

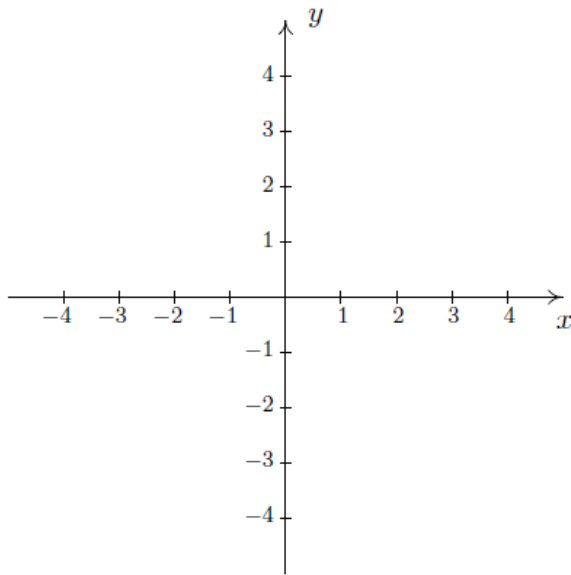


SECTION 1.1

Part B: The Cartesian Coordinate Plane

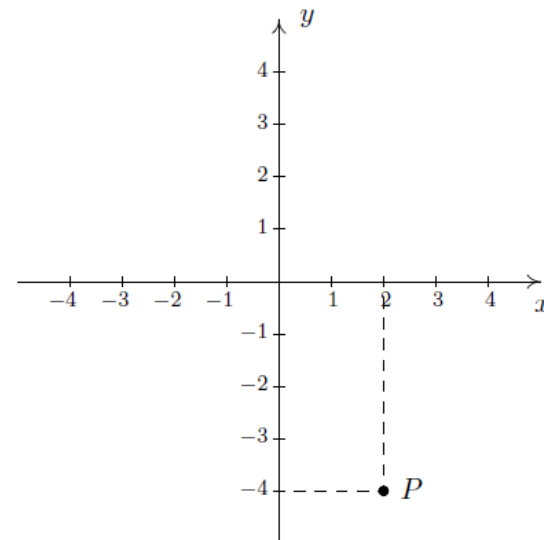
CARTESIAN COORDINATE PLANE

- Two real number lines crossing at a right angle at 0
- The horizontal number line is usually called the x-axis
- The vertical number line is usually called the y-axis



CARTESIAN COORDINATES OF POINT

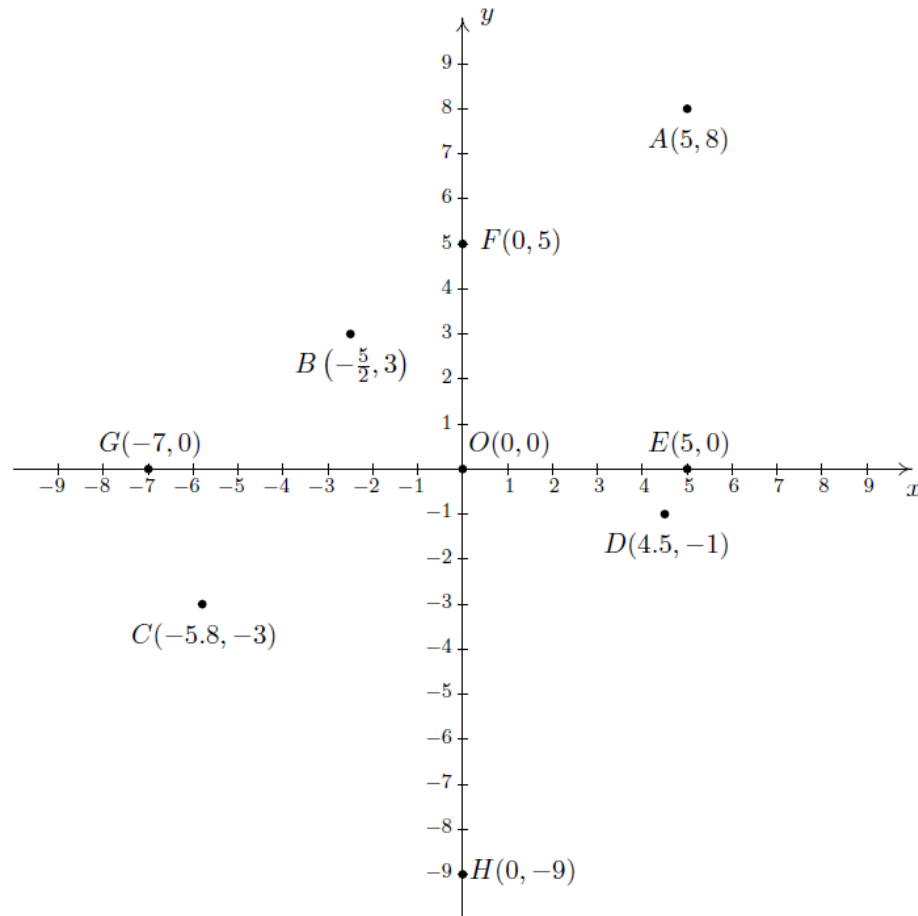
- Imagine dropping a vertical line from the x-axis to P and extending a horizontal line from the y-axis to P
- We describe the point P using the ordered pair (2,-4)
 - The first number is called the abscissa or x-coordinate
 - The second is called the ordinate or y-coordinate
- The ordered pair (2,-4) comprise the Cartesian coordinates of the point P



