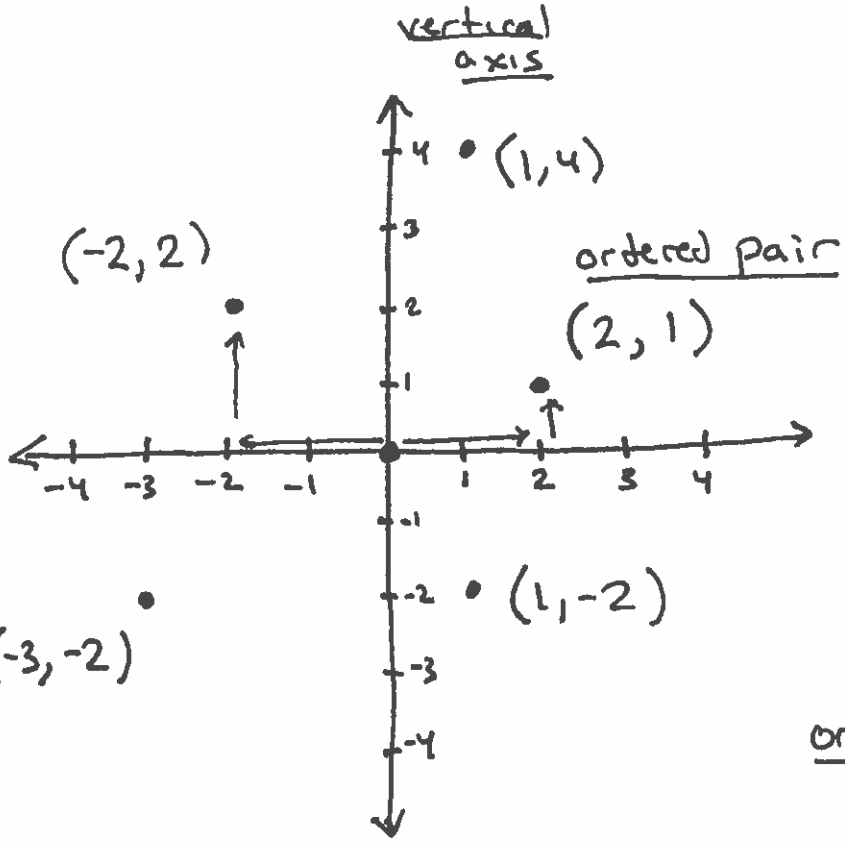
Slowly, draw this

deCartes

The Cartesian coordinate system



A linear equation in two variables is like:

(number)·x + (number)y = number

$3x + 2y = 7$

$y = \frac{1}{2}x + 5$

$\Downarrow$

$-\frac{1}{2}x + y = 5$

A solution to a linear eq. in two variables is saying $\begin{cases} x = \ldots \\ y = \ldots \end{cases}$

Linear equations in 2 variables typically have ∞-ly many solutions.

Ex $2x + 5y = 20$

One solution:

$x = 5,\ y = 2$

$2(\ ) + 5(\ ) = 20$

$2(5) + 5(2) = 20$

$10 + 10 = 20$ ✓

$\Downarrow$

$(5, 2)$

Another Solution:

$x = 10,\ y = 0$

$2(\ ) + 5(\ ) = 20$

$2(10) + 5(0) = 20$ ✓

$\Downarrow$

$(10, 0)$

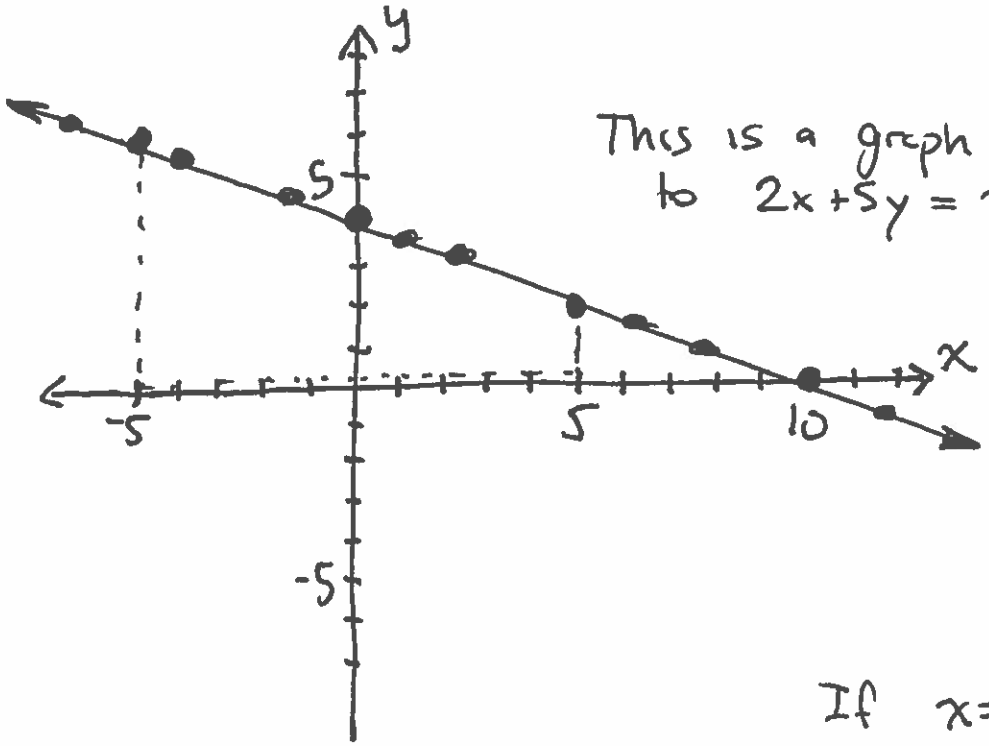
And

$x = 0,\ y = 4$

$2(0) + 5(4) = 20$ ✓

$\Downarrow$

$(0, 4)$



This is a graph of solutions to $2x + 5y = 20$.

If $x = -5$

$2(-5) + 5y = 20$

$-10 + 5y = 20$

$5y = 30$

$y = 6$

$\Leftarrow$

$(-5, 6)$

Ex $y = -3x + 6$

Is $(1, 3)$ a solution? (x, y)

Yes.

$( ) = -3( ) + 6$
$3 = -3(1) + 6$
$3 = -3 + 6$
$3 = 3$ ✓

Is $(-1, -3)$ a solution? (x, y)

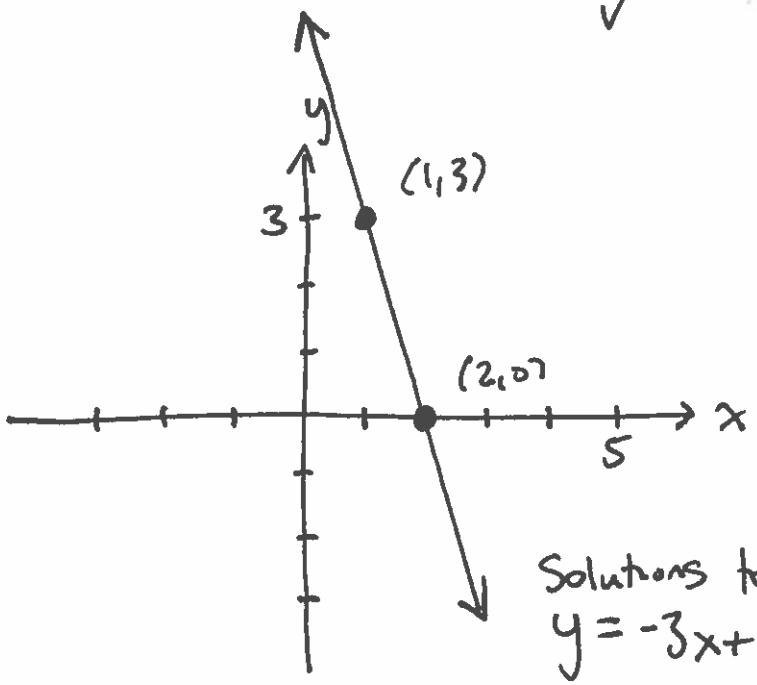
No!

$(-3) = -3(-1) + 6$
$-3 = 3 + 6$
$-3 = 9$
No!

Is $(2, 0)$ a solution? (x, y)

Yes!

$( ) = -3( ) + 6$
$0 = -3(2) + 6$
$0 = -6 + 6$ ✓



Solutions to $y = -3x + 6$

Ex Given $y = 3x + 1$.

