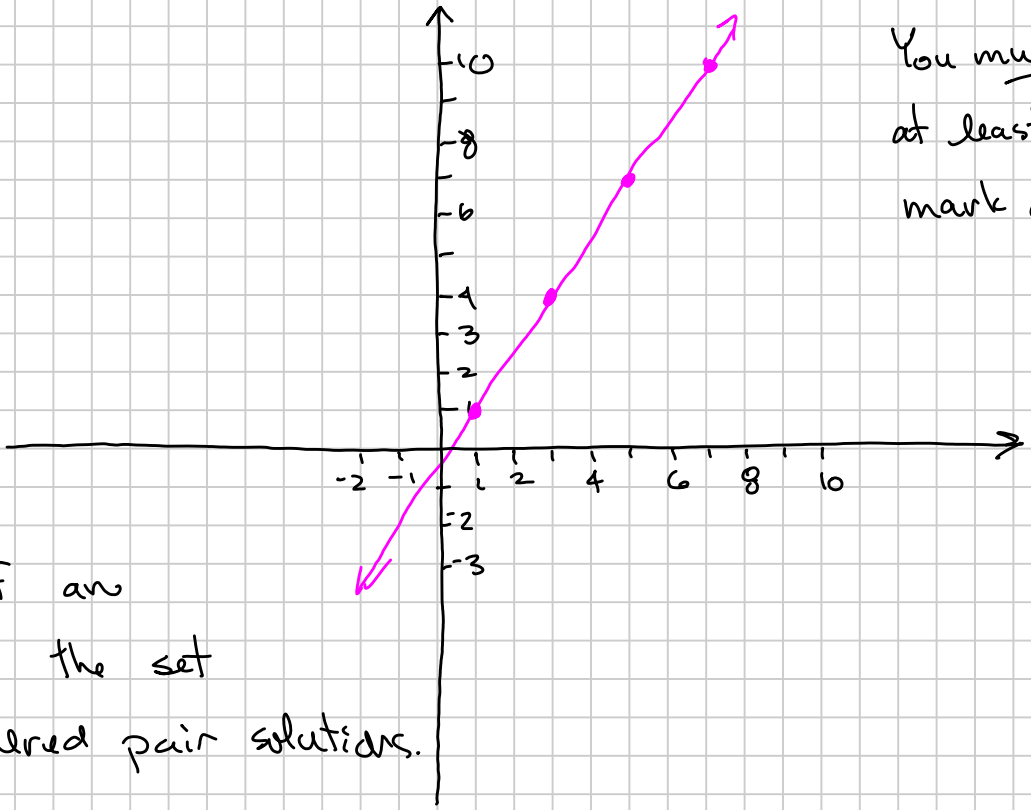
3.2 (Graphs of Linear Eqns) (cont'd)

Note Title 2/5/2015

Example from last time: $3x - 2y = 1$

Solutions:

$(3, 4)$
$(1, 1)$
$(5, 7)$
$(7, 10)$



You must mark at least 1 tick mark on each axis.

- The graph of an equation is the set of all ordered pair solutions.

The graph of a linear equation is a line.

Example: Graph the line $-3x + 2y = -4$.

Choose a value for x or y, and then solve for the other.

