Math 115

Fall 2018

Lecture 10

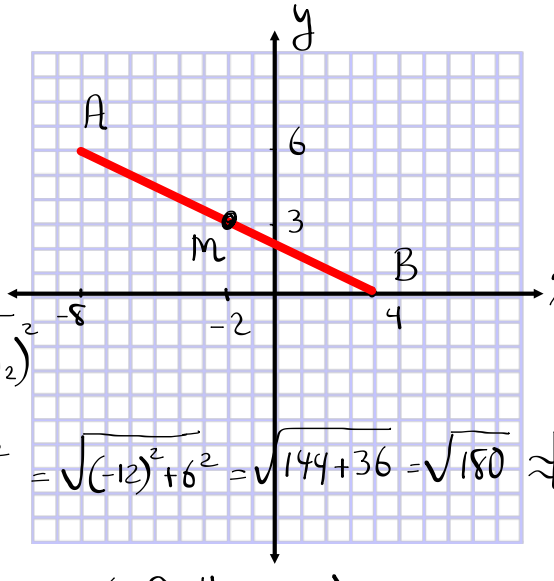
$? \; a^2 + b^2 = c^2 \; ?$

$y = mx + b \quad ? \quad d = rt$

Review:

Draw $\overline{AB}$ with

$A(-8,6)$, $B(4,0)$



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

$$= \sqrt{(-8-4)^2+(6-0)^2} = \sqrt{(-12)^2+6^2} = \sqrt{144+36} = \sqrt{180} \approx 13.4$$

$$M = M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = M\left(\frac{-8+4}{2}, \frac{6+0}{2}\right) = M\left(\frac{-4}{2}, \frac{6}{2}\right)$$

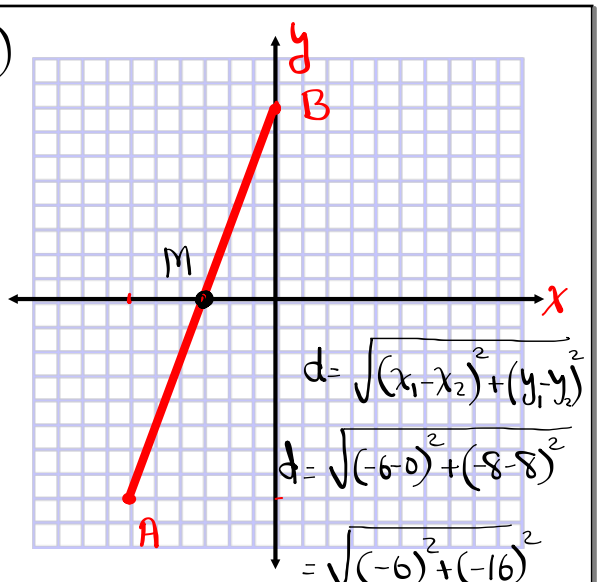
$$= M(-2,3)$$

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

1) Draw $\overline{AB}$

2) Find the distance from A to B.

3) Find the midpoint of $\overline{AB}$.



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

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

$= M(-3,0)$

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

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

$= \sqrt{(-6)^2+(-16)^2}$

$= \sqrt{36+256}$

$= \sqrt{292}$

$\approx \boxed{17.1}$

Graph $x=6$, $x+3=0$, $y=-5$, and $y-4=0$ in the Same Coordinate System.

x-only $\rightarrow$ V.L.

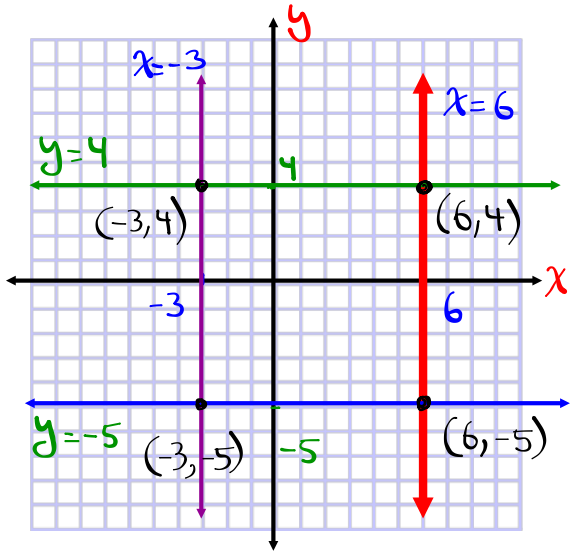
y-only $\rightarrow$ H.L.