Use a table to make a graph of the solutions to this equation.

use at least 5

Make up x-values	Find y-values	
-2	-5	(-2, -5)
-1	-2	(-1, -2)
0	1	(0, 1)
1	4	(1, 4)
2	7	(2, 7)

$y = 3(\ ) + 1$

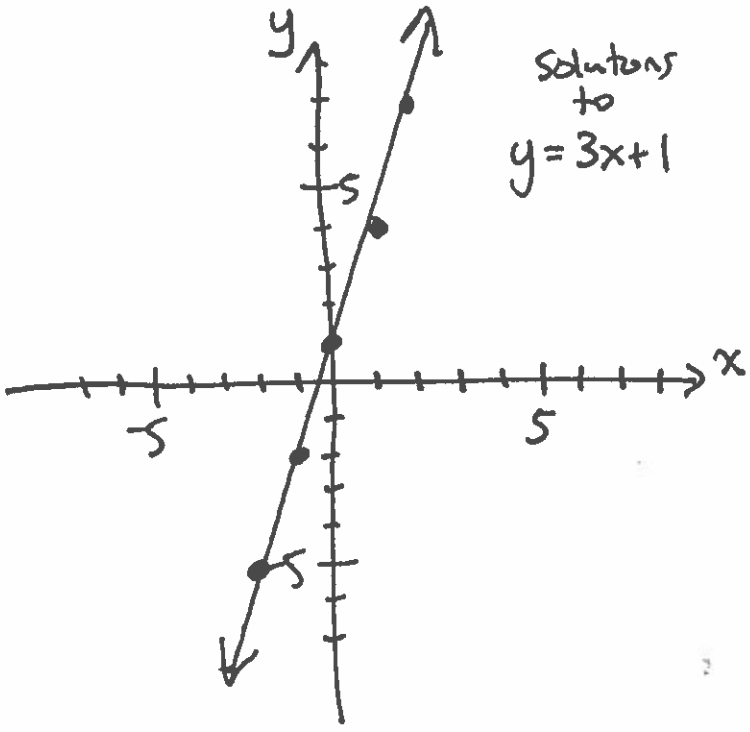
$y = 3(-2) + 1$
$= -6 + 1$
$y = -5$

$y = 3(\ ) + 1$
$= 3(-1) + 1$
$y = -2$

$y = 3(\ ) + 1$
$= 3(0) + 1$
$= 1$

$y = 3(1) + 1$
$= 3 + 1$
$y = 4$

$y = 3(2) + 1$
$= 6 + 1$
$y = 7$



Solutions to $y = 3x + 1$

Ex Plot $y = 4x$

Ex Plot $y = -x - 4$

Ex Plot $y = \frac{1}{2}x + 5$

Ex Bought chickens. Equipment & chickens cost you $400.

It's costy $20 per month to feed them.

Let x = how many months passed

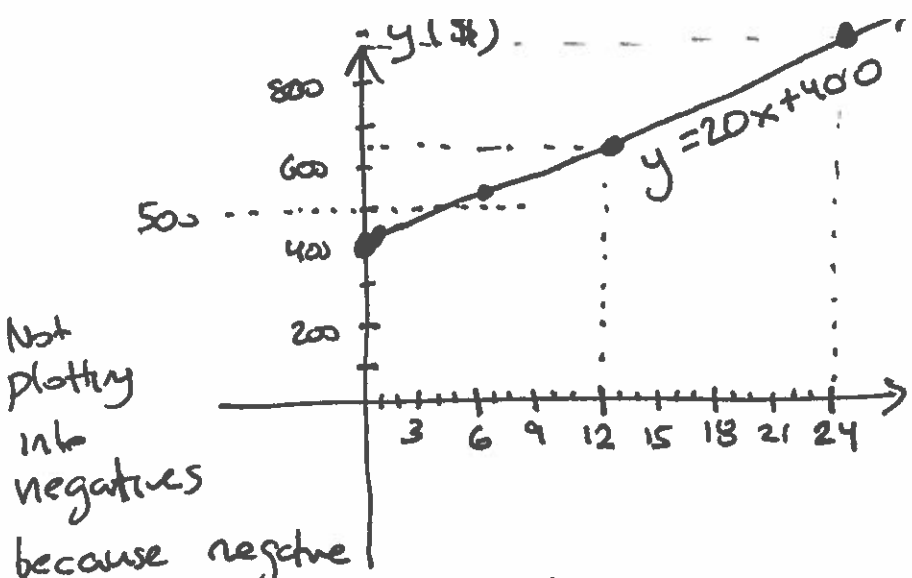
Let y = amount of money spent after x months.

