Math 115

Winter 2017

Lecture 5

① Solve: $-3(4x-5)+2=8x-13$

$-12x+15+2=8x-13$

$-12x-8x=-13-17$

$-20x=-30 \rightarrow \boxed{x=\frac{3}{2}}$ $\left\{\frac{3}{2}\right\}$

② $\frac{3}{4}(x-1) \geq \frac{4}{5}(x+2)-1$

LCD = 20

$5\cdot 3(x-1) \geq 4\cdot 4(x+2) - 20\cdot 1$

$15x-15 \geq 16x+32-20$

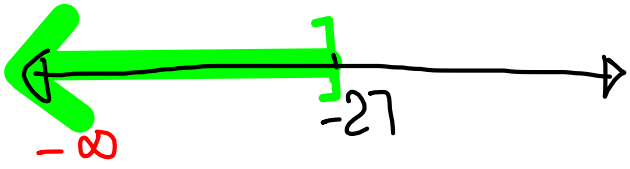
$15x-16x \geq 12+15$

$-x \geq 27$

$x \leq -27$

① S.B.N. $\{x \mid x \leq -27\}$

② Graphing



③ Interval notation $(-\infty, -27]$

Translate only: $x^3 = \sqrt{x}$

Cube of Some number is equal to Square root of the number.

1) Solve: $-7 \leq -2x + 3 < 17$

$-10 \leq -2x < 14$

$5 \geq x > -7$ → $-7 < x \leq 5$

S.B.N. $\{x \mid -7 < x \leq 5\}$

Graph

I.N. $(-7, 5]$

2) Solve for y: $-4x + 3y = -12$

$3y = 4x - 12$ → $y = \frac{4}{3}x - \frac{12}{3}$ → $y = \frac{4}{3}x - 4$

John has 83 coins. Quarters & dimes only. The number of Quarters is 7 fewer than four times the # of dimes. How much money does he have?

Dimes → x

Quarters → $4x-7$

$x + 4x - 7 = 83$

$5x = 90 \quad x = 18$

18 Dimes & 65 Quarters

$18(10) + 65(25) \Rightarrow$ \$18.05

what percent of 250 is 1.25?

$\frac{P}{100} \cdot 250 = 1.25 \rightarrow P = .5$

.5% of 250 is 1.25.

$2.5P = 1.25$

$P = \frac{1.25}{2.5}$

450 miles in 7.5 hrs. How many miles in 10 hrs?

$\frac{450}{7.5} = \frac{x}{10}$

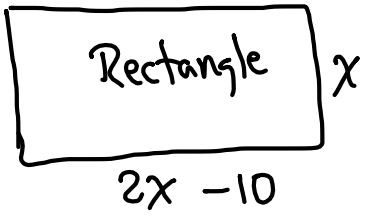
$7.5x = 4500$

$x = \frac{4500}{7.5}$

$x = 600$

600 Miles

Find x Such that $10 < P < 50$.



$10 < 2L + 2W < 50$

$10 < 2(2x-10) + 2x < 50$

$10 < 4x - 20 + 2x < 50$

$10 < 6x - 20 < 50$

$10 + 20 < 6x < 50 + 20$

$30 < 6x < 70$

$\frac{30}{6} < x < \frac{70}{6}$

$5 < x < \frac{35}{3}$

Class Quiz 2

① Solve: $4(2x-3)-8 = 3(3x-10)-x$

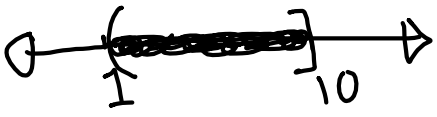
$8x-12-8 = 9x-30-x$

$8x-20 = 8x-30$ → $0 = -10$

$8x-8x = -30+20$

$\emptyset$

② Solve & Graph: $1 < x \leq 10$



$-4 < 2x-6 \leq 14$

$-4+6 < 2x \leq 14+6$

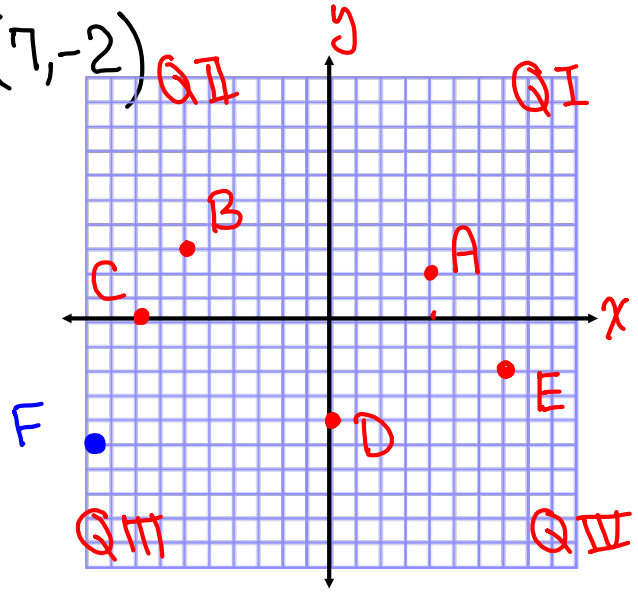
$2 < 2x \leq 20$

① Plot the following pts, Give quadrants:

A(4,2) , B(-6,3) , C(-8,0)

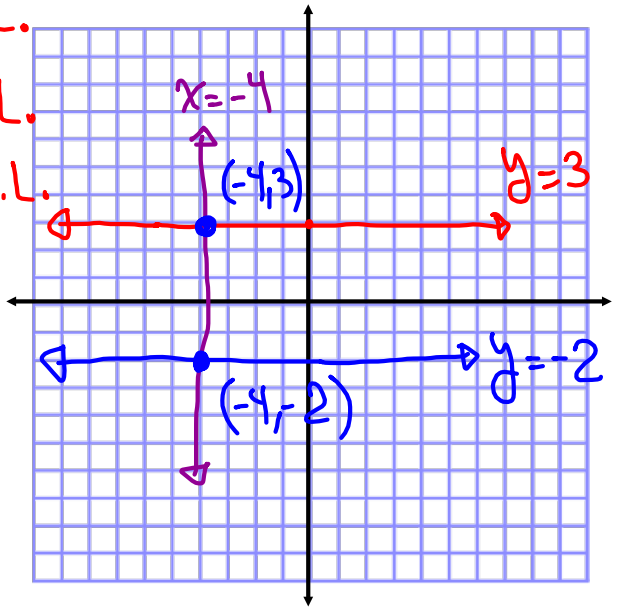
D(0,-4) , E(7,-2)

F(-10,-5) ?



Graph & label any point of intersection.

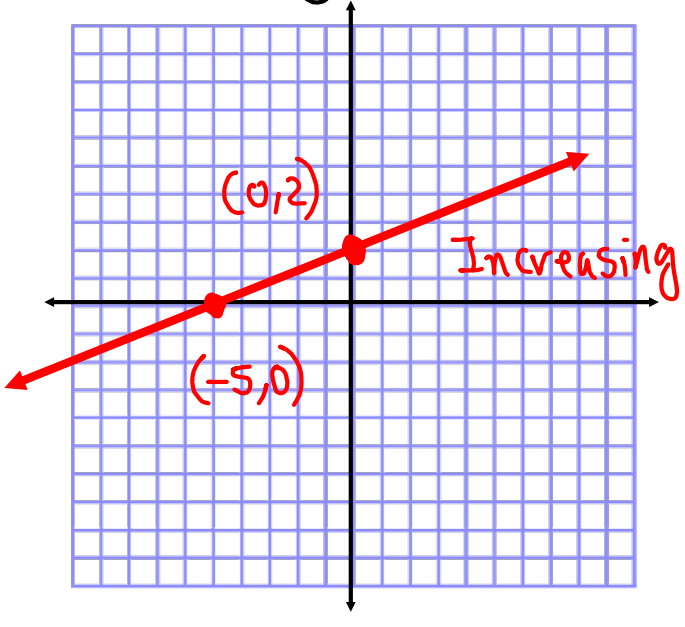
$\begin{cases} y=3 \rightarrow \text{H.L.} \\ x=-4 \rightarrow \text{V.L.} \\ y=-2 \rightarrow \text{H.L.} \end{cases}$