$\boxed{x=6}$ V.L.

$x+3=0 \rightarrow \boxed{x=-3}$ V.L.

$\boxed{y=-5}$ H.L.

$y-4=0 \rightarrow \boxed{y=4}$ H.L.

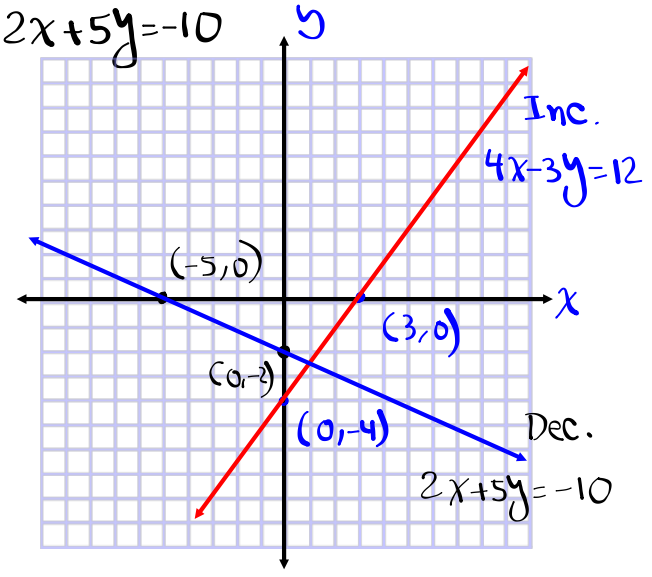


Use intercept methods to graph

$4x - 3y = 12$ and $2x + 5y = -10$

x	y
0	-4
3	0

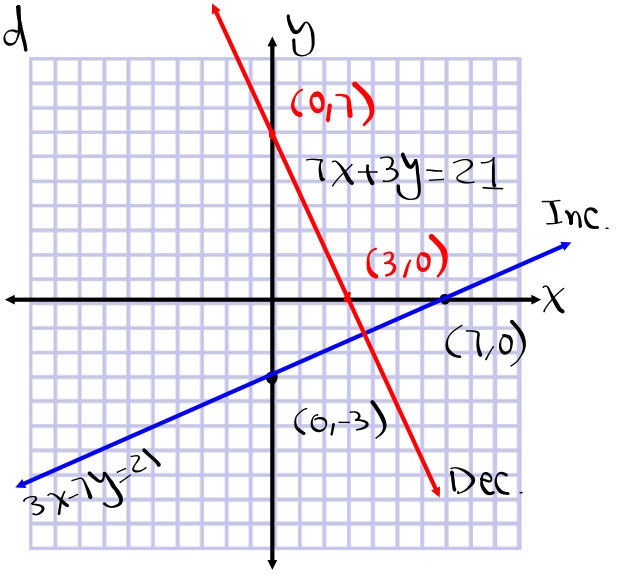
x	y
0	-2
-5	0



Graph $3x - 7y = 21$ and $7x + 3y = 21$ using intercept methods.

x	y
0	-3
7	0

x	y
0	7
3	0



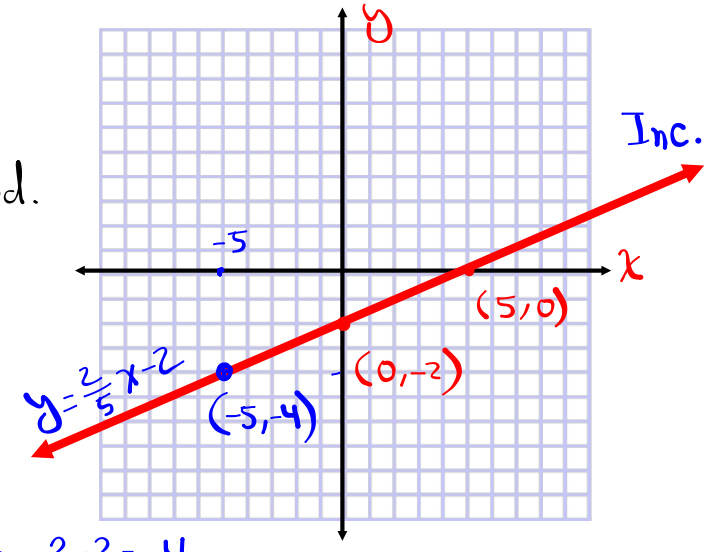
Graph

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

by 2-Point method.