$$\Longrightarrow \quad y = 20x + 400$$

Use a table to make a plot.

x-values	y-values	
0 (when chickens bought)	400	20(0)+400
1	420	20(1)+400
6	520	20(6)+400
12	640	20(12)+400
24	880	20(24)+400

meaningful!



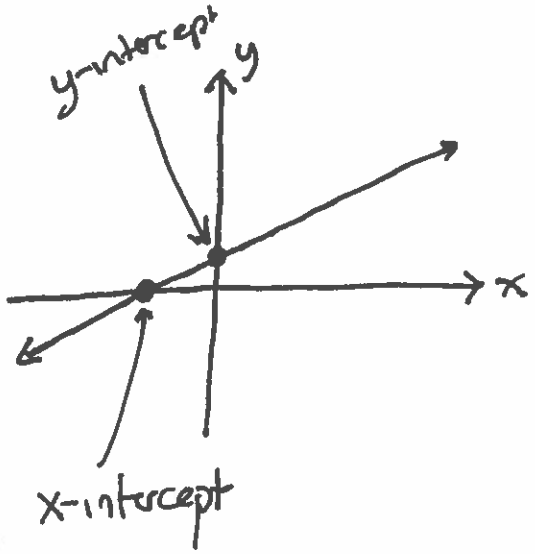
Chicken Expense

Not plotting into negatives because negative months don't make sense here.

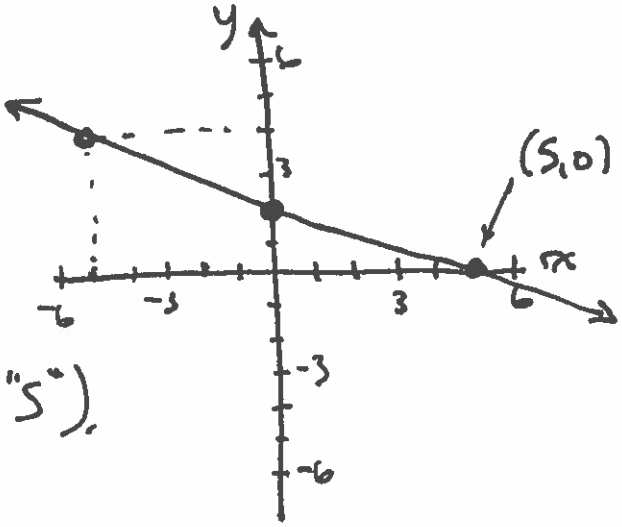
label physical meaning!

- Ticks at places that make sense in context
- Labels on axes include units.
- Didn't extend line into places where it makes no sense
- Gave a title to the graph (Chicken Expense)

3.2



x & y-intercepts are where a graph intersects x- & y-axis.



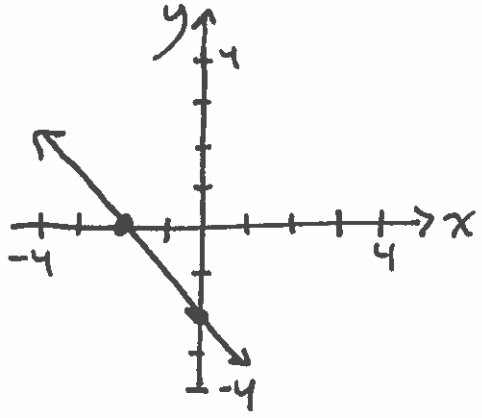
The x-intercept is: (5,0)

(people might say "5").

