

Section 6.7

Graphing Linear Equations

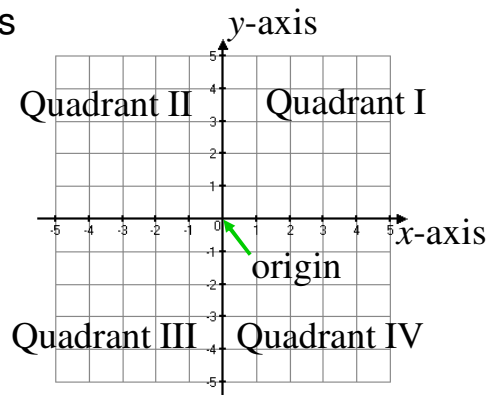


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Rectangular Coordinate System

- The horizontal line is called the x -axis.
- The vertical line is called the y -axis.
- The point of intersection is the origin.

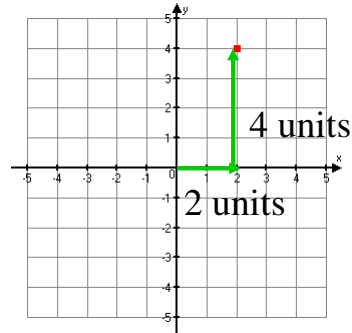


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Plotting Points

- Each point in the xy -plane corresponds to a unique ordered pair (a, b) .
- Plot the point $(2, 4)$. Starting from the origin:
 - Move 2 units right
 - Move 4 units up



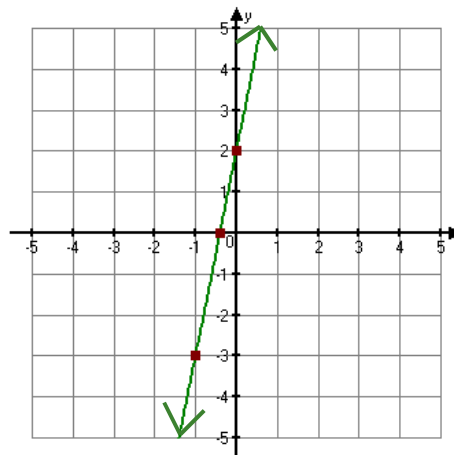
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Graphing Linear Equations

- Graph the equation $y = 5x + 2$

x	y
0	2
$-2/5$	0
-1	-3



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To Graph Equations by Plotting Points

- Solve the equation for y .
- Select at least three values for x and find their corresponding values of y .
- Plot the points.
- The points should be in a straight line. Draw a line through the set of points and place arrow tips at both ends of the line.



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Graphing Using Intercepts

- The x -intercept is found by letting $y = 0$ and solving for x .

Example:

$$\begin{aligned}y &= -3x + 6 \\0 &= -3x + 6 \\-6 &= -3x \\2 &= x\end{aligned}$$

- The y -intercept is found by letting $x = 0$ and solving for y .

Example:

$$\begin{aligned}y &= -3x + 6 \\y &= -3(0) + 6 \\y &= 6\end{aligned}$$



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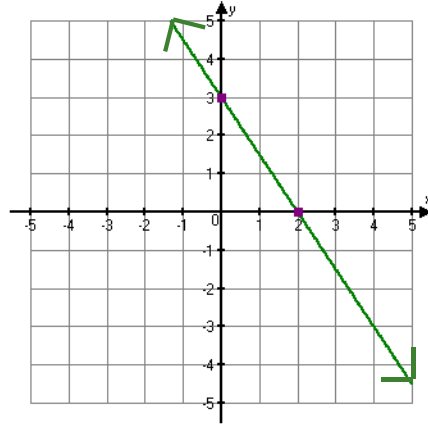
Example: Graph $3x + 2y = 6$

- Find the x-intercept.

$$\begin{aligned}3x + 2y &= 6 \\3x + 2(0) &= 6 \\3x &= 6 \\x &= 2\end{aligned}$$

- Find the y-intercept.

$$\begin{aligned}3x + 2y &= 6 \\3(0) + 2y &= 6 \\2y &= 6 \\y &= 3\end{aligned}$$



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Slope

- The ratio of the vertical change to the horizontal change for any two points on the line.

$$\text{Slope} = \frac{\text{vertical change}}{\text{horizontal change}}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