x	y
0	-2
5	0
-5	

$y = \frac{2}{5}(-5) - 2 = -2 - 2 = -4$



Graph

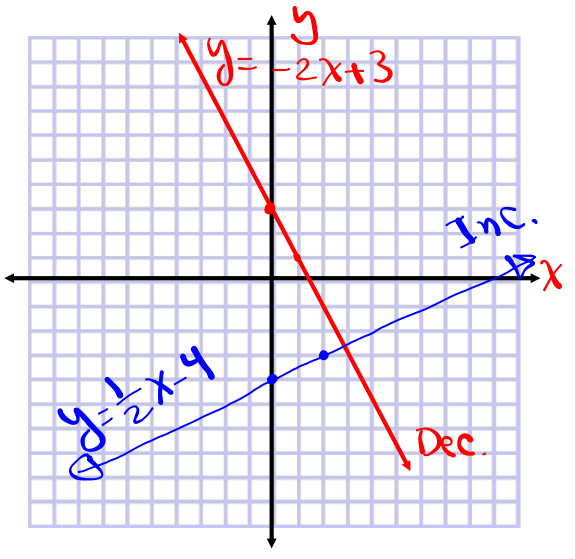
$y = -2x + 3$ and

x	y
0	3
1	1

$y = \frac{1}{2}x - 4$ by

x	y
0	-4
2	-3

2-Point method.



Given $3x+4y=8$

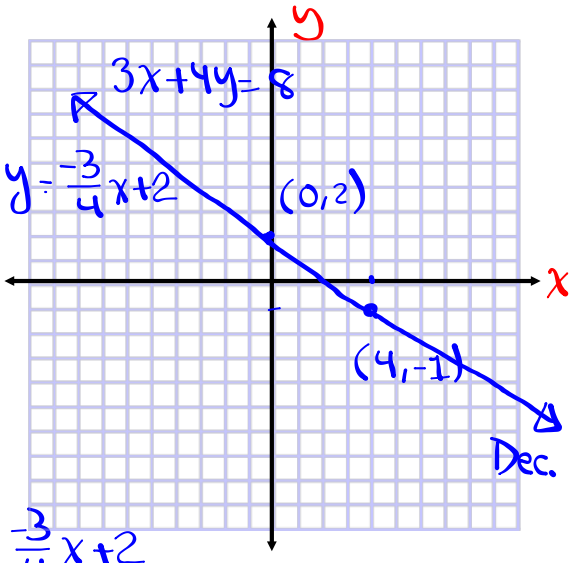
① Solve for y.

② Use 2-point method to graph.

$4y = -3x + 8$

$y = \frac{-3}{4}x + \frac{8}{4}$ $\quad y = \frac{-3}{4}x + 2$

x	y
0	2
4	-1



Given $3x-5y=0$

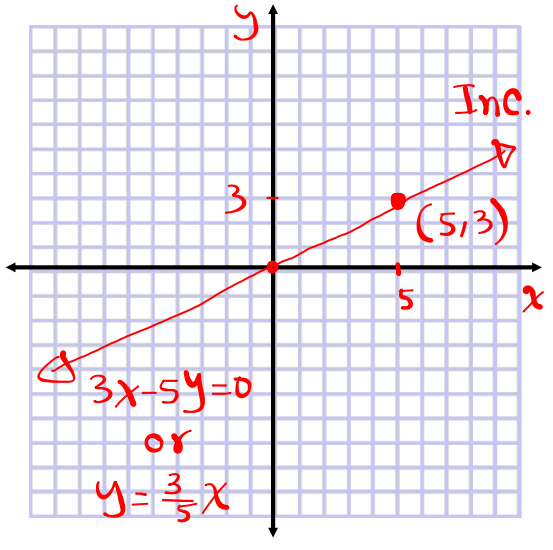
1) Solve for y

2) Graph using 2-Point method.

$-5y = -3x$

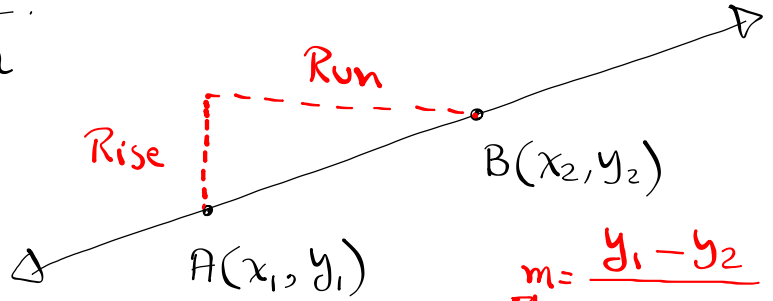
$y = \frac{-3}{-5}x$ $\quad y = \frac{3}{5}x$

x	y
0	0
5	3



Slope of a slant line is the ratio of

$\frac{\text{rise}}{\text{Run}}$.