The y-intercept is: (0,2)

(people might say "2")

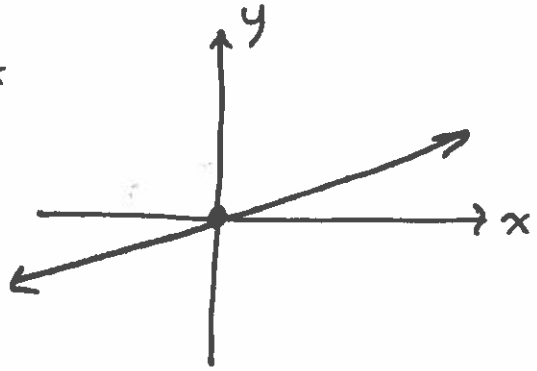
Ex



x-intercept at (-2,0).

y-intercept at (0,-2).

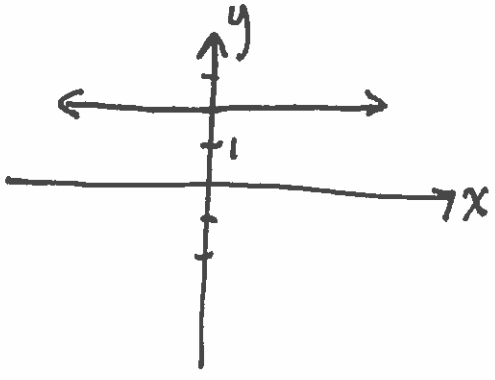
Ex



x-intercept at (0,0).

y-intercept at (0,0).

Ex



x-intercept does not exist!

y-intercept at (0,2)

Ex $x + y = 6$

Use intercepts to plot this.

Calculate x-intercept

y will be 0.

$x + 0 = 6$

$x = 6$

$\rightarrow (6,0)$

Calculate y-intercept

x will be 0

$0 + y = 6$

$y = 6$

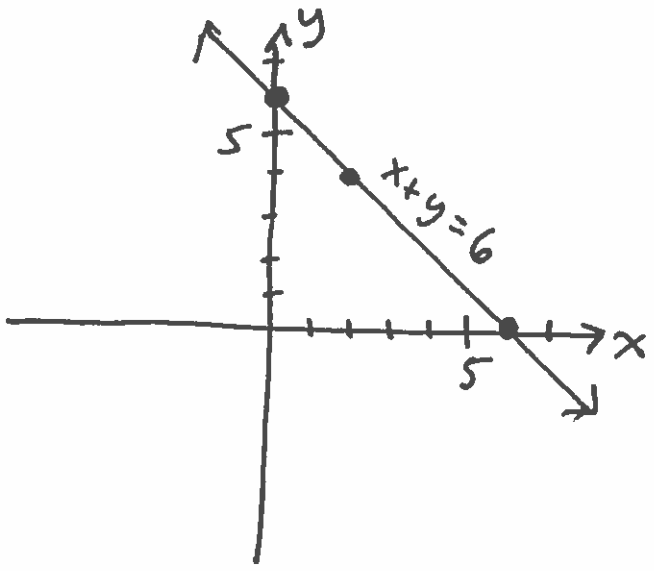
$\rightarrow (0,6)$

Make one check point. Pick one x-value...

$x = 2.$ $2 + y = 6$

$y = 4$

$(2,4)$



Ex $6x-2y=12$

Plot using intercepts.

