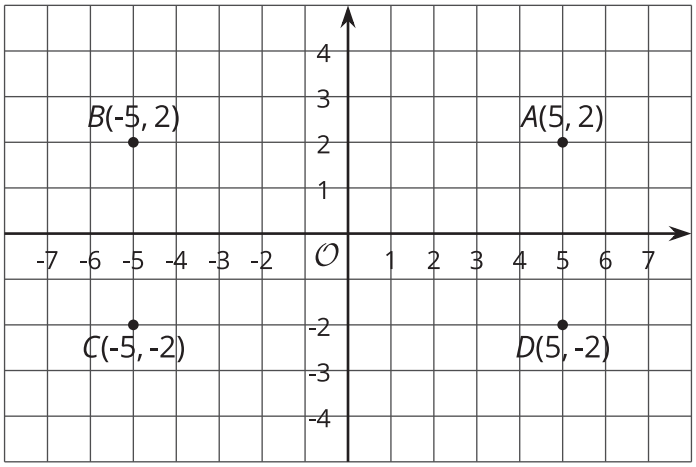
Lesson 14 Summary

The points $A(5, 2)$, $B(-5, 2)$, $C(-5, -2)$, and $D(5, -2)$ are shown in the coordinate 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.



Notice that the vertical distance between points A and D is 4 units because point A is 2 units above the horizontal axis and point D is 2 units below the horizontal axis. The horizontal distance between points A and B is 10 units because point B is 5 units to the left of the vertical axis and point A is 5 units to the right of the vertical axis.

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

