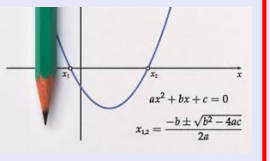
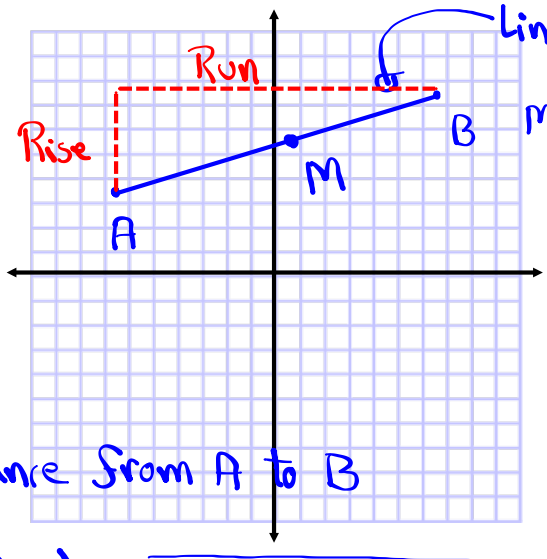
Math 125

Spring 2022

Lecture 2



For Points $A(x_1, y_1)$ and $B(x_2, y_2)$,



Line Segment $\overline{AB}$

Midpoint

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

Slope $= \frac{\text{Rise}}{\text{Run}}$

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

distance from A to B

$$d(A,B) = \sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$$

Given $A(-4,2)$, $B(8,10)$

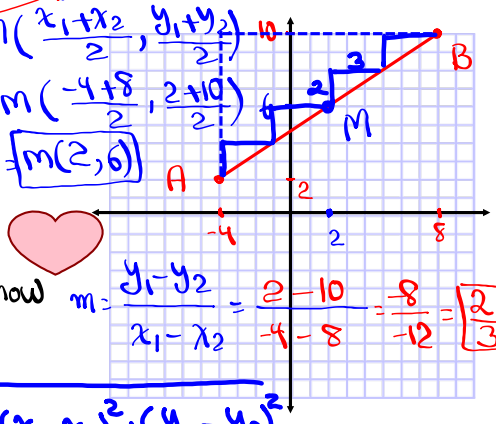
1) Draw $\overline{AB}$ ✓

2) Find midpoint M and plot it.

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

$= M\left(\frac{-4+8}{2}, \frac{2+10}{2}\right)$

$= \boxed{M(2,6)}$



3) Find slope m, show rise and run.

$m = \frac{y_1-y_2}{x_1-x_2} = \frac{2-10}{-4-8} = \frac{-8}{-12} = \boxed{\frac{2}{3}}$

4) Find $d(A,B) = \sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$

$= \sqrt{(-4-8)^2+(2-10)^2} = \sqrt{(-12)^2+(-8)^2}$

$= \sqrt{144+64}$

$= \sqrt{208}$

$\approx \boxed{14.4}$

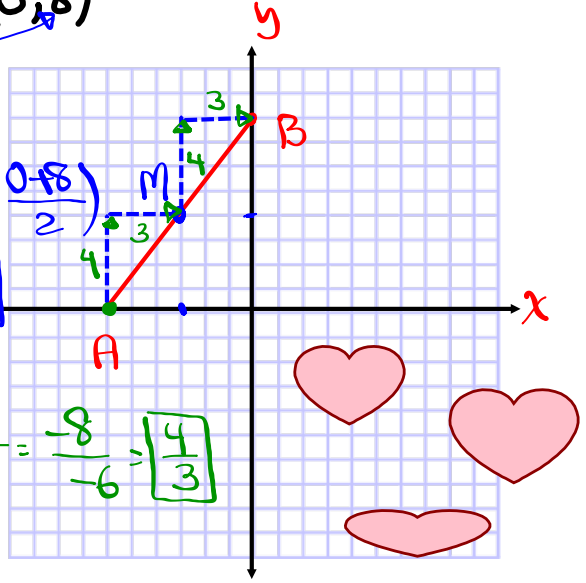
Given $A(-6,0)$, $B(0,8)$

1) Draw $\overline{AB}$ ✓

2) Find M

$M\left(\frac{-6+0}{2}, \frac{0+8}{2}\right)$

$\boxed{M(-3,4)}$



3) Find m

$m = \frac{0-8}{-6-0} = \frac{-8}{-6} = \boxed{\frac{4}{3}}$

4) Find $d(A,B)$

$= \sqrt{(-6-0)^2+(0-8)^2} = \sqrt{(-6)^2+(-8)^2} = \sqrt{36+64}$

$= \sqrt{100} = \boxed{10}$

How to draw a line in Standard Form:

$Ax + By = C$

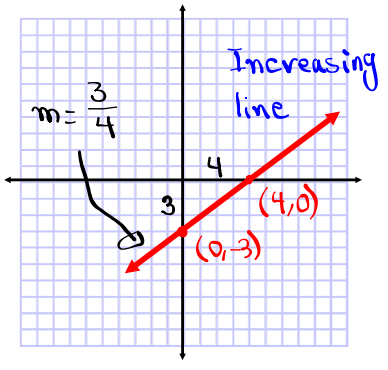
$3x - 4y = 12$

Do intercept method:

x	y
0	-3
4	0

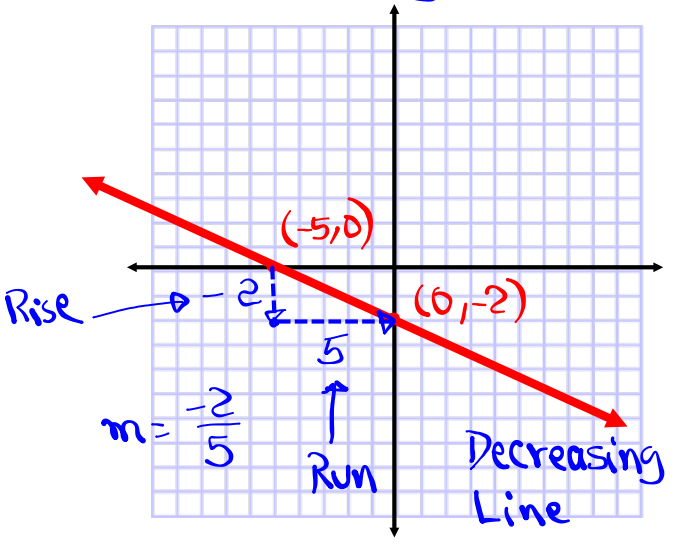
$3(0) - 4y = 12$ $\quad -4y = 12$ $\quad y = -3$

$3x - 4(0) = 12$ $\quad 3x = 12$ $\quad x = 4$



Graph $2x + 5y = -10$ by intercept method.

x	y
0	-2
-5	0



How to draw a line in Slope-Int. Form:

$y = mx + b$

$y = \frac{-2}{3}x + 4$

Y-Int (0,b)

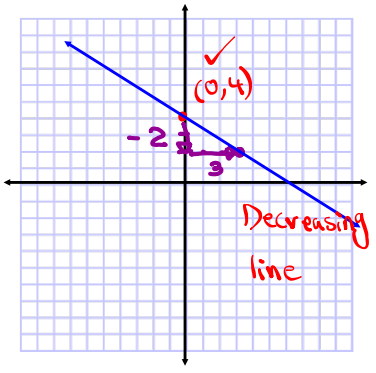
1) Plot Y-Int

$m = \frac{-2}{3}$

Y-Int (0,4)

2) From there, I use rise & run of the slope to get a second Point.

3) Draw

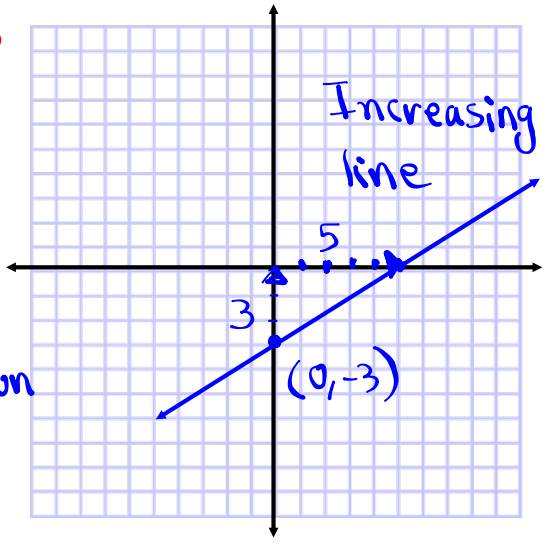


Given $y = \frac{3}{5}x - 3$

1) Y-Int (0,-3)

2) Slope $m = \frac{3}{5}$ (Rise / Run)

3) Draw



Given $4x - 5y = 10$

1) Rewrite in Slope-Int. Form

$y = mx + b$

Isolate y.