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

x	y
0	2
-5	0

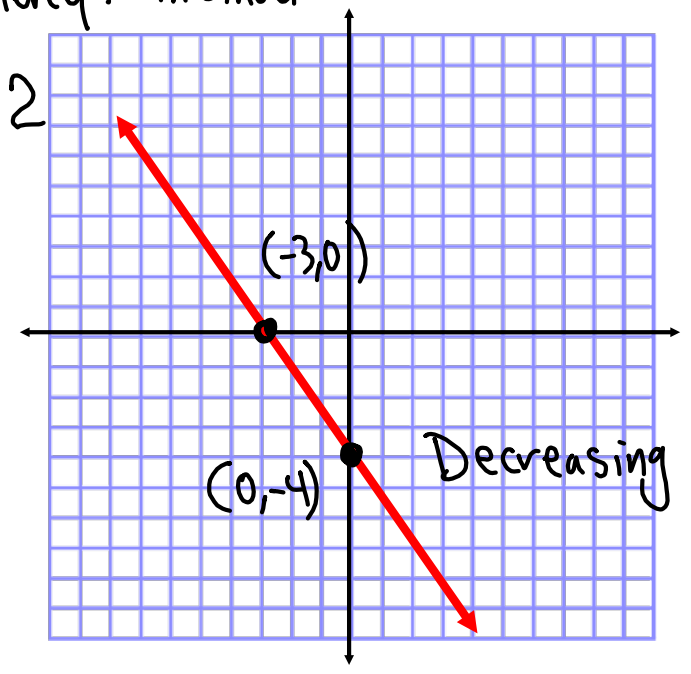
Intercept Method



Graph by intercept method

$4x + 3y = -12$

x	y
0	-4
-3	0



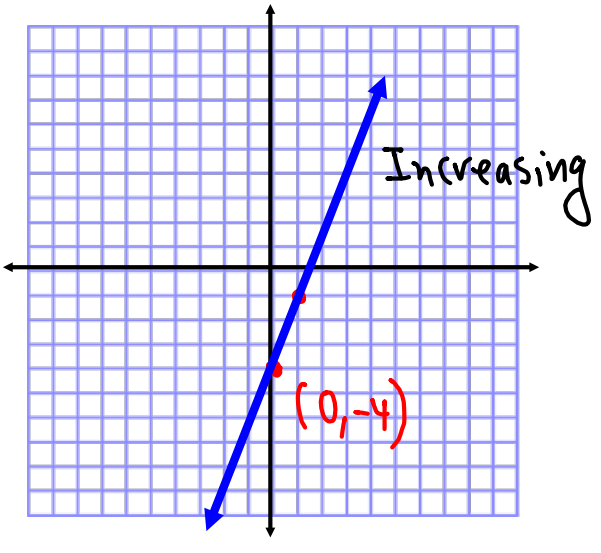
Graph using 2-points:

$y = 3x - 4$

x	y
0	-4
1	-1

$y = 3(0) - 4 = -4$

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



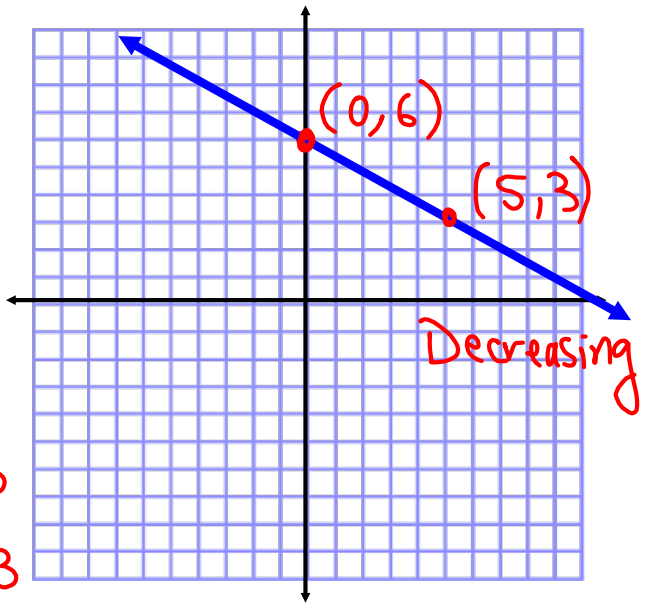
Graph using 2-pt method:

$y = \frac{-3}{5}x + 6$

x	y
0	6
5	3

$y = \frac{-3}{5}(0) + 6 = 6$

$y = \frac{-3}{5}(5) + 6 = 3$

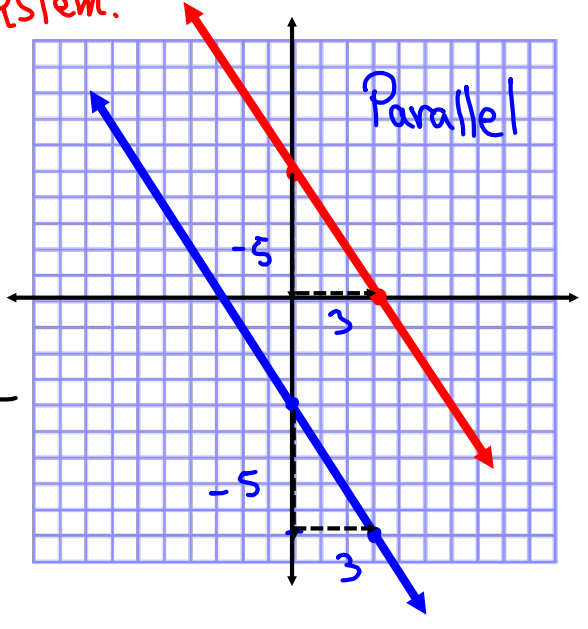


Graph both lines below in the Same Coordinate System:

$\begin{cases} 5x + 3y = 15 \\ y = \frac{-5}{3}x - 4 \end{cases}$

x	y
0	5
3	0

x	y
0	-4
3	-9

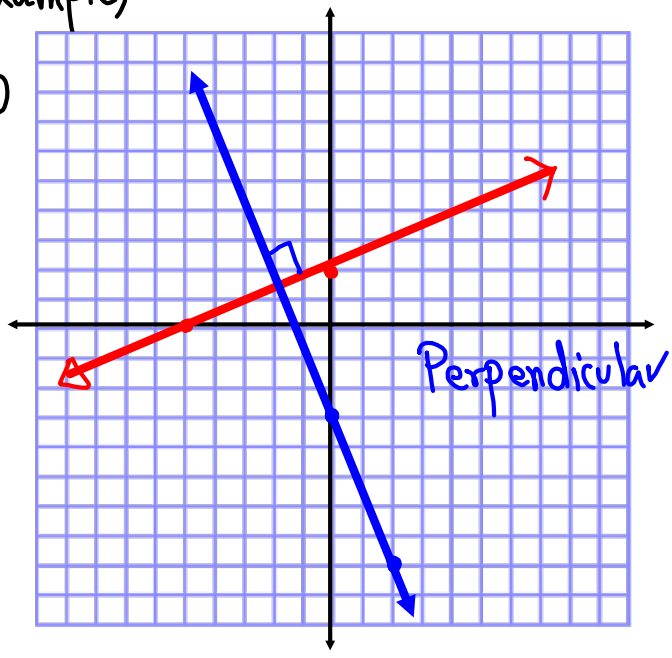


Graph (see last example)

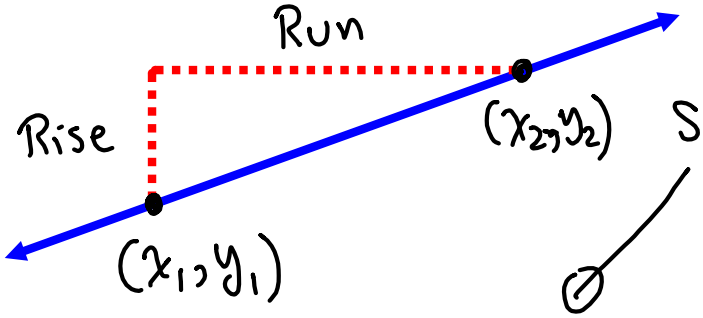
$$\begin{cases} 2x - 5y = -10 \\ y = \frac{-5}{2}x - 3 \end{cases}$$

x	y
0	2
-5	0

x	y
0	-3
2	-8



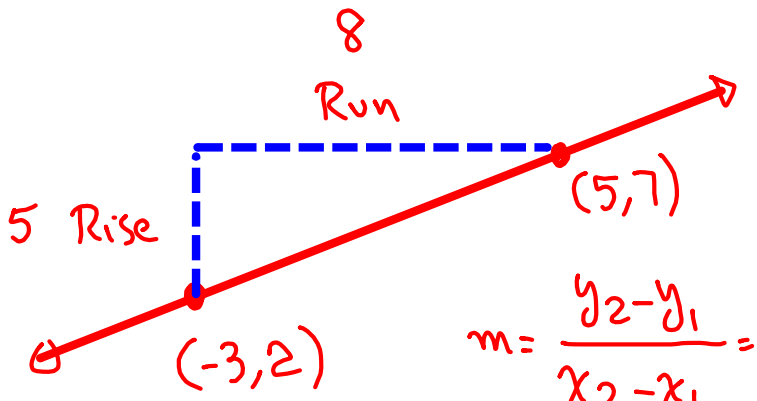
Slope of a slanted line:



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

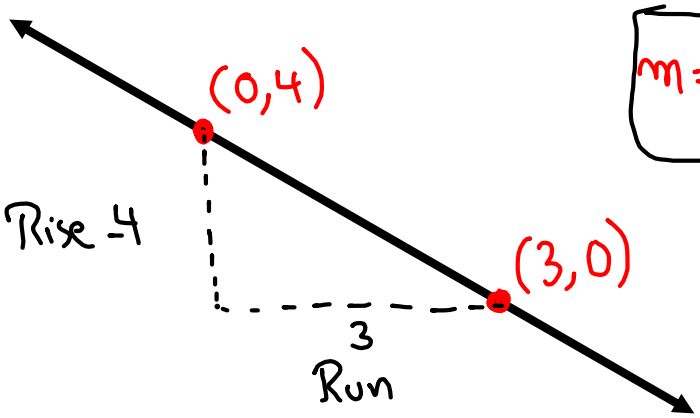
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