$x = 2$

$-3(2) + 2y = -4$

$-6 + 2y = -4$

$2y = 2$

$\frac{2y}{2} = \frac{2}{2}$

$y = 1$

$(2, 1)$

$x = 4$

$-3(4) + 2y = -4$

$-12 + 2y = -4$

$2y = 8$

$\frac{2y}{2} = \frac{8}{2}$

$y = 4$

$(4, 4)$

$x = -3$

$-3x + 2y = -4$

$-3(-3) + 2y = -4$

$9 + 2y = -4$

$2y = -13$

$y = \frac{-13}{2} = -6\frac{1}{2}$

$(-3, -6\frac{1}{2})$

$y = 1$

$-3x + 2y = -4$

$-3x + 2(1) = -4$

$-3x + 2 = -4$

$-3x = -6$

$\frac{-3x}{-3} = \frac{-6}{-3}$

$x = 2$

$(2, 1)$

$y = -2$

$-3x + 2y = -4$

$-3x + 2(-2) = -4$

$-3x - 4 = -4$

$-3x = 0$

$\frac{-3x}{-3} = \frac{0}{-3}$

$x = 0$

$(0, -2)$

$x = 8$

$-3(8) + 2y = -4$

$-24 + 2y = -4$

$2y = 20$

$y = 10$

$(8, 10)$

$x = -4$