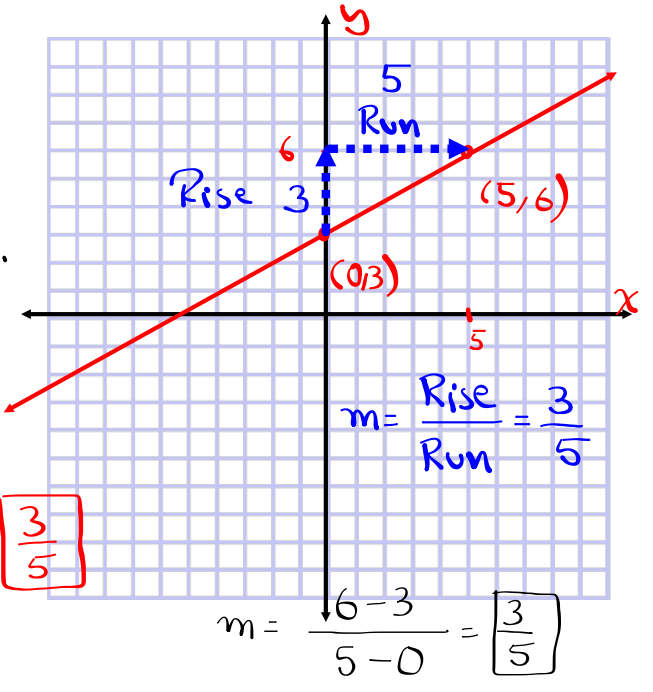


$$m = \frac{y_1 - y_2}{x_1 - x_2}$$

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

Draw a line that contains (0,3) and (5,6). Show rise & run of its slope.

Find the slope (0,3) & (5,6)

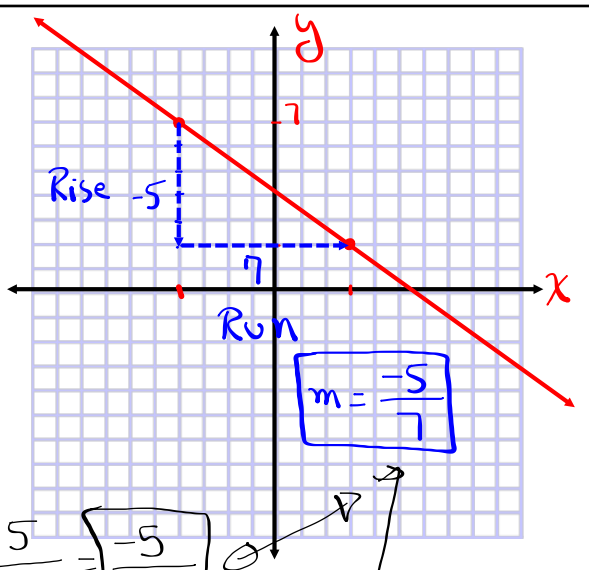


$$m = \frac{3-6}{0-5} = \frac{-3}{-5} = \boxed{\frac{3}{5}}$$

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{3}{5}$$

$$m = \frac{6-3}{5-0} = \boxed{\frac{3}{5}}$$

Graph a line that contains $(-4,7)$ and $(3,2)$. Show rise & run of its slope. Find the slope.



