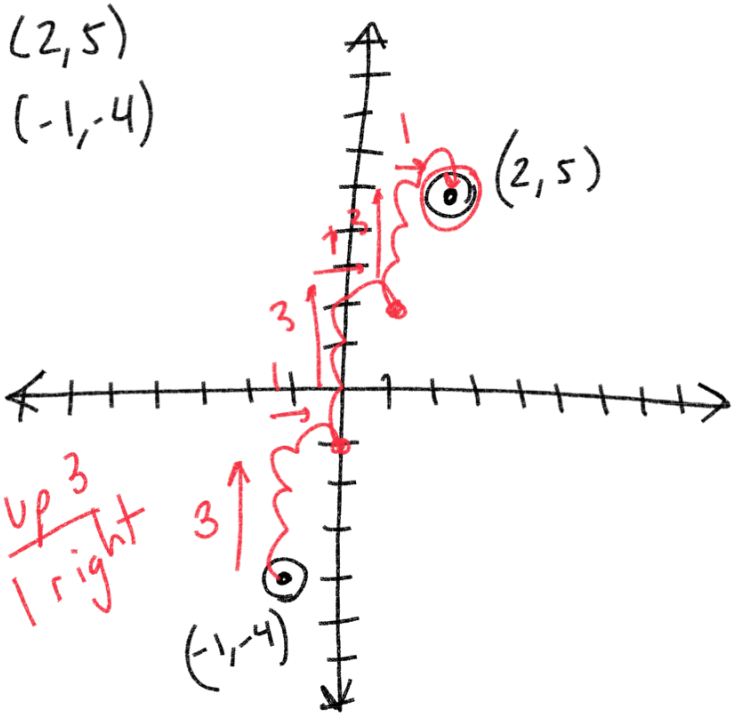
S-G Geometry Session 11 7/13

Find the slope.

$(2,5)$ and $(-1,-4)$ — x_1, y_1 and x_2, y_2

$$\text{slope} = m = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}} = \frac{\text{up/down}}{\text{over/right}} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-5}{-1-2} = \frac{-9}{-3} = 3 \qquad \frac{\text{up } 3}{\text{right } 1}$$



2.) Write in linear form

slope $= \frac{2}{3}$ y-intercept : -5

$m = \frac{2}{3}$ $b = -5$

Slope-Intercept form

$y = mx + b$

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

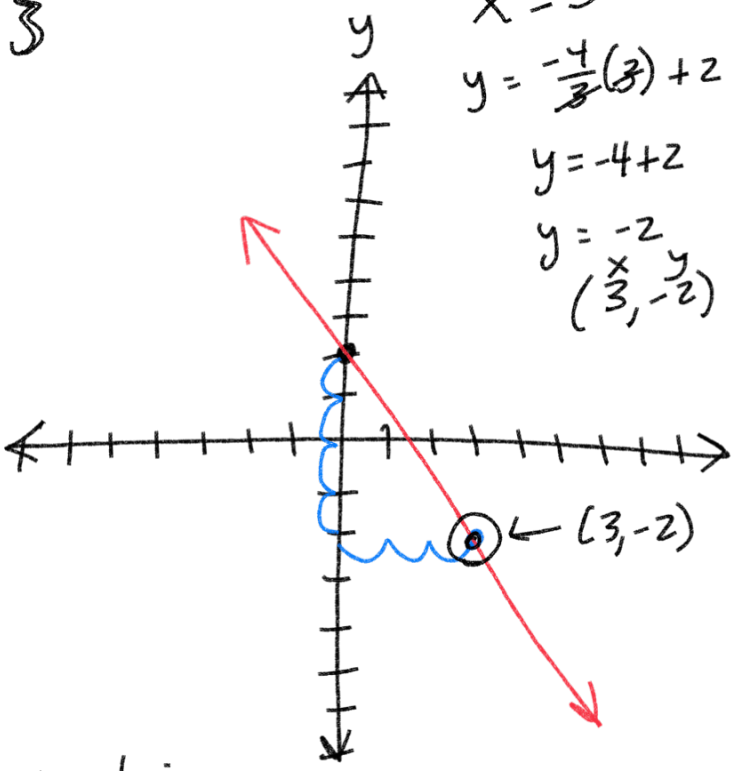
Graph $y = \frac{-4}{3}x + 2$

slope: $-\frac{4}{3}$ y-int: 2

1.) Plot y-int

2.) Use slope

$m: \frac{-4}{3} = \frac{\text{down } 4}{3 \text{ right}}$



$x = 3$

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

$y = -4 + 2$

$y = -2$

$(\overset{x}{3}, \overset{y}{-2})$

Find the equation for the line

slope: $m = \frac{2}{3}$ through $(\overset{x}{-3}, \overset{y}{9})$

Point-slope form

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

Slope-Intercept form

$y = mx + b$

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

$x = -3$

$y = 9$

$9 = \left(\frac{2}{3}\right)(-3) + b$

$9 = -2 + b$

$+2 \quad +2$

$11 = b$

$y = mx + b$

$y = \frac{2}{3}x + 11$

Find the linear equation with the points:

$(1, 8)$ (x_1, y_1) and $(3, -2)$ (x_2, y_2)

1.) Find the slope

$$\frac{y_1 - y_2}{x_1 - x_2} \text{ or } \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 8}{3 - 1} = \frac{-10}{2} = -5$$

$m = -5$

2.) Find y-intercept

$y = mx + b$

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

$8 = -5 + b$

$+5 \quad +5$

$13 = b$

$m = -5$

$x = 1 \quad y = 8$

$y = mx + b$

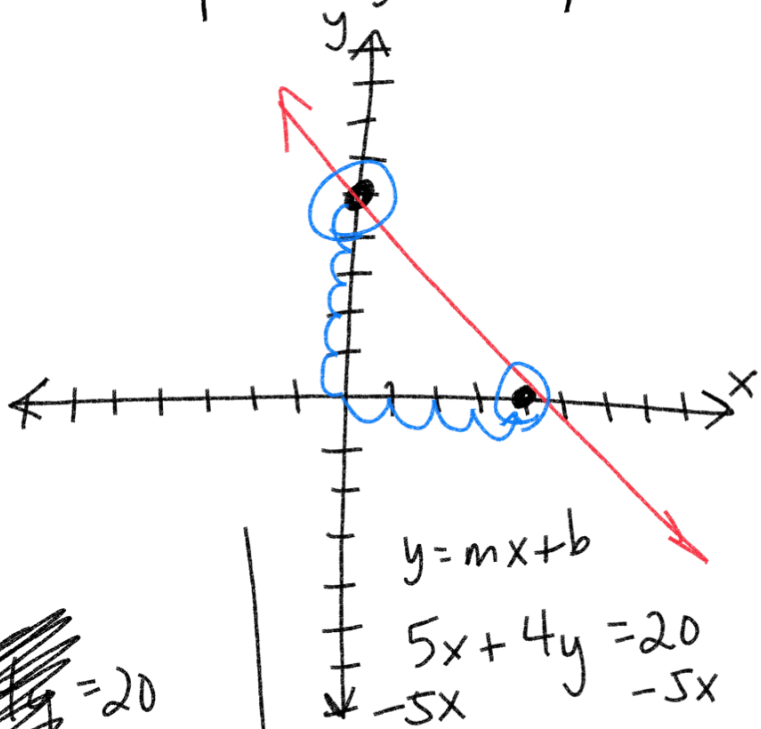
$y = -5x + 13$

Standard form

$Ax + By = C$

$5x + 4y = 20$

Graph using intercepts



kill x

$x = 0 \quad (0, 5)$

$5x + 4y = 20$

$5(0) + 4y = 20$

$y = 5$

kill y

$y = 0$

$5x + 4y = 20$

$\frac{5x}{5} = \frac{20}{5} \quad (4, 0)$

$x = 4$

$y = mx + b$

$5x + 4y = 20$

$-5x \quad -5x$

$\frac{4y}{4} = \frac{-5x}{4} + \frac{20}{4}$

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

slope: $-\frac{5}{4}$ y-int: 5

Graph $2x + 6y = 12$

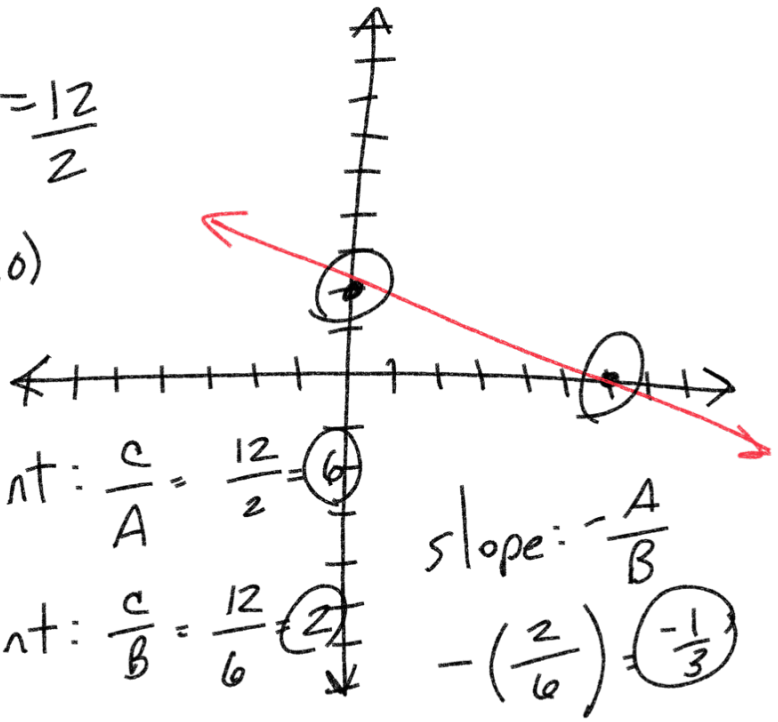
$\frac{2x}{2} + \frac{6y}{6} = \frac{12}{2}$

