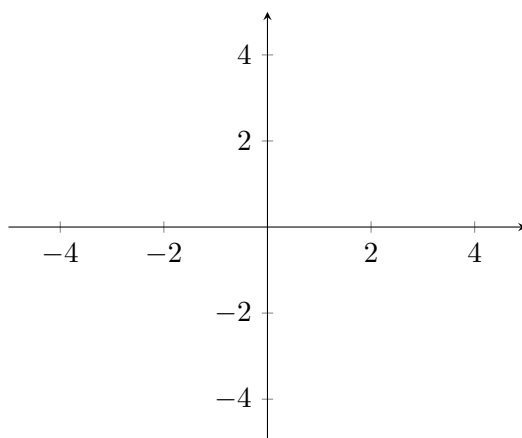


**Topics:**  $x, y$ -plane and coordinate system, quadrants, plotting points, distance formula

**Student Learning Outcomes:**

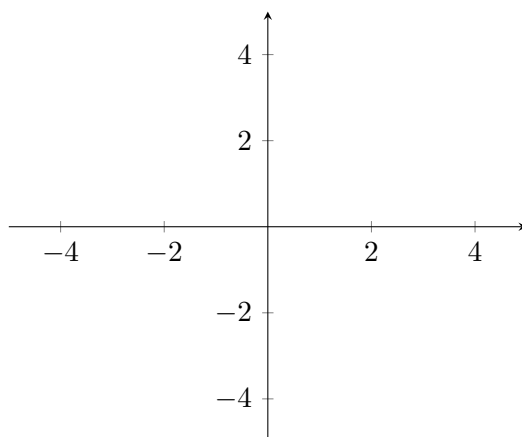
1. Students will be able to plot points in an  $x, y$ -plane using a coordinate system.
  2. Students will be able to determine the distance between two points on an  $x, y$ -plane using the distance formula.
- 

## 1 Rectangular Coordinate System



1. First, label the  $x$  and  $y$  axes on the rectangular coordinate system below. Then plot and label the given points.

$A(2, -3)$      $B(-2, 0)$      $C(-1, 2)$



## 2 The Distance Formula

We have just completed an activity called Crowd Crumple. You should now have a piece of paper with a graph, two labeled points, and a line connecting those two points labeled  $d$ .

1. Use prior knowledge to find the distance between the two points on your paper or make a reasonable guess and write your answer below.
  
2. Determine the horizontal and vertical distances between your two points.
  - (a) Determine the **horizontal distance** between your points  $(x_1, y_1)$  and  $(x_2, y_2)$ :  
(This is the distance between the  $x$ -values.)
  
  - (b) Determine the **vertical distance** between your points  $(x_1, y_1)$  and  $(x_2, y_2)$ :  
(This is the distance between the  $y$ -values.)
  
  - (c) Draw lines on your graph to represent the horizontal and vertical distances between your two points. Do your lines form a recognizable shape?
  
  - (d) How can we use these two values to determine the straight-line distance  $d$  between your points  $(x_1, y_1)$  and  $(x_2, y_2)$ ?
  
  - (e) Calculate the distance between your points  $(x_1, y_1)$  and  $(x_2, y_2)$ .

**The Distance Formula:** The distance between points  $(x_1, y_1)$  and  $(x_2, y_2)$  is given by  $d =$

3. Use the distance formula to calculate the distance between the points  $(1, 5)$  and  $(4, 9)$ .

### 3 Student Learning Outcomes Check

1. Can you plot points in an  $x, y$ -plane using a coordinate system?
2. Are you able to determine the distance between two points on an  $x, y$ -plane using the distance formula?

If any of your answers were no, please ask about these topics in class.