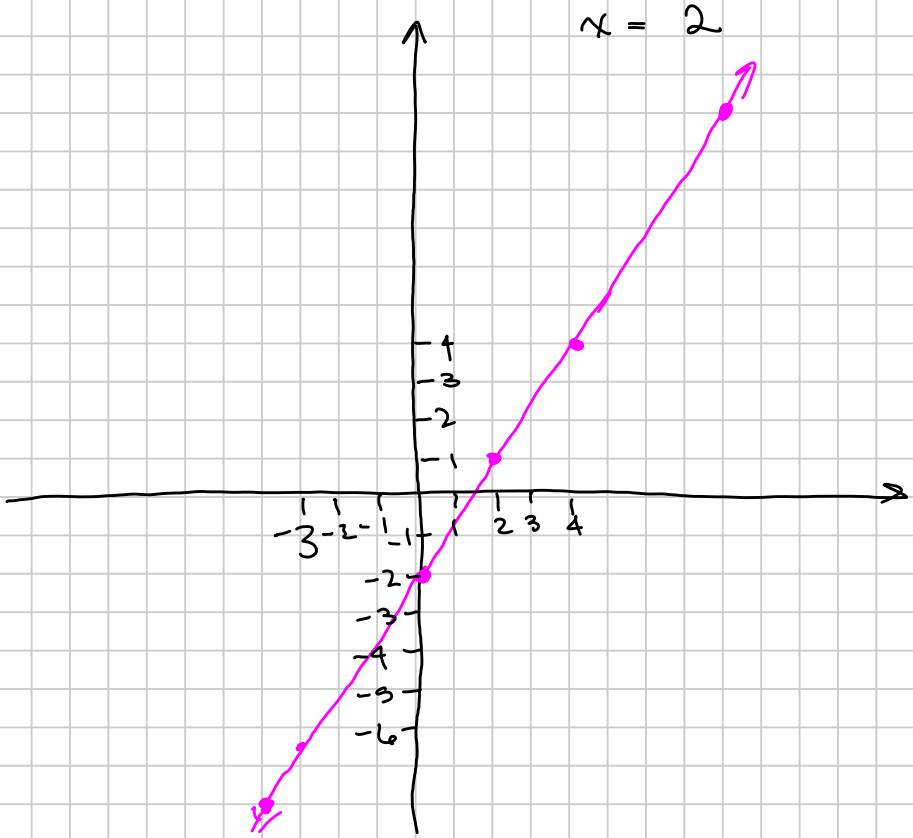
$-3(-4) + 2y = -4$

$12 + 2y = -4$

$2y = -16$

$\frac{2y}{2} = \frac{-16}{2} \Rightarrow y = -8$

$(-4, \quad)$



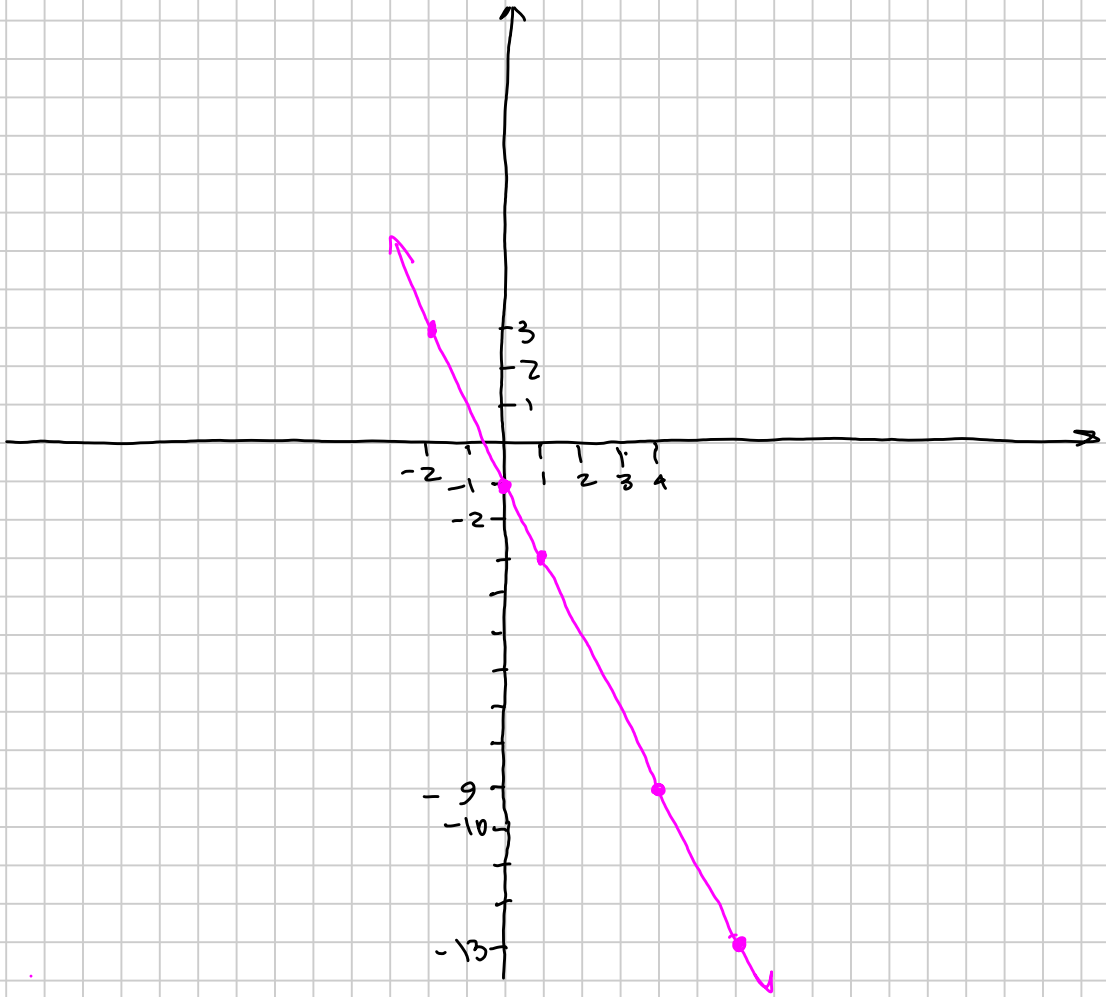
Ex: Graph $2x+y=-1$

Solve for y first: $2x+y=-1$

$-2x \quad -2x$

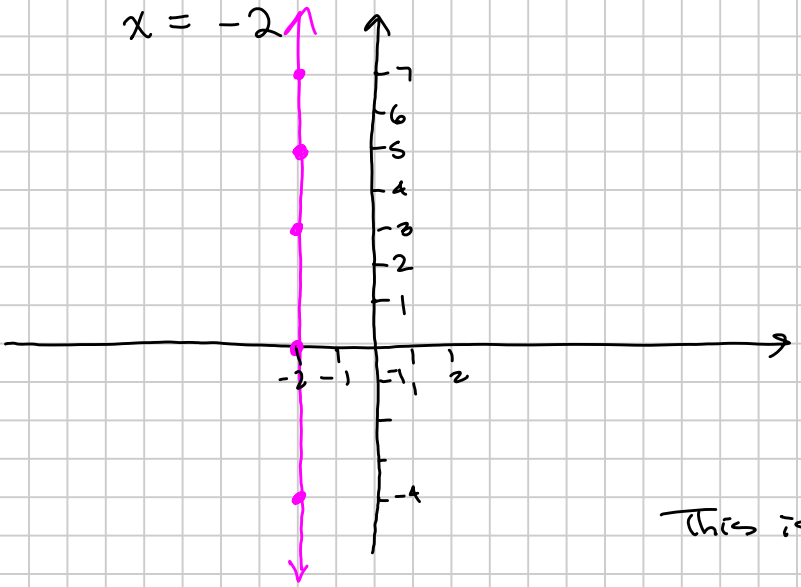
$y=-1-2x$ or $y=-2x-1$

x	$y=-1-2x$	Pair
4	$y=-1-2(4)=-1-8=-9$	$(4,-9)$
-2	$y=-1-2(-2)=-1+4=3$	$(-2,3)$
6	$y=-1-2(6)=-1-12=-13$	$(6,-13)$
1	$y=-1-2(1)=-1-2=-3$	$(1,-3)$
0	$y=-1-2(0)=-1-0=-1$	$(0,-1)$



Example: Graph the equation.

$x = -2$



Ordered pair solutions

$(-2, 0)$

$(-2, 5)$

$(-2, 3)$

$(-2, 7)$

$(-2, -4)$

This is a vertical line.

Ex: Graph the equation.