x-intercept

let $y=0$

$6x-2(0)=12$

$6x=12$

$x=2$

$(2,0)$

y-intercept

let $x=0$

$6(0)-2y=12$

$-2y=12$

$y=-6$

$(0,-6)$

check point

Let $x=1$

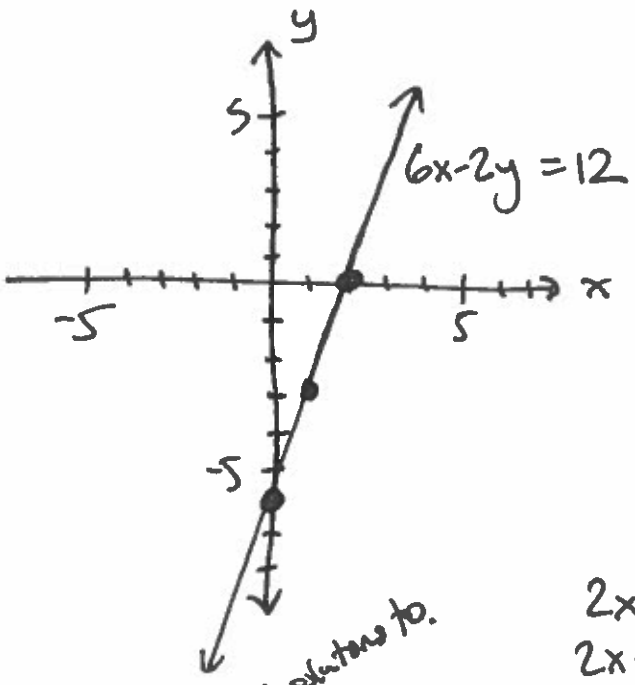
$6(1)-2y=12$

$6-2y=12$

$-2y=6$

$y=-3$

$(1,-3)$



Ex Plot $-x+3y=10$

Ex Plot $2x+5=3y$

x-int ($y=0$)

$2x+5=3(0)$

$2x+5=0$

$2x=-5$

$x=-5/2$

$(-\frac{5}{2},0)$

$(-2\frac{1}{2},0)$

y-int ($x=0$)

$2(0)+5=3y$

$5=3y$

$\frac{5}{3}=y$

$(0,5/3)$

$(0,1\frac{2}{3})$

check pt

$y=5$

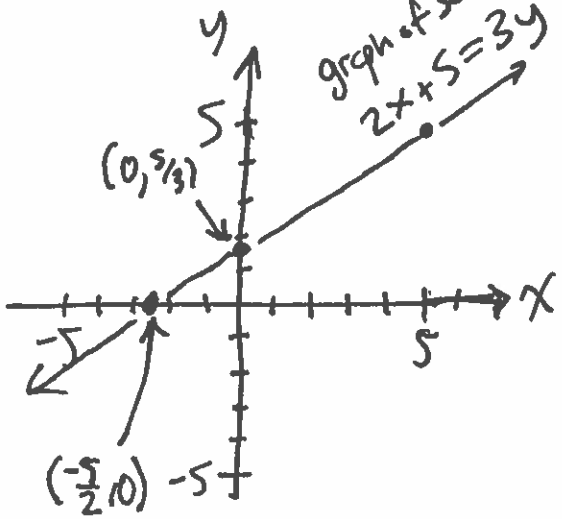
$2x+5=3(5)$

$2x+5=15$

$2x=10$

$x=5$

$(5,5)$



Ex x = # months passed

y = $ spent after x months on equipment, chickens, food.

$$y = 20x + 400$$

<We already plotted using a table.>

Plot using intercepts...