EXAMPLE

○ Plot the following points:

- $A(5,8)$
- $B(5/2, 3)$
- $C(-5.8, -3)$
- $D(4.5, -1)$
- $E(5,0)$
- $F(0,5)$
- $G(-7,0)$
- $H(0, -9)$
- $O(0,0)$

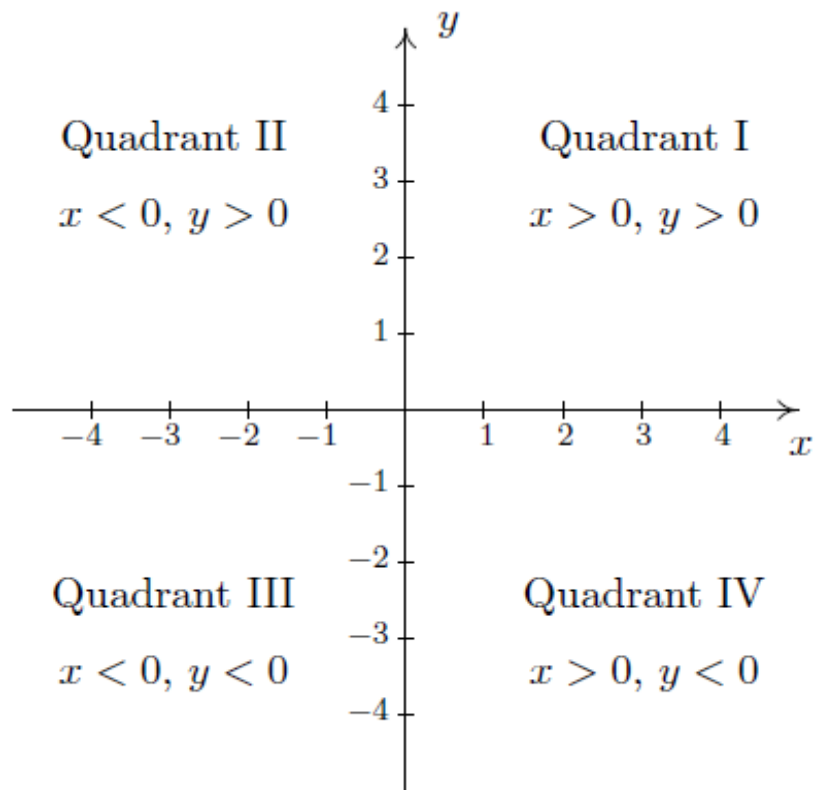


IMPORTANT FACTS ABOUT THE CARTESIAN COORDINATE PLANE

- (x,y) lies on the x-axis if and only if $y = 0 \rightarrow (x,0)$
- (x,y) lies on the y-axis if and only if $x = 0 \rightarrow (0,y)$
- The origin is the point $(0,0)$. It is the only point common to both axes.

