Sec 3.1 Rectangular Coordinate System

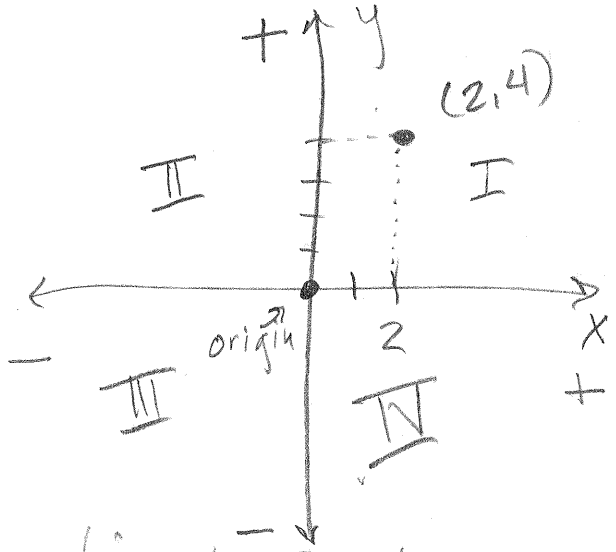
An ordered pair:
a pair of numbers written in parenthesis consisting of a first component and a second component

Ex: $(2,4)$, $(-2,0)$, $(1,-2)$, $(155,000, 25)$

$(\quad , \quad)$

↑ x-coordinate ↖ y-coordinate

$(2,4)$



aka Cartesian Coordinate System

$-2x + 5y = 8$

$(1,2)$ is a solution ✓

$-2(1) + 5(2) = 8$

$-2 + 10 = 8$

$8 = 8$ ✓

$(-1,-2)$ ← Not a solution

$-2(-1) + 5(-2) = 8$

$2 + -10 = 8$

$-8 \neq 8$

$3x - 4y = 12$ ✓

$(0, ?)$ $\quad 3(0) - 4y = 12$

$\frac{-4y}{-4} = \frac{12}{-4}$

$y = -3$

$(0, -3)$

$(?, -6)$

$(-4, -6)$

$(?, 0)$

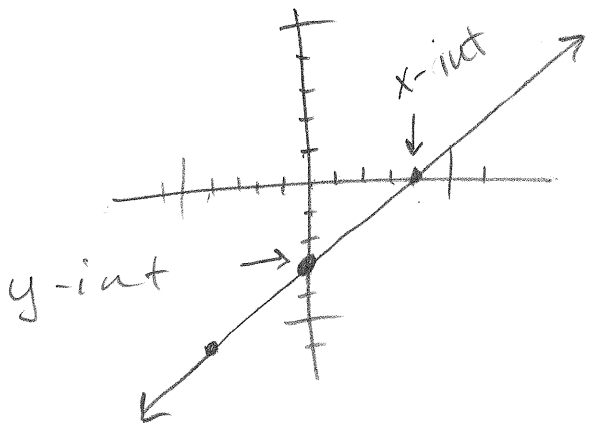
$(4, 0)$

The graph of an equation is the set of points that corresponds to <u>all</u> ordered pairs that satisfy the equation

a table to organize

x	y
0	-3
-4	-6
4	0

$3x - 4y = 12$



A Linear Equation in two variables can be written in the form

(Line)

$$Ax + By = C$$

this form is Standard form

two most helpful points to graph

1. x-intercept
   - where it crosses x-axis
   - $y = 0$
     $(x, 0)$
2. y-intercepts
   - where it crosses y-axis
   - $x = 0$
     $(0, y)$

if x-int and y-int happen at the point it must be at (0,0)