$x = 0$

$y = 2 \quad (0, 2)$

$y = 0$

$x = 6 \quad (6, 0)$



Standard Form

$Ax + By = C$

$2x + 6y = 12$

$A = 2 \quad B = 6 \quad C = 12$

x int: $\frac{C}{A} = \frac{12}{2} = 6$

y int: $\frac{C}{B} = \frac{12}{6} = 2$

slope: $-\frac{A}{B}$

$-\left(\frac{2}{6}\right) = -\frac{1}{3}$

Parallel lines

Never touch

slopes are equal

Find given slope

$y = 3x + 2$ slope $= 3$

$y = mx + b$

$y = 3x - 4$

slope y-int

$y = 3x + 2$

$y = 3x - 4$

Find the equation for a line parallel to $y = 3x + 2$ that goes through $(4, 8)$

$m = 3$ $x = 4$ $y = 8$

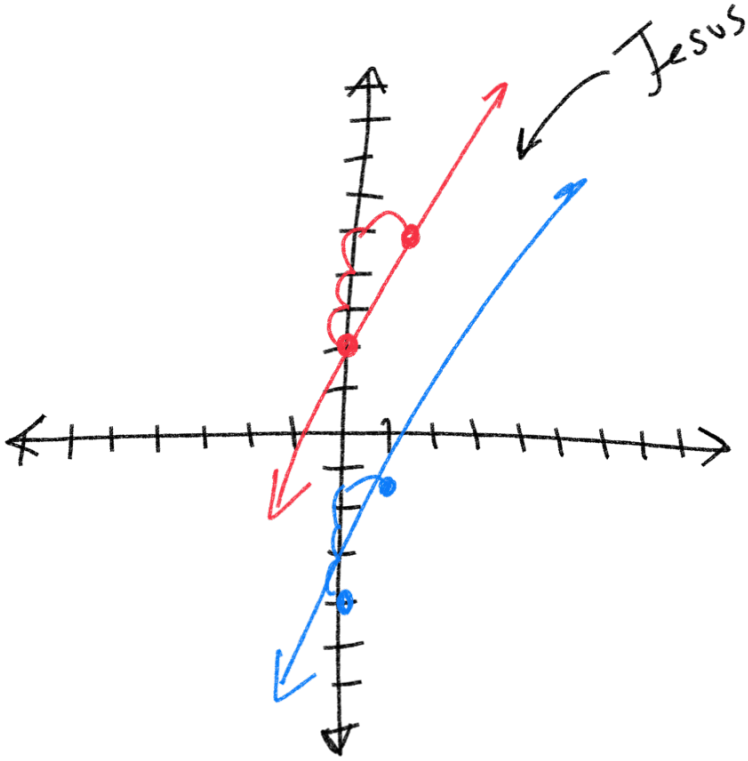
$y = mx + b$

$8 = (3)(4) + b$

$8 = 12 + b$

$-12 \quad -12$

$-4 = b$



Perpendicular Lines

Intersects at 90° angles

Have slopes that are opposite inverses

Given $y = 2x - 3$

Given slope: 2

$2 \xrightarrow{\text{opposite}} -2 \longrightarrow \text{inverse } -\frac{1}{2}$

switch sign flip

Find the equation for a line perpendicular to $y = -\frac{3}{4}x + 8$ that goes through $(-3, 2)$

Given slope: $-\frac{3}{4}$

Needed slope = $-\frac{3}{4} \rightarrow \frac{3}{4} \xrightarrow{\text{opposite}} \frac{4}{3}$ (inverse)

$m = \frac{4}{3}$ point $(-3, 2)$

$x = -3 \quad y = 2$

$y = mx + b$

$2 = \left(\frac{4}{3}\right)(-3) + b$

$2 = -4 + b$

$+4 \quad +4$

$b = 6$

$y = mx + b$

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