$(-4,7)$ & $(3,2)$

$$m = \frac{7-2}{-4-3} = \frac{5}{-7} = \frac{-5}{7}$$

$(-4,7)$ & $(3,2)$

$$m = \frac{2-7}{3-(-4)} = \frac{-5}{3+4} = \frac{-5}{7}$$

$x = a$ Vertical line

$y = b$ Horizontal line

$Ax + By = C$ Standard form

Slant line

$y = mx + b$ Slope-Int. form

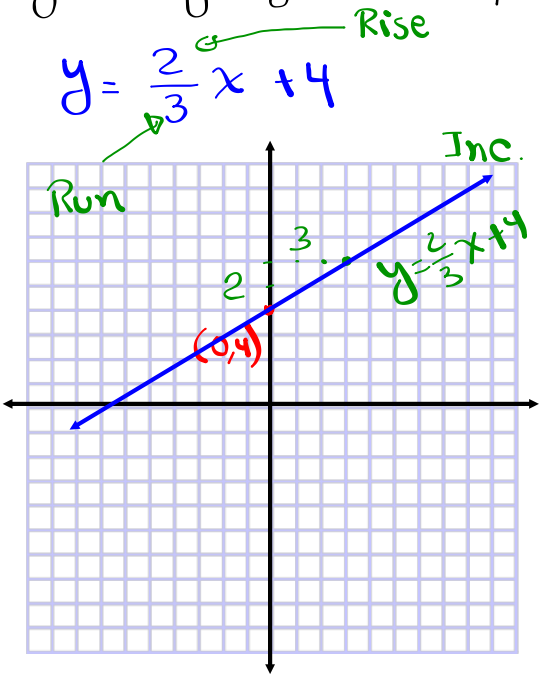
$y - y_1 = m(x - x_1)$ Point-slope form

Graphing $y = mx + b$ by using y-Int & slope:

1) Plot Y-Int $(0, b)$

2) From the Y-Int use rise & run of slope to reach anoter Point

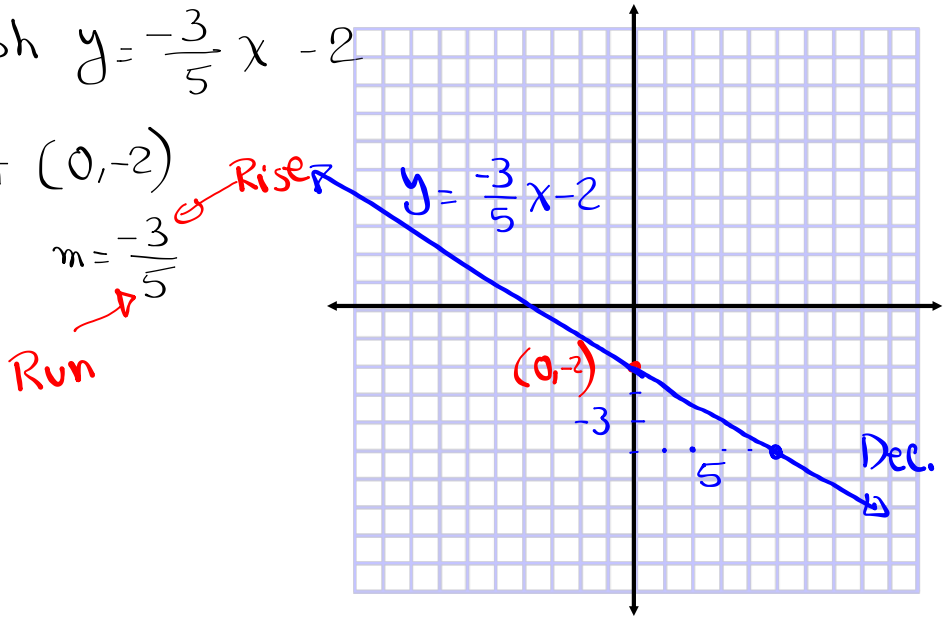
3) Connect these points, then extend.