$y = 3$

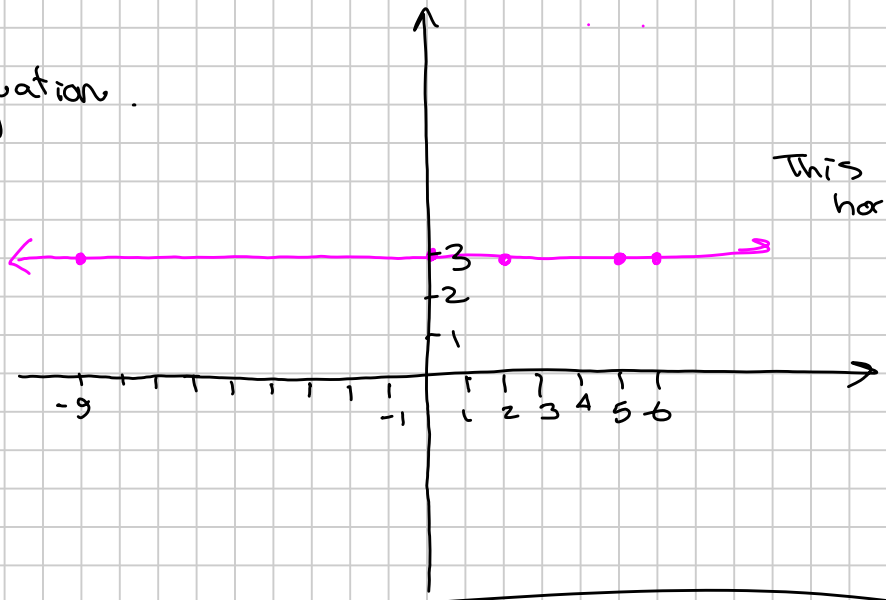
$(0, 3)$

$(-9, 3)$

$(6, 3)$

$(2, 3)$

$(5, 3)$



This is a horizontal line.

Important:

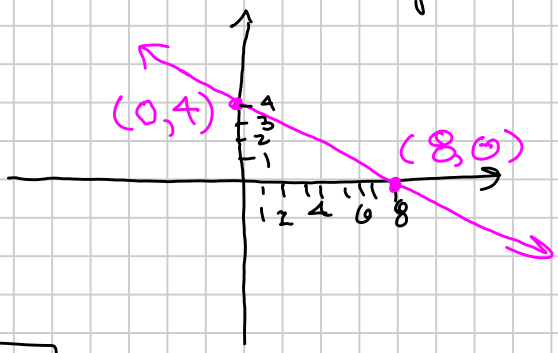
$y = k$ (k a constant) is the equation of a horizontal line.

$x = k$ (k a constant) is the equation of a vertical line.

3.3: Graphing Lines using Intercepts

x-intercept: x-coordinate of the point where the graph intersects the x-axis.

y-intercept: y-coordinate of the point where the graph intersects the y-axis.



In this example,

the x-intercept is 8 [so the associated ordered pair is (8,0)].

and the y-intercept is 4 [so the associated ordered pair is (0,4)].

Finding the Intercepts

To find the x-intercept, set $y=0$ and solve for x.

To find the y-intercept, set $x=0$ and solve for y.

Example: Graph the equation using intercepts.

$$-2x + 4y = 12$$

Find the x-intercept:

Set $y=0$:

$$-2x + 4(0) = 12$$
$$-2x + 0 = 12$$
$$-2x = 12$$
$$\frac{-2x}{-2} = \frac{12}{-2}$$
$$x = -6$$

$(-6, 0)$

Find the y-intercept:

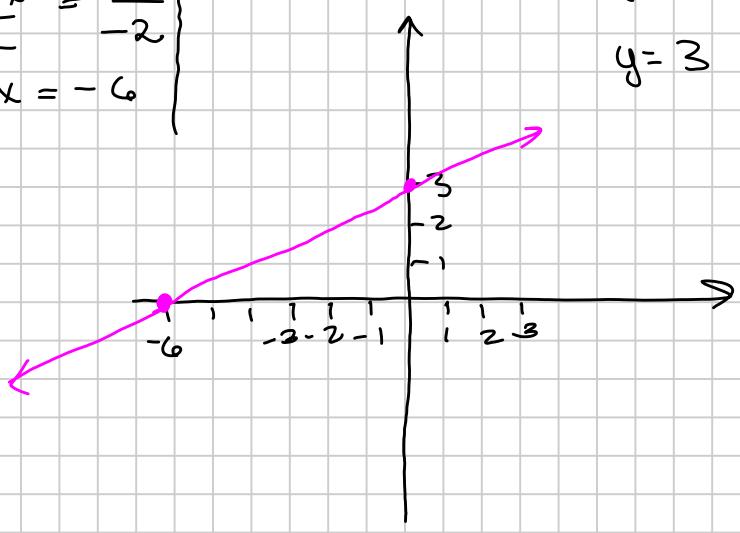
Set $x=0$:

$$-2(0) + 4y = 12$$
$$0 + 4y = 12$$
$$4y = 12$$
$$\frac{4y}{4} = \frac{12}{4}$$
$$y = 3$$

$(0, 3)$

The x-intercept is -6.