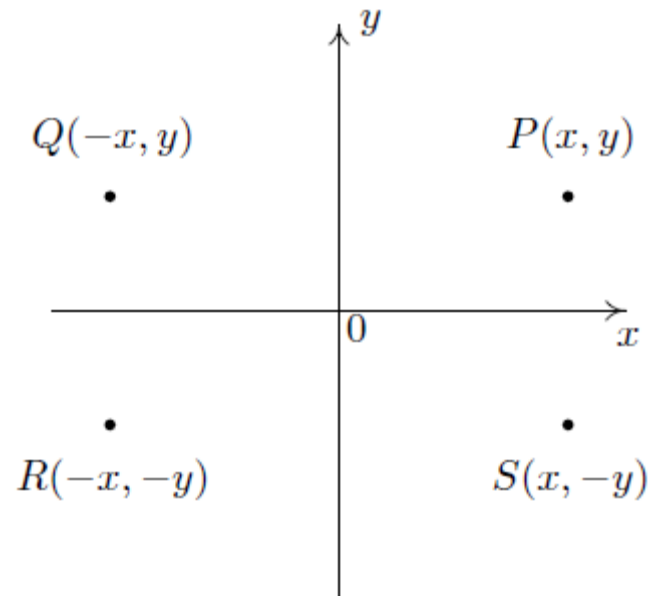


FOUR QUADRANTS



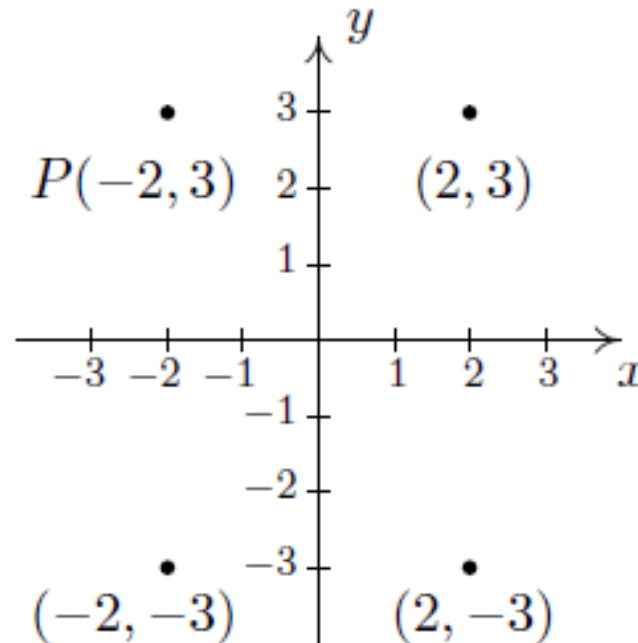
SYMMETRY

- P and S are symmetric about the x-axis, as are Q and R
- P and Q are symmetric about the y-axis, as are R and S
- P and R are symmetric about the origin, as are Q and S



EXAMPLE

- Let P be the point $(-2, 3)$
- Find the points which are symmetric to P about the:
 - x -axis $\rightarrow (-2, -3)$
 - y -axis $\rightarrow (2, 3)$
 - origin $\rightarrow (2, -3)$

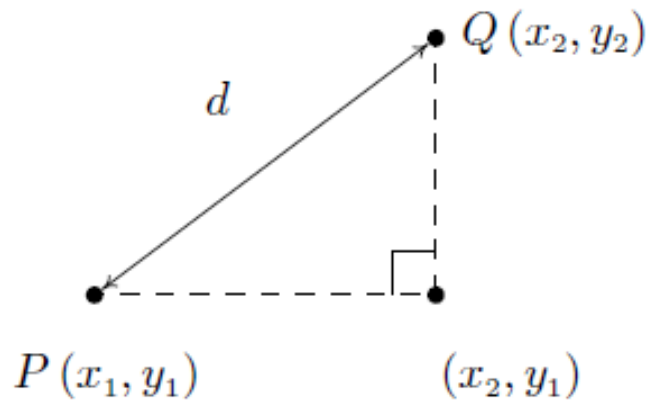


REFLECTIONS

- To reflect a point (x,y) about the:
 - x-axis replace y with $-y$
 - y-axis replace x with $-x$
 - origin replace x with $-x$ and y with $-y$



DISTANCE IN PLANE

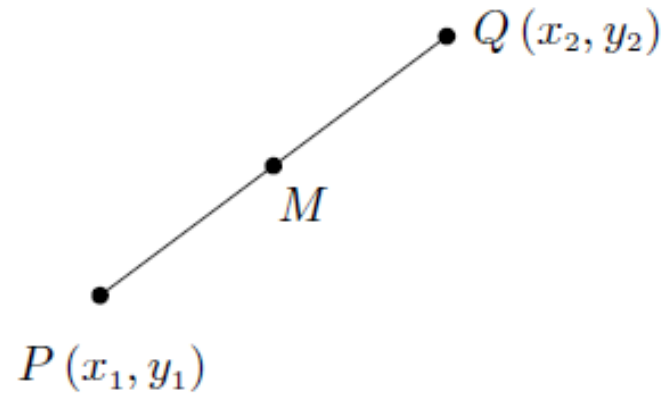


$$d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



MIDPOINT FORMULA



$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