x-intercept

$y = 0$

$0 = 20x + 400$

$-400 = 20x$

$\frac{-400}{20} = x$

$-20 = x$ → $(-20, 0)$

y-intercept

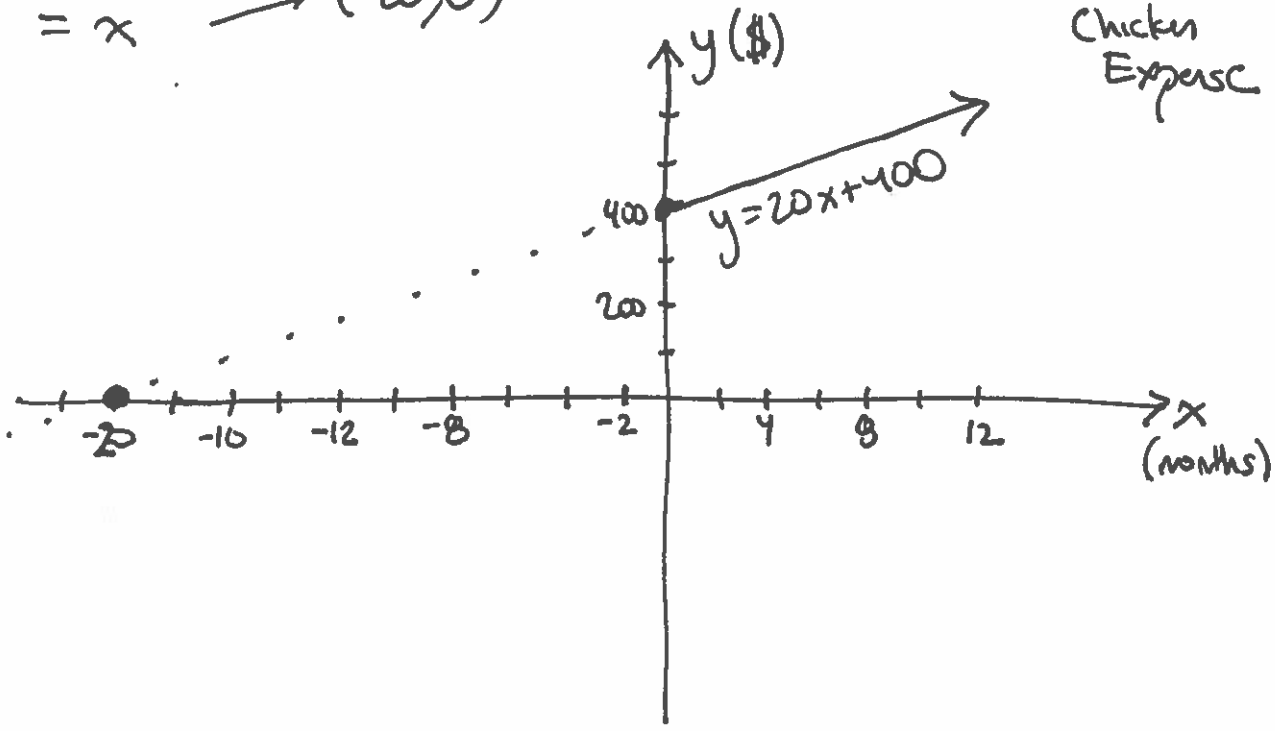
$x = 0$

$y = 20(0) + 400$

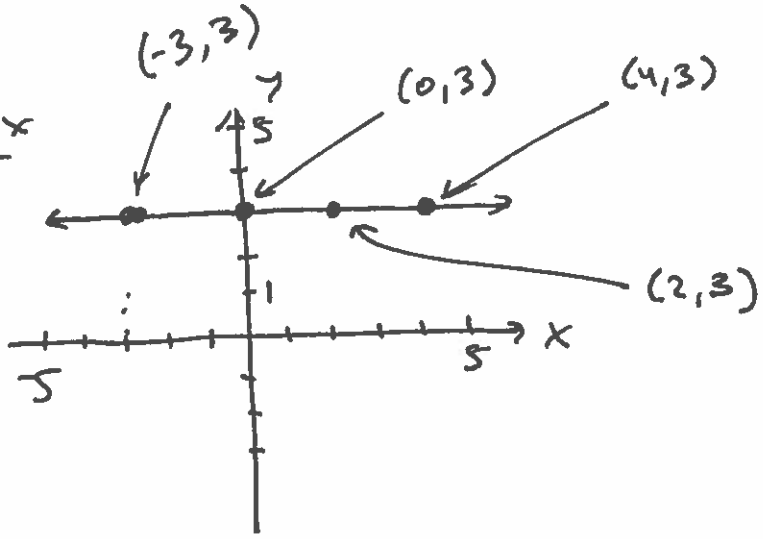
$y = 400$

$(0, 400)$

Check Pt.



Ex



Horizontal Line

Its equation is

$y = 3$

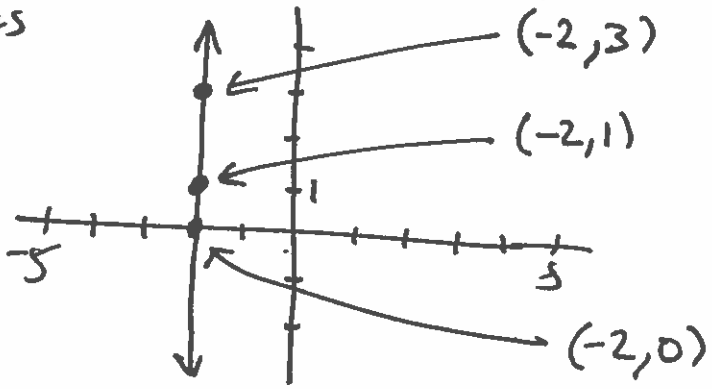
"y has to be 3; as far as x goes, make it whatever you want"

Horizontal Lines

have equations $y =$ number.

have a y-intercept; usually no x-intercept.

Vertical Lines has equation $x = -2$



Vertical Lines

have equations $x =$ number

have an x-intercept; usually no y-intercept