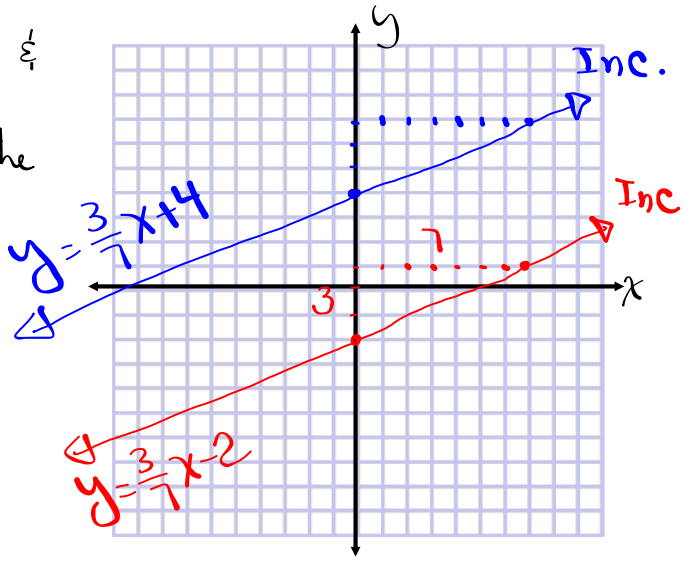
Graph $y = \frac{-3}{5}x - 2$

Y-Int $(0, -2)$

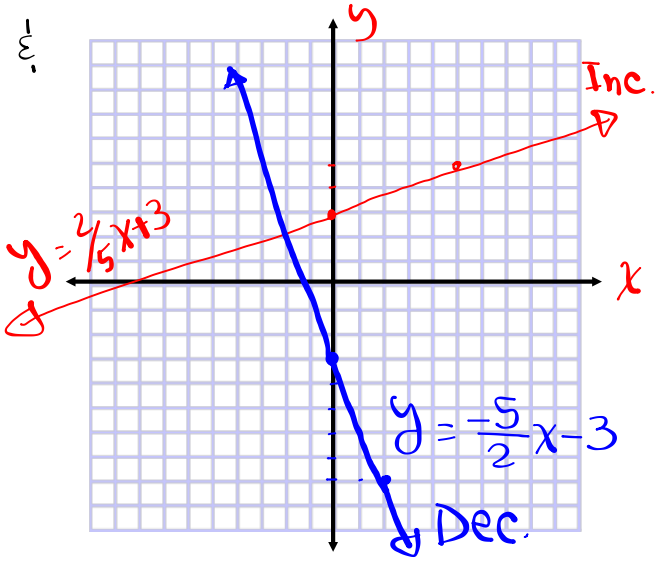
Slope $m = \frac{-3}{5}$



Graph $y = \frac{3}{7}x - 2$ & $y = \frac{3}{7}x + 4$ in the same coordinate system.



Graph $y = \frac{2}{5}x + 3$ & $y = \frac{-5}{2}x - 3$.



Vertical line → No slope
→ undefined slope

Horizontal line → Zero slope
→ $m = 0$

Two slant lines are parallel when
a) Different y-Int, and
b) Same slope.

Two slant lines are perpendicular when
a) Slopes are negative reciprocal of each other, or
b) Product of their slopes is -1.

Graph point-slope equations:

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

$y - 3 = \frac{2}{5}(x - 4)$

Point $(4, 3)$

Slope $m = \frac{2}{5}$

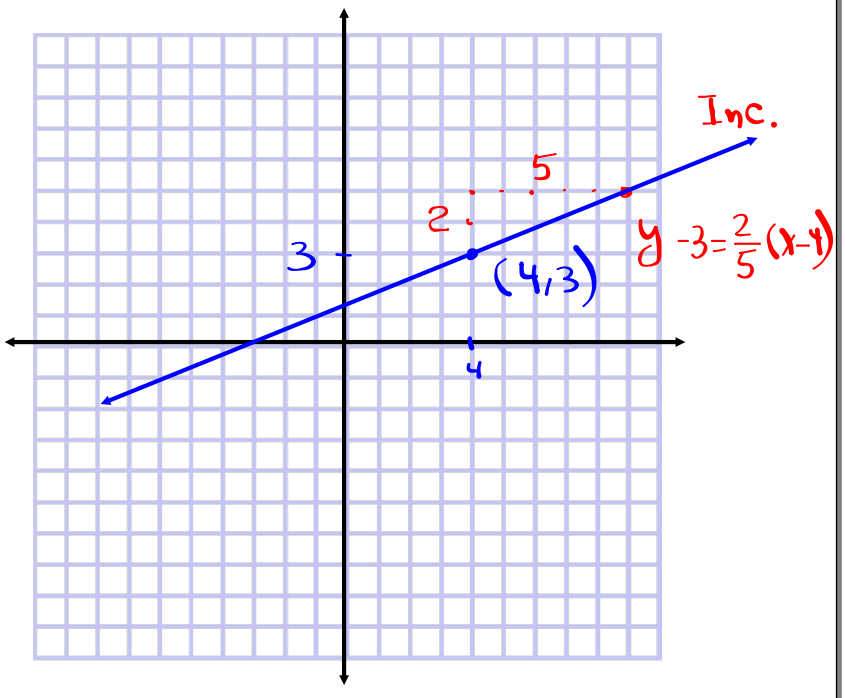
1) Point (x_1, y_1)