$4x - 5y = 10$

$-5y = -4x + 10$

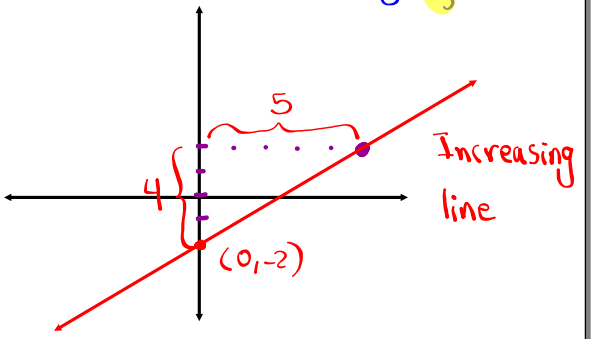
$\frac{-5}{-5}y = \frac{-4}{-5}x + \frac{10}{-5}$

$y = \frac{4}{5}x - 2$

2) Y-Int $(0, -2)$

3) Slope $m = \frac{4}{5}$ (Rise / Run)

4) Draw



Lines in Point-slope Form: Slope m

$y - y_1 = m(x - x_1)$ Point (x_1, y_1)

$y - 3 = \frac{4}{3}(x - 5)$ $m = \frac{4}{3}$ (Rise / Run)

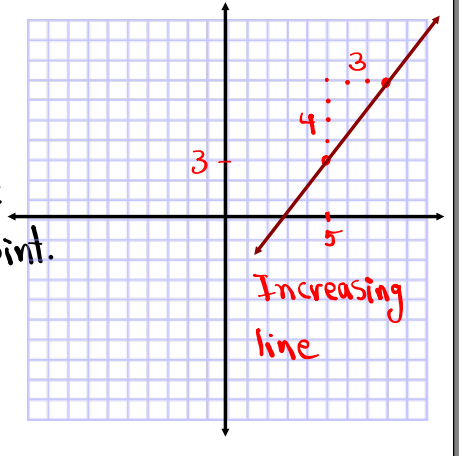
Point $(5, 3)$

Draw

1) Plot the point

2) From there, use Rise & Run of slope to get to second point.

3) Then draw.