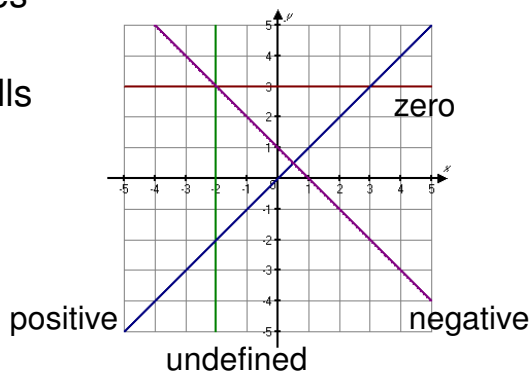


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Types of Slope

- Positive slope rises from left to right.
- Negative slope falls from left to right.
- The slope of a vertical line is undefined.
- The slope of a horizontal line is zero.



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Example: Finding Slope

- Find the slope of the line through the points (5, -3) and (-2, -3).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-3 - (-3)}{-2 - 5}$$

$$m = \frac{-3 + 3}{-7}$$

$$m = \frac{0}{-7} = 0$$



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The Slope-Intercept Form of a Line

- Slope-Intercept Form of the Equation of the Line

$y = mx + b$ where m is the slope of the line and $(0, b)$ is the y -intercept of the line.



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Graphing Equations by Using the Slope and y -Intercept

- Solve the equation for y to place the equation in slope-intercept form.
- Determine the slope and y -intercept from the equation.
- Plot the y -intercept.
- Obtain a second point using the slope.
- Draw a straight line through the points.



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Example

- Graph $2x - 3y = 9$.
- Write in slope-intercept form.

$$2x - 3y = 9$$

$$-3y = -2x + 9$$

$$\frac{-3y}{-3} = \frac{-2x}{-3} + \frac{9}{-3}$$

$$y = \frac{2}{3}x - 3$$

The y -intercept is $(0, -3)$
and the slope is $2/3$.

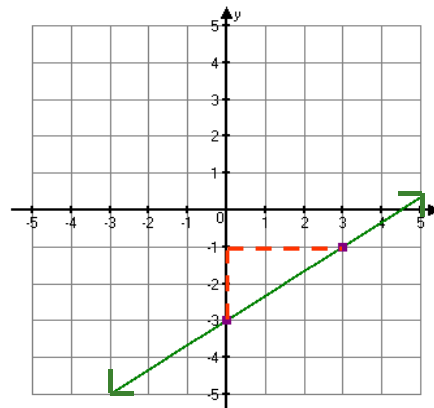


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Example continued

- Plot a point at $(0, -3)$ on the y -axis, then move *up* 2 units and to the *right* 3 units.

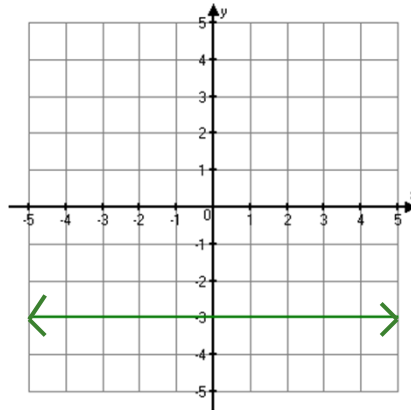


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Horizontal Lines

- Graph $y = -3$.
- y is always equal to -3 , the value of y can never be 0 .
- The graph is parallel to the x -axis.

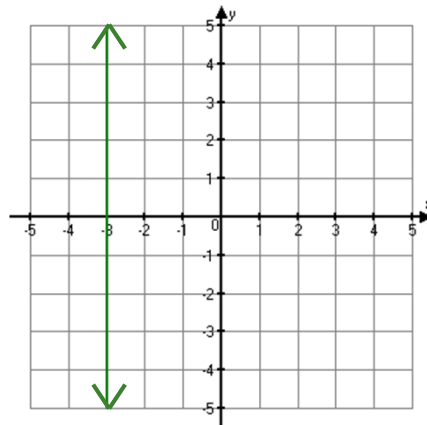


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Vertical Lines

- Graph $x = -3$.
- x always equals -3 , the value of x can never be 0 .
- The graph is parallel to the y -axis.



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