2) Slope m

3) Plot the point

4) From the point, use rise & run of slope to find another Point

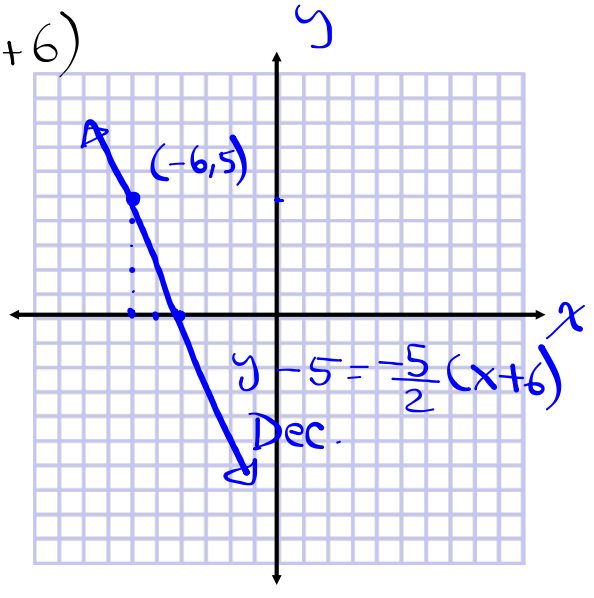
5) Connect & Extend.



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

Point $(-6,5)$

Slope $m=\frac{-5}{2}$

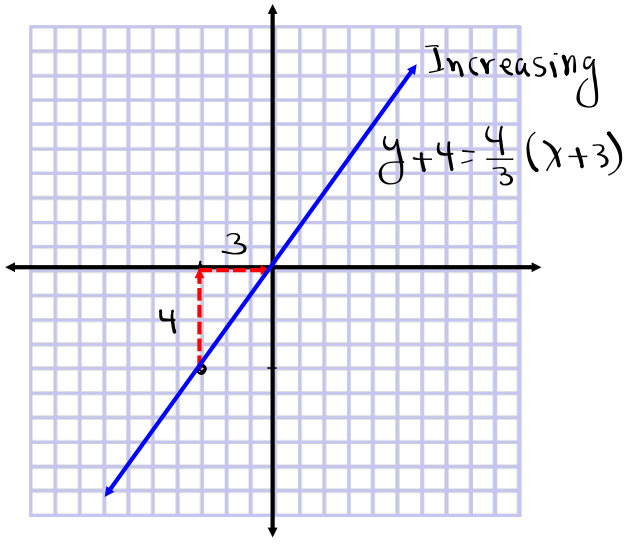


Graph

$y+4=\frac{4}{3}(x+3)$

Point $(-3,-4)$

Slope $\frac{4}{3}$



More on Slope:

when no slope → V.L.

when undefined slope → V.L.

when Zero slope → H.L.

when $m = 0$ → H.L.

when $m > 0$ → Increasing line

when $m < 0$ → Decreasing line

when $m_1 = m_2$ with different y-Ints. → Parallel slant lines

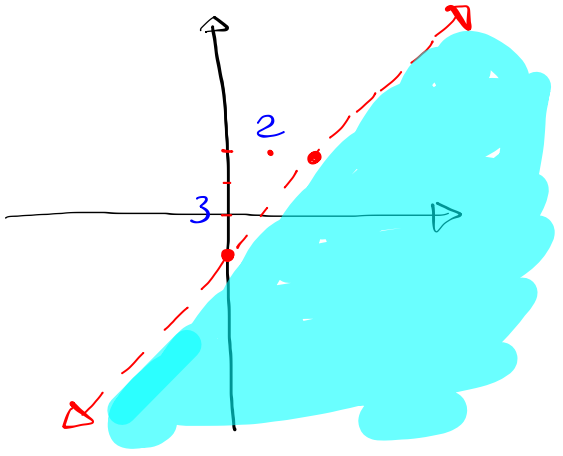
when $m_1 \cdot m_2 = -1$ → Perpendicular slant lines

Graphing inequalities with two variables:

$y < \frac{3}{2}x - 1$

Slant line

broken/Dashed



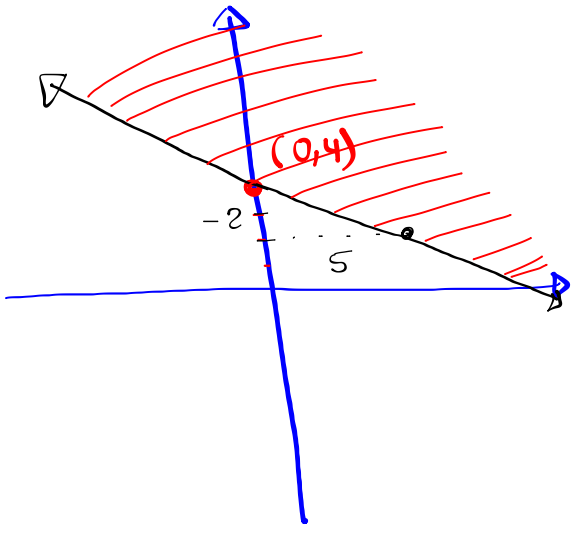
Graph & Shade

$y \geq \frac{-2}{5}x + 4$

Y-Int (0,4)