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



$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-2}{5-(-3)} = \boxed{\frac{5}{8}}$$

$$m = \frac{2-7}{-3-5} = \frac{-5}{-8} = \boxed{\frac{5}{8}}$$



$$\boxed{m = \frac{-4}{3}}$$

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

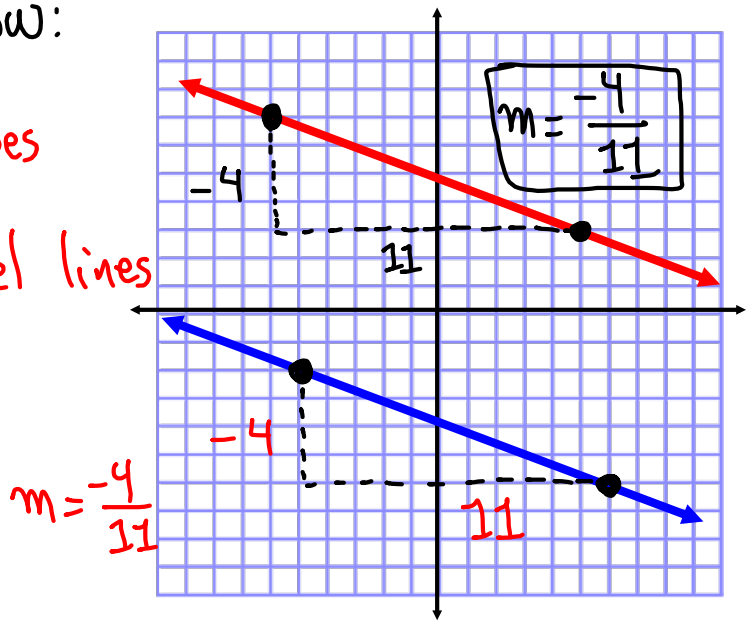
$$m = \frac{0-4}{3-0}$$

$$\boxed{m = -\frac{4}{3}}$$

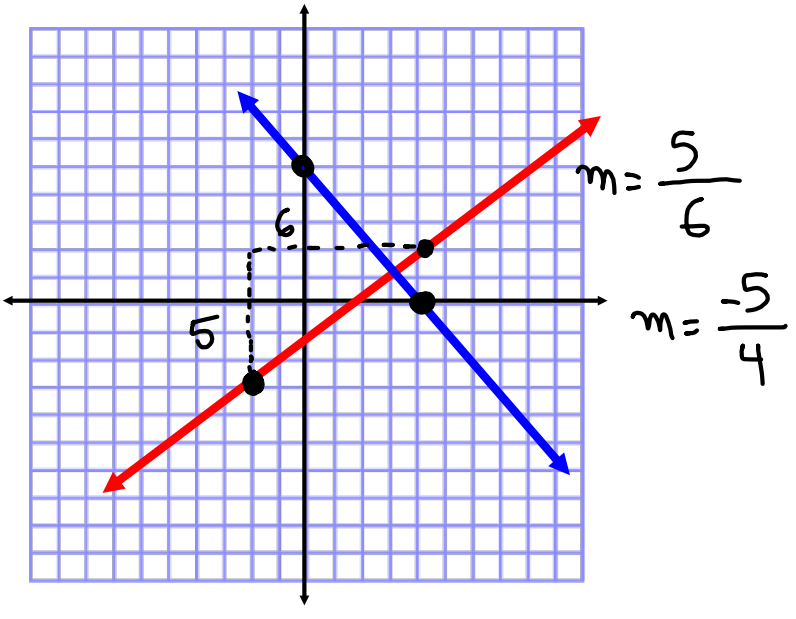
Find slope for both lines given below:

Equal Slopes

$\Rightarrow$ Parallel lines

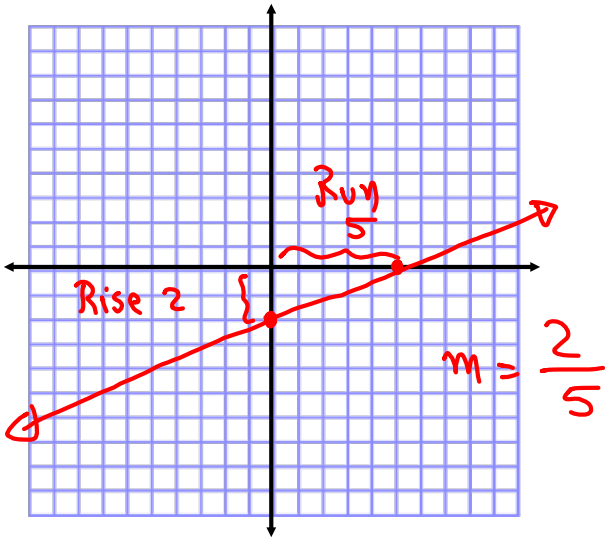


Repeat last example for



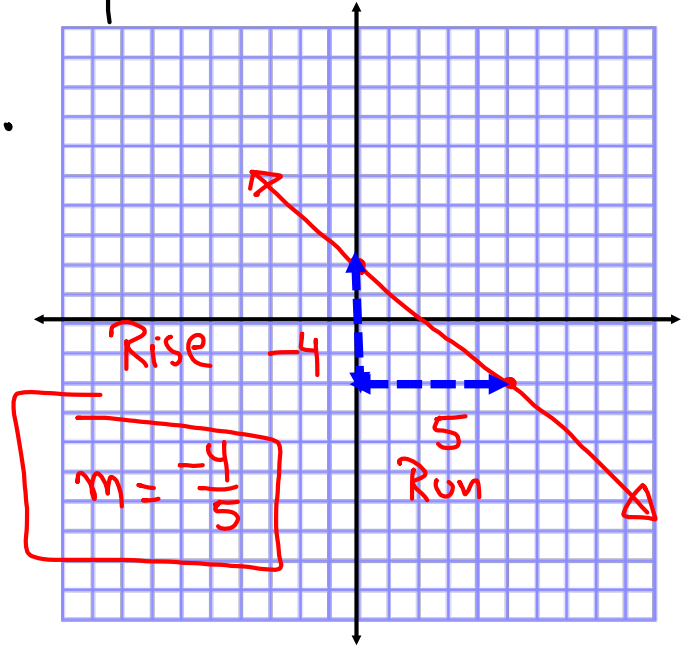
Graph $2x - 5y = 10$, Show rise & Run of the slope.

x	y
0	-2
5	0



Repeat last example for $y = \frac{-4}{5}x + 2$.

x	y
0	2
5	-2



Slope - Int Form

$y = mx + b$

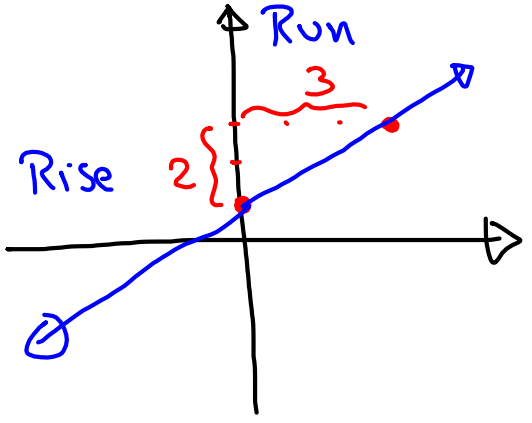
Slope = m

Y-Int (0,b)

$y = \frac{2}{3}x + 1$

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

Y-Int (0,1)

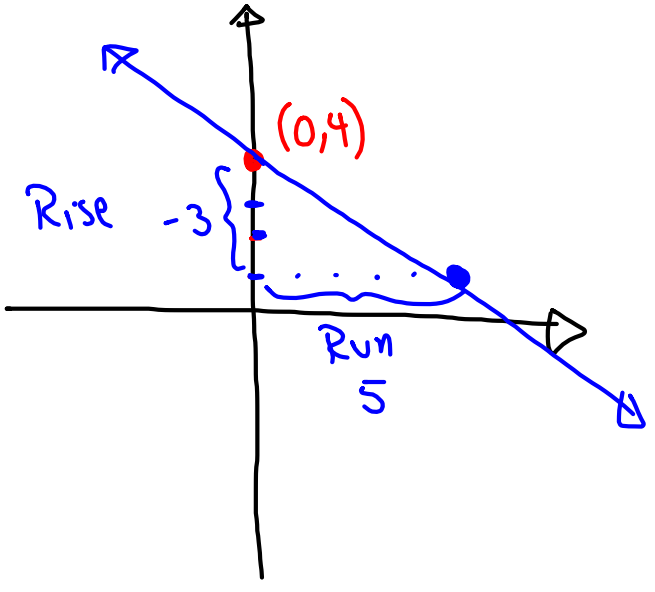


Graph

$y = \frac{-3}{5}x + 4$

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

Y-Int: (0,4)

