7-3 Linear Equations and Their Graphs

<u>Line</u>ar Equations - Equations whose graphs are lines

To be a linear equation, you must say NO to all of the following:

    1.) Does the equation have a variable to a power other than 1? (Ex. $x^2 + y = 3$ has a variable to 2nd power.

    2.) Is there a product of variables?
        (Ex. $xy = 4$ is a product of variables.)

    3.) Is there a variable in my denominator?
        (Ex. $\frac{2}{x} + y = 5$ has a variable in the denominator.)

Are the following Linear Equations?

$2x + 3y = 7$
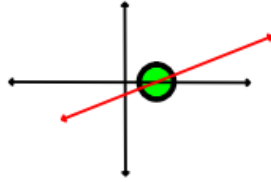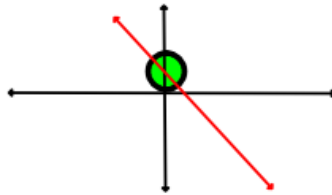
Linear Equation

$xy = 1$

Not a Linear Equation

$y = \dfrac{1}{x}$

Not a Linear Equation

x - intercept - where the line crosses x-axis

y - intercept - where the graph crosses the y-axis

To find the x-intercept, set y = 0 and solve for x.
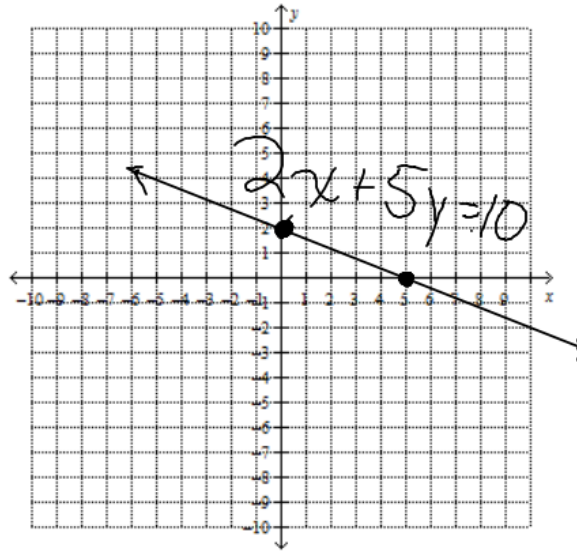   - It will look like (x, 0)

To find y-intercept, set x = 0 and solve for y.
   - It will look like (0, y)

Graph using x- and y- intercepts.

$2x + 5y = 10$
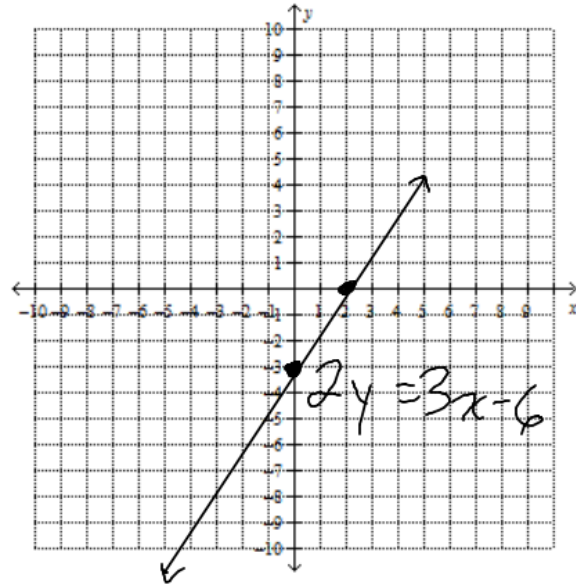
x - int	y - int
y = 0	x = 0
(5, 0)	(0, 2)

$2x + 5y = 10$

$2x + 5(0) = 10$

$2x = 10$

$\dfrac{2x}{2} = \dfrac{10}{2}$

$x = 5$

$2x + 5y = 10$

$2(0) + 5y = 10$

$5y = 10$

$\dfrac{5y}{5} = \dfrac{10}{5}$

$y = 2$

$2x + 5y = 10$

Graph using intercepts

2y = 3x - 6

x-int	y-int
$y = 0$	$x = 0$
$(2, 0)$	$(0, -3)$

$2y = 3x - 6$

$2(0) = 3x - 6$

$0 = 3x - 6$

$3x - 6 \neq 0$

$\underline{+6 \quad +6}$

$\dfrac{3x}{3} = \dfrac{6}{3} \quad x = 2$

$2y = 3x - 6$

$2y = 3(0) - 6$

$\dfrac{2y}{2} = -\dfrac{6}{2}$

$y = -3$

$2y = 3x - 6$

x = # line is vertical
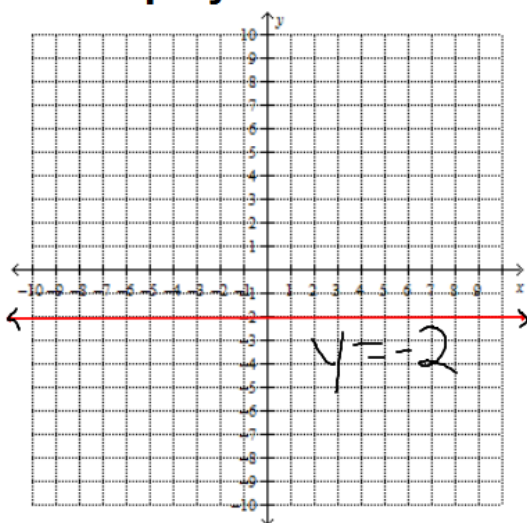
y = # graph is horizontal

Graph y = -2

Graph x = 3

y = -2

x = 3