Slope $\frac{-2}{5}$

Slant line, Solid



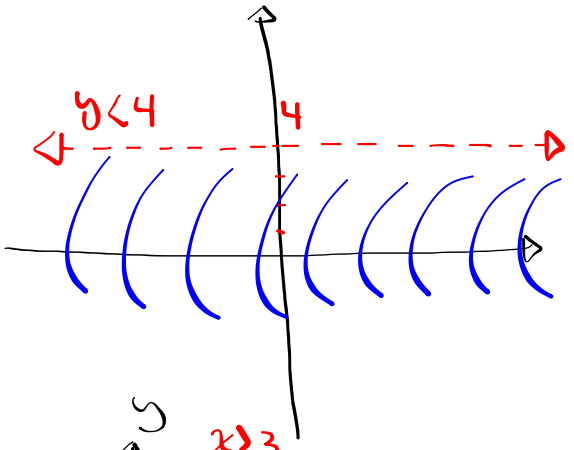
Graph & shade

$y < 4$

Horizontal

broken

shade below



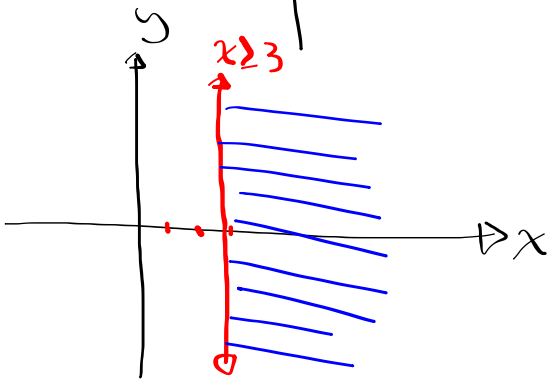
Graph & shade

$x \geq 3$

Solid,

Vertical,

Shade right



Raul has 31 coins.

Dimes, Nickels, and Quarters.

# of Nickels is twice # of dimes.

# of Quarters is 3 more than # of dimes.

1) How many of each?

2) How much in total?

Dimes → x

Nickels → $2x$

Quarters → $x+3$

$\underbrace{\text{Dimes}}_{x} + \underbrace{\text{Nickels}}_{2x} + \underbrace{\text{Quarters}}_{x+3} = 31 \text{ Coins}$

$x + 2x + x + 3 = 31$

$4x + 3 = 31$ $\quad 4x = 28$ $\quad \boxed{x = 7}$

He has 7 dimes, 14 Nickels, and 10 quarters.

$7(10¢) + 14(5¢) + 10(25¢) = \boxed{390¢}$

$= \boxed{\$3.90}$

Find two consecutive odd integers such that when twice the smaller one is reduced by 5 times the larger one, we get -109.

x & $x+2$

$2 \cdot \text{smaller} - 5 \cdot \text{larger} = -109$

$2x - 5(x+2) = -109$

$2x - 5x - 10 = -109$

$-3x = -109 + 10$

$-3x = -99$

$x = 33$

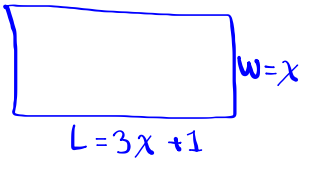
33 & 35

The Perimeter of a rectangular billboard is 66 ft.

Its length is 1 ft longer than 3 times its width.

① Find its dimensions.

② Find its area.



$P = 66$

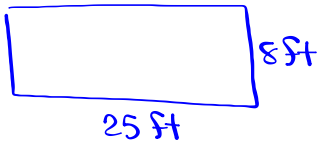
$2L + 2W = 66$

$2(3x+1) + 2x = 66$

$6x + 2 + 2x = 66$

$8x = 64$

$x = 8$



Dimensions: 8 ft by 25 ft

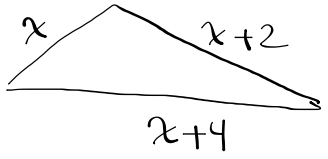
Area $= LW$

$= 25(8) =$ 200 ft^2

Perimeter of a triangular garden is 54 meters.

3 sides are three consecutive even integers.

Find all 3 sides.



x must be even

$P = 54$

$a + b + c = 54$

$x + x+2 + x+4 = 54$

$3x + 6 = 54$

$3x = 48$

$x = 16$

16m, 18m, and 20m.

Work on Study Guides

Quiz at 6:00