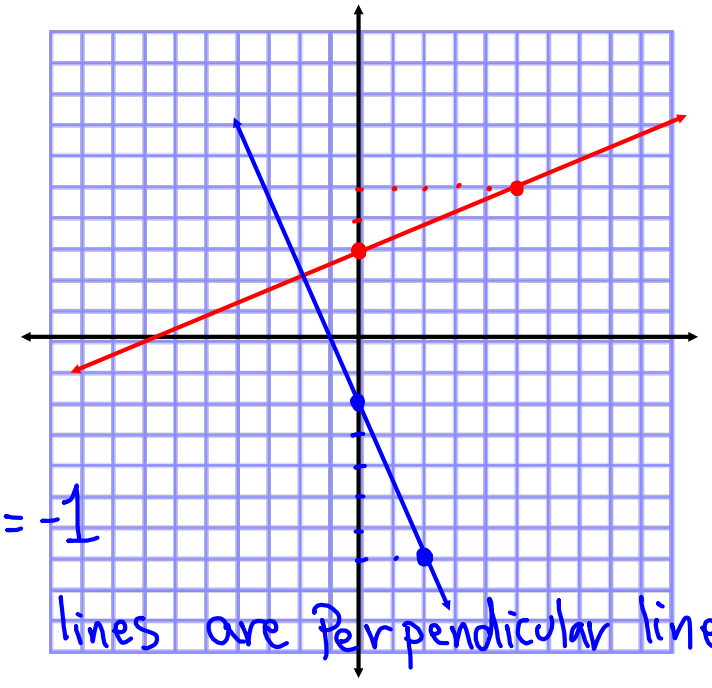


Graph

$y = \frac{2}{5}x + 3$

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

$\frac{2}{5} \cdot -\frac{5}{2} = -1$



lines are perpendicular lines.

Horizontal line ⟷ $m = 0$

Vertical line ⟷ m is undefined
or
No slope

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

ex: $x = 5$ → Vertical line

→ no slope or undefined slope

ex: $y = -3$ → Horizontal line

→ Zero slope → $m = 0$

ex: $2x + 5y = -15$ → Slant line

Write in Slope-Int Form first

$y = mx + b$

$5y = -2x - 15$

$\frac{5}{5}y = \frac{-2}{5}x - \frac{15}{5}$ ⇒ $y = \frac{-2}{5}x - 3$

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

Write in Slope-Int Form $y = mx + b$

1) $3x - 4y = 8$

$-4y = -3x + 8$

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

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

$m = \frac{3}{4}$, Y-Int $(0, -2)$

2) $\frac{2}{3}x + \frac{1}{2}y = 1$

LCD = 6

$6 \cdot \frac{2}{3}x + 6 \cdot \frac{1}{2}y = 6 \cdot 1$

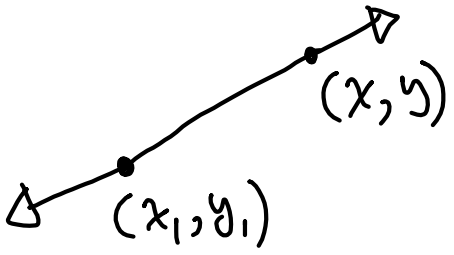
$4x + 3y = 6$

$3y = -4x + 6$

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

$m = \frac{-4}{3}$, Y-Int $(0, 2)$

How to find equation of a Slant line



$$m = \frac{y - y_1}{x - x_1}$$

Cross-Multiply

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

Point-Slope form

Find eqn of a line that contains (2,5) with slope 3.

$(2,5) = (x_1, y_1)$

$m = 3$

$\Rightarrow$ use Point-Slope formula

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

$$y - 5 = 3(x - 2)$$

$$y - 5 = 3x - 6$$

$$y = 3x - 6 + 5$$

$$\boxed{y = 3x - 1}$$

$m = 3$

Y-Int $(0, -1)$

Use last example to find equation of a line that contains $(-3, 4)$ with slope $\frac{2}{3}$.

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

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

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

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

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

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

$\boxed{y = \frac{2}{3}x + 6}$

$m = \frac{2}{3}$, Y-Int $(0, 6)$

See last example to find equation of a line that contains the origin with slope $\frac{-2}{5}$.

$(0, 0)$

$x_1 = 0$

$y_1 = 0$

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

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

$y - 0 = \frac{-2}{5}(x - 0)$

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

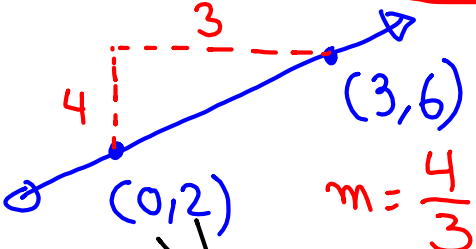
$m = \frac{-2}{5}$

Y-Int $(0, 0)$

Find eqn of a line that contains $(0,2)$ & $(3,6)$.