find the intercepts and graph

$$4x - y = -3$$

x-int: $(-3/4, 0)$ y-int $(0, 3)$

$y = 0$

$4x - 0 = -3$

$4x = -3$

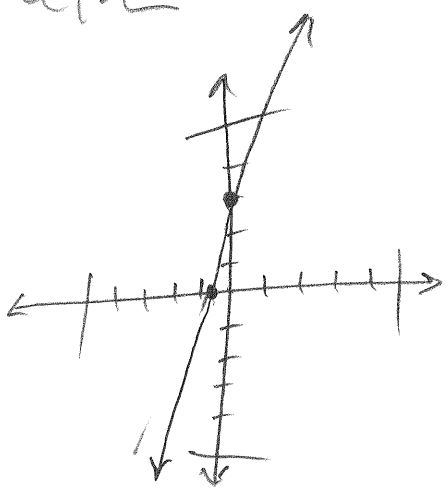
$x = -3/4$

$x = 0$

$4(0) - y = -3$

$-y = -3$

$y = 3$



$3x + y = 0$

x-int

$3x + 0 = 0$

$3x = 0$

$x = 0$

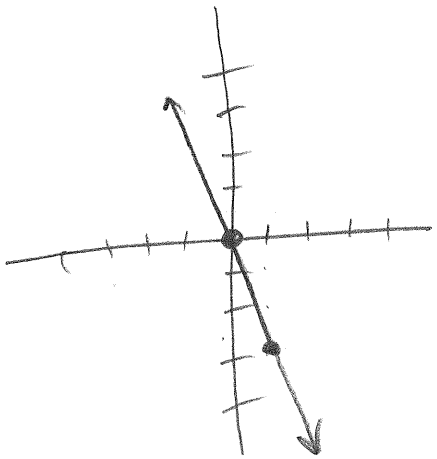
$(0,0)$

y-int

$3(0) + y = 0$

$y = 0$

$(0,0)$ <-same-> $(0,0)$



Let $x = 1$

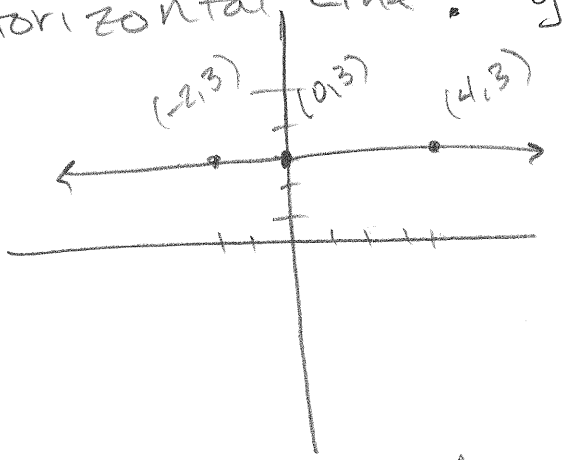
$3(1) + y = 0$

$3 + y = 0$

$y = -3$

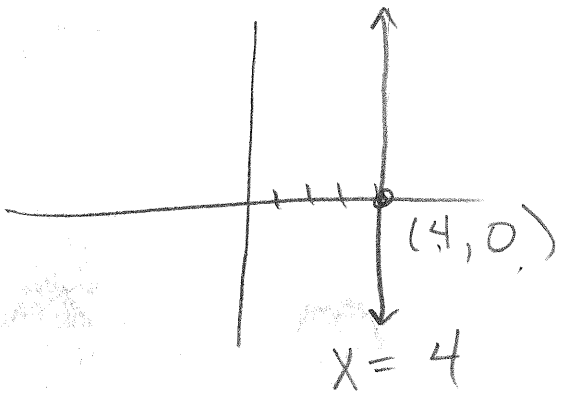
$(1, -3)$

Horizontal Line: $y = b$



$y = 3$

Vertical Line: $x = a$



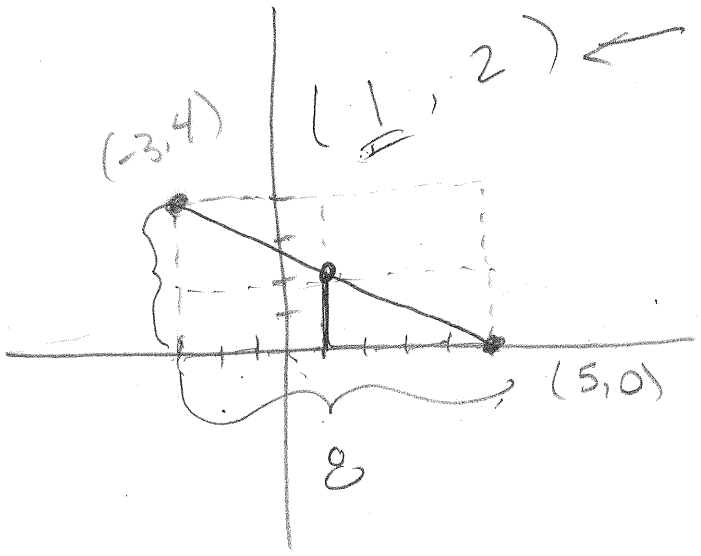
$x = 4$

$Ax + By = C$

$y = 3$

$x = 4$

Line segment: has an final point on both side



$8/4 = 4$

~~$5-(-3)=8$~~

Average two x coordinate

$$\frac{-3+5}{2} = \frac{2}{2} = 1$$

↑ x-coordi of midpoint

Average of y

$$\frac{0+4}{2} = \frac{4}{2} = 2$$

Mid point of two line segment formed by (x_1, y_1) and (x_2, y_2) the mipoint is

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