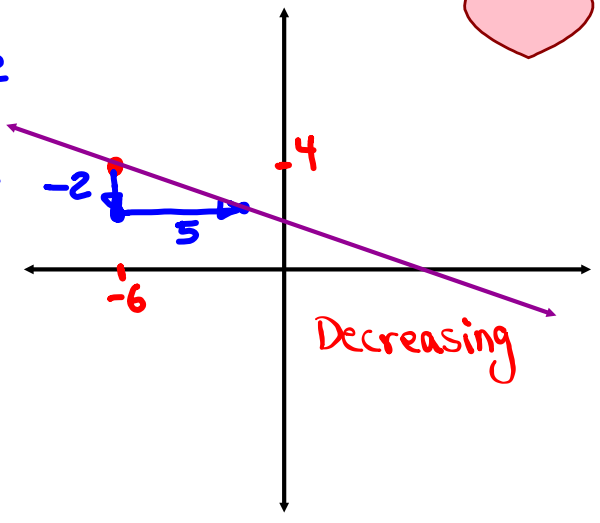
Given $y-4=\frac{-2}{5}(x+6)$

$y-y_1=m(x-x_1)$

1) Point $(-6,4)$

2) Slope $m=\frac{-2}{5}$ Rise -2, Run 5

3) Draw the line



Special lines

1) Vertical lines

$x=a$

No slope

or

undefined slope

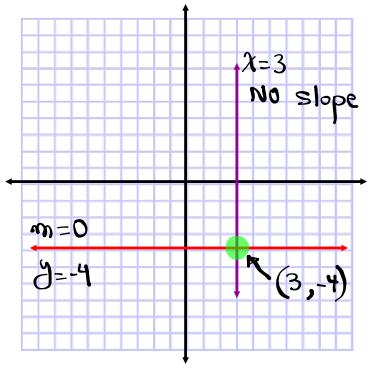
2) Horizontal lines

$y=b$

$m=0$

Zero slope

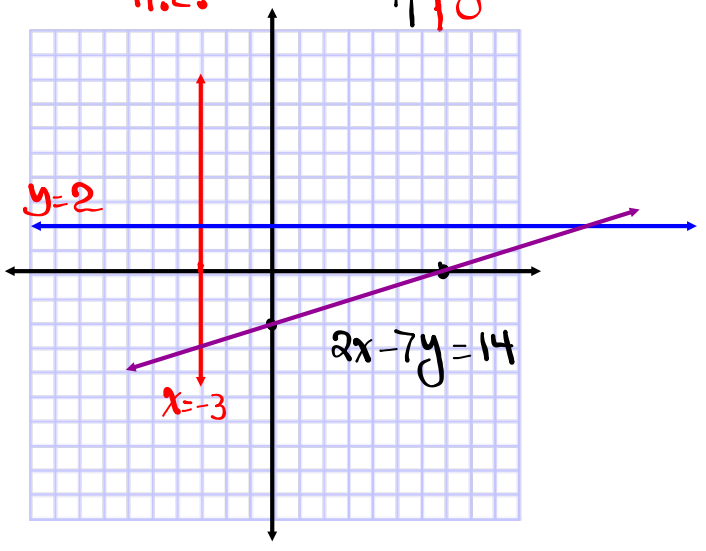
Draw $x=3$, and $y=-4$ in the same coordinate system. clearly mark their intersection Point.



Draw $x=-3$, $y=2$, and $2x-7y=14$ in the Same Coordinate System.

V.L. H.L.

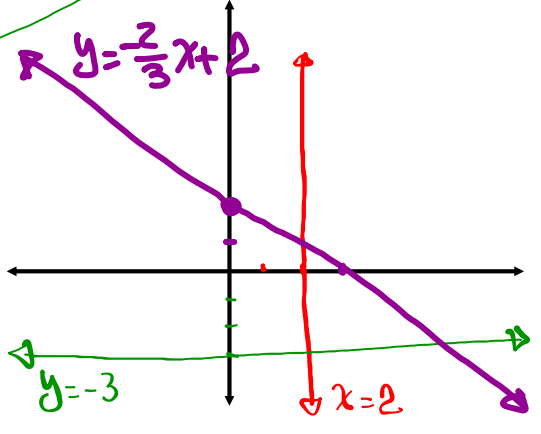
x	y
0	-2
7	0



Graph $x=2$, $y=-3$, and $y=\frac{-2}{3}x+2$ in the Same Coordinate System.

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

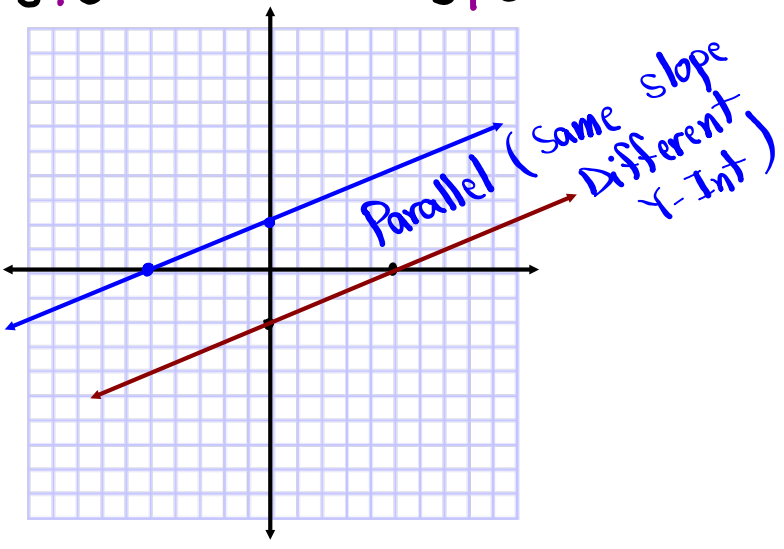
$m=\frac{-2}{3}$ Y-Int$(0,2)$



Graph $2x-5y=10$ and $2x-5y=-10$.