$m = \frac{2-6}{0-3}$

$= \frac{-4}{-3} = \frac{4}{3}$



$m = \frac{4}{3}$

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

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

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

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

$m = \frac{4}{3}$

Y-Int $(0,2)$

See last example to find eqn of a line that contains $(-5,2)$ and $(0,-2)$.

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

$m = \frac{2-(-2)}{-5-0}$

$y - (-2) = \frac{-4}{5}(x - 0)$

$m = \frac{4}{-5}$ $\quad m = \frac{-4}{5}$

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

$m = -4/5$, Y-Int $(0,-2)$

Consecutive even integers

$2, 4, 6, \ldots$

$46, 48, 50, \ldots$

$88, 90, 92, \ldots$

$-24, -22, -20, \ldots$

$x, x+2, x+4, x+6, \ldots$

24 & 26

Find two cons. even integers such that their sum is 50.

$x + x+2 = 50$

$2x+2 = 50$

$2x = 48$

$x = 24$

Find two consecutive even integers such that the difference of 5 times the smaller one and 3 times the larger one is 30.

Small → x

large → $x+2$

$5 \cdot \text{Smaller} - 3 \cdot \text{larger} = 30$

$5x - 3(x+2) = 30$

$5x - 3x - 6 = 30$

$2x - 6 = 30$

$2x = 36$

$x = 18$

18 & 20

Find two consecutive even integers such that 7 times the larger one is equal to 150 more than 3 times the smaller one.

Small → x

Large → $x+2$

$7 \cdot \text{large} = 3 \cdot \text{Small} + 150$

$7(x+2) = 3x + 150$

$7x + 14 = 3x + 150$

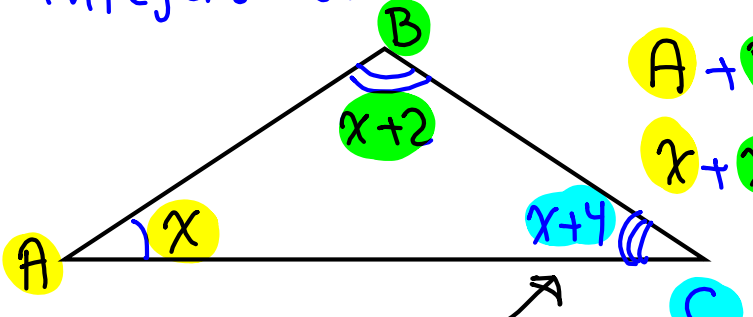
$7x - 3x = 150 - 14$

$4x = 136$

$x = 34$

34 & 36

Three angles in triangle ABC are measured and are consecutive even integers. Find the largest one.



$A + B + C = 180^\circ$

$x + x+2 + x+4 = 180$

$3x + 6 = 180$

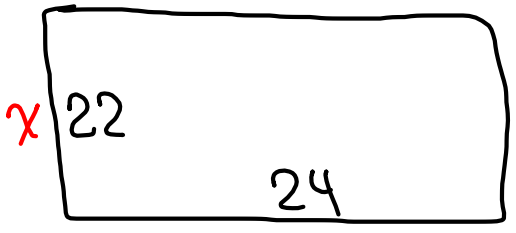
$3x = 174$

$x = 58$

Largest one

$58 + 4 = 62^\circ$

Perimeter of a rectangle is 92 m. length & width are two cons. even integers. find its area.



$P = 92$

$2L + 2W = 92$

$2(x+2) + 2x = 92$

$\vdots$

$x = 22$

$A = LW = 22 \cdot 24 = 528\ m^2$

Consecutive odd integers:

1, 3, 5, ...

27, 29, 31, ...

−15, −13, −11, ...

95, 97, 99, ...

x , $x+2$, $x+4$

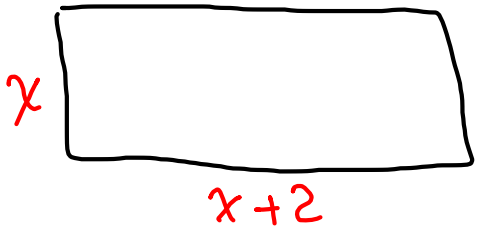
Cons. even / odd

$x, x+2, x+4, x+6, \ldots$

when x is even $\rightarrow$ even, even, ...

x is odd $\rightarrow$ odd, odd, ...

A rectangular garden has a perimeter of 80 ft. Length & width are two cons. odd integers. find its dimensions.



$P = 80$

$2L + 2W = 80$

$2(x+2) + 2x = 80$

$2x + 4 + 2x = 80$

$4x = 76 \rightarrow x = 19$

19 ft by 21 ft

SG 4 & SG 5, WP 5
Due Wednesday.