The y-intercept is 3.



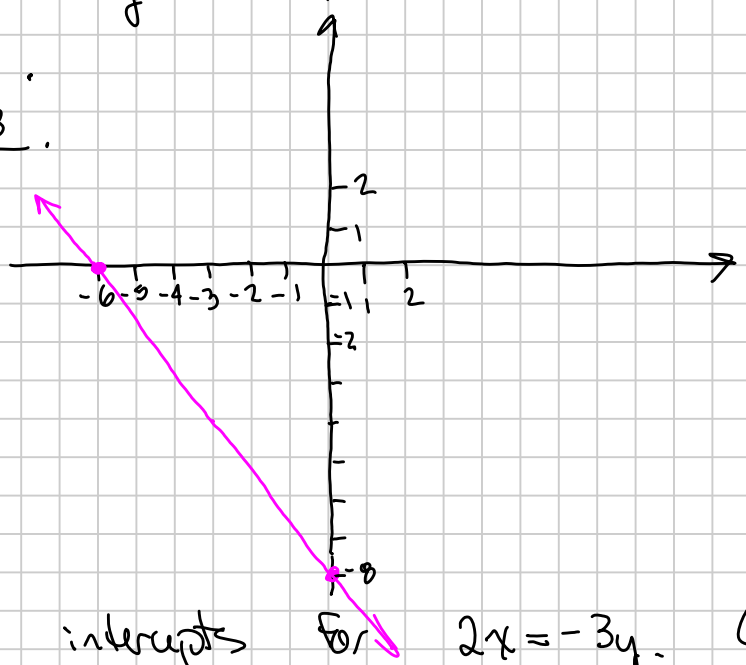
Example: Graph the line using intercepts.

$$4x + 3y = -24$$

The x-intercept is -6.

The y-intercept is -8.

Ordered pairs:
$(-6, 0)$
$(0, -8)$



Ex: Find the intercepts for $2x = -3y$. Graph it.

The x-intercept is 0.
The y-intercept is 0.

Find x-intercept, set $y=0$.

$y=0$ | $2x = -3(0)$

$2x = 0$

$\frac{2x}{2} = \frac{0}{2}$

$x = 0$

$(0, 0)$

Find y-intercept by setting $x=0$:

$x=0$ | $2(0) = -3y$

$0 = -3y$

$\frac{0}{-3} = \frac{-3y}{-3}$

$0 = y$

$(0, 0)$

We need to find at least 1 other point.

$x = 3 \Rightarrow 2x = -3y$

$2(3) = -3y$

$6 = -3y$

$-2 = y$ $\quad (3, -2)$

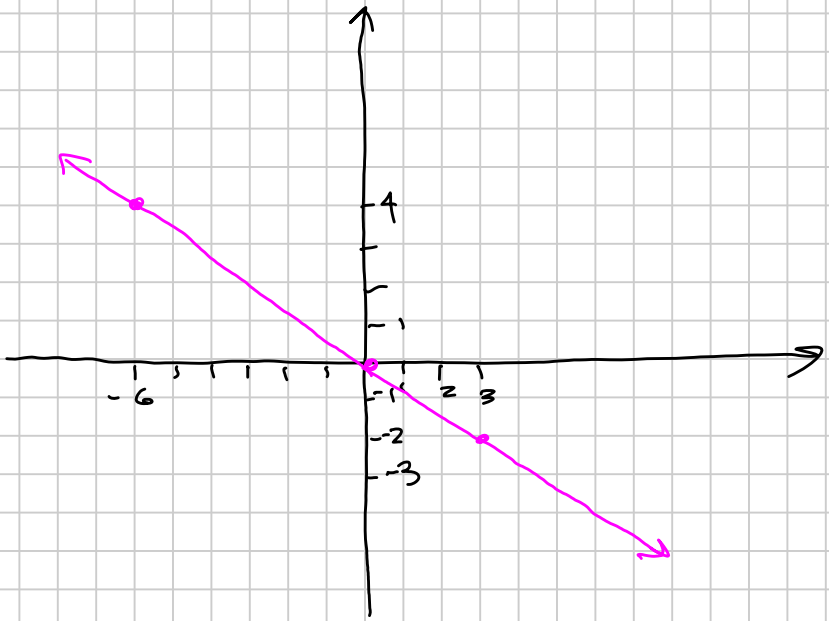
$x = -6 \Rightarrow 2(-6) = -3y$

$-12 = -3y$

$\frac{-12}{-3} = \frac{-3y}{-3}$

$4 = y$ $\quad (-6, 4)$

Graph on next page!


4
1
-6
-1
2
3
-2
-3