x	y
0	-2
5	0

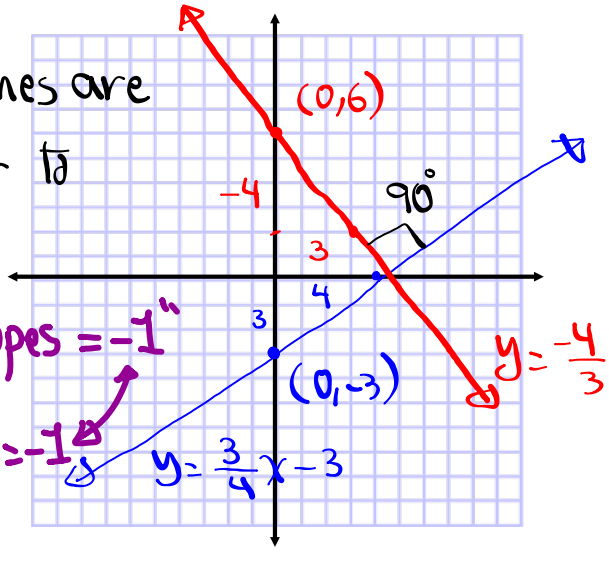
x	y
0	2
-5	0



Graph $y=\frac{3}{4}x-3$ and $y=\frac{-4}{3}x+6$

$y=mx+b$ $y=mx+b$

these two lines are Perpendicular to each other.



"Product of slopes $=-1$"

$\frac{3}{4}\cdot\frac{-4}{3}=\frac{-12}{12}=-1$

Graph $y+3=\frac{-2}{3}(x+2)$

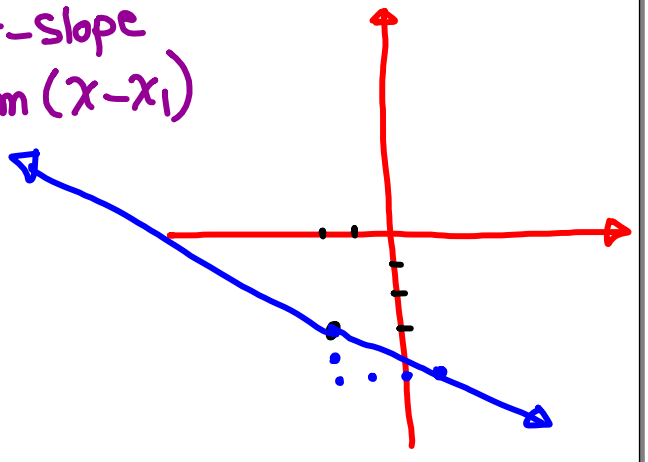
Point-Slope

$y-y_1=m(x-x_1)$

Point $(-2,-3)$

Slope $m=\frac{-2}{3}$

Draw



Algebra Review

Solve: $2(x+8)-10=x+6$

$2x+16-10=x+6$

$2x+6=x+6$

$2x-x=6-6$

$\boxed{x=0}$

Solution Set

$\{0\}$

Simplify: $\dfrac{(x^6)^4 \cdot x^3}{(x^5)^5} = \dfrac{x^{24} \cdot x^3}{x^{25}}$

$(x^m)^n = x^{mn}$

$x^m \cdot x^n = x^{m+n}$

$= \dfrac{x^{27}}{x^{25}}$

$\dfrac{x^m}{x^n} = x^{m-n}$

$= x^{27-25} = \boxed{x^2}$

Solve & graph

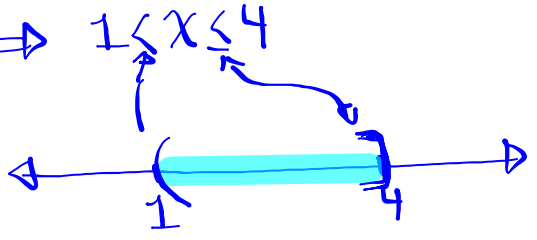
$1 < 3x - 2 \leq 10$

Hint: Isolate x in the middle

$1 + 2 < 3x - 2 + 2 \leq 10 + 2$

$3 < 3x \leq 12$

$\dfrac{3}{3} < x \leq \dfrac{12}{3} \longrightarrow 1 < x \leq 4$



Foil & then Simplify

$(2x-3)(3x+2)+5x$

$= 6x^2 + 4x - 9x - 6 + 5x$

$= \boxed{6x^2 - 6}$

Class QZ 2

Graph $5x - 4y = -20$ by intercept method.

x	y
0	5
-4	0