M-G Geometry Week 15 1/12

1.) Find the line that goes through the points: $(2,3)$ and $(4,9)$

↓ equation

$y = mx + b$

$$\text{slope} = m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9-3}{4-2} = \frac{6}{2} = 3$$

Now, plug into $y = mx + b$

$m = 3$ choose point: $(2,3)$ (y)

$$y = mx + b$$
$$3 = (3)(2) + b$$
$$3 = 6 + b$$
$$-6 \quad -6$$
$$-3 = b$$

$$y = mx + b$$
$$\boxed{y = 3x - 3}$$

2.) Find the equation for the line through: $(8,-2)$ and $(4,10)$

Step 1: Find slope

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

Step 2: Plug into $y = mx + b$

Choose point: $(4,10)$

Every equation → $y = mx + b$

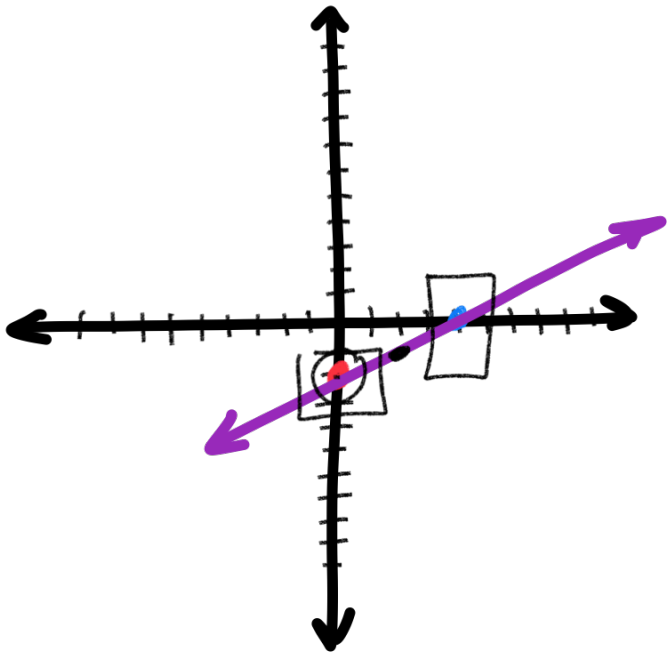
$$\boxed{y = -3x + 22}$$

$$y = mx + b$$
$$10 = (-3)(4) + b$$
$$10 = -12 + b$$
$$+12 \quad +12$$
$$\boxed{22 = b}$$

Graph. Standard Form

$Ax + By = C$

$3x - 6y = 12$



2 options

1st: Rearrange into $y = mx + b$

$3x - 6y = 12$

$-3x \qquad -3x$

$\frac{-6y}{-6} = \frac{-3x}{-6} + \frac{12}{-6}$

$y = \frac{1}{2}x - 2$ [Graph]

2nd: Death (Intercepts)

$3x - 6y = 12$

$x = 0$: $3(0) - 6y = 12$

$\frac{-6y}{-6} = \frac{12}{-6}$

$y = -2$

$(0, -2)$ y-int

$\frac{3x}{3} - \frac{6y}{3} = \frac{12}{3}$

$y = 0$: $x - 6(0) = 4$

$x = 4$

$(4, 0)$ x-int

Short cut

x-int: $\frac{C}{A} = \frac{12}{3} = 4$

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

slope $= -\frac{A}{B} = -\frac{3}{-6} = \frac{1}{2}$

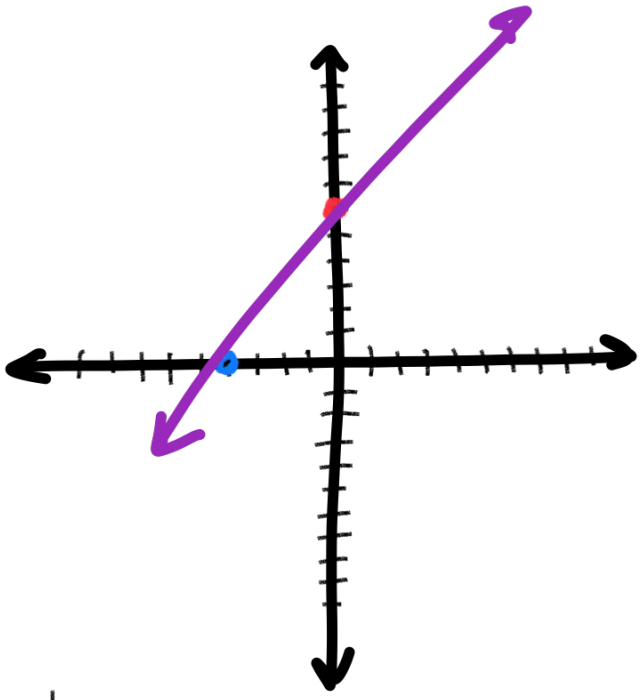
Graph. $-6x + 4y = 24$

$\frac{-6x}{4} + \frac{4y}{4} = \frac{24}{4}$

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

$\frac{-6x}{-6} + \frac{4y}{-6} = \frac{24}{-6}$

$y = 0$ $\quad x = -4$ $\quad (-4, 0)$



Parallel lines → Have the same slope

Never touching

slope-intercept

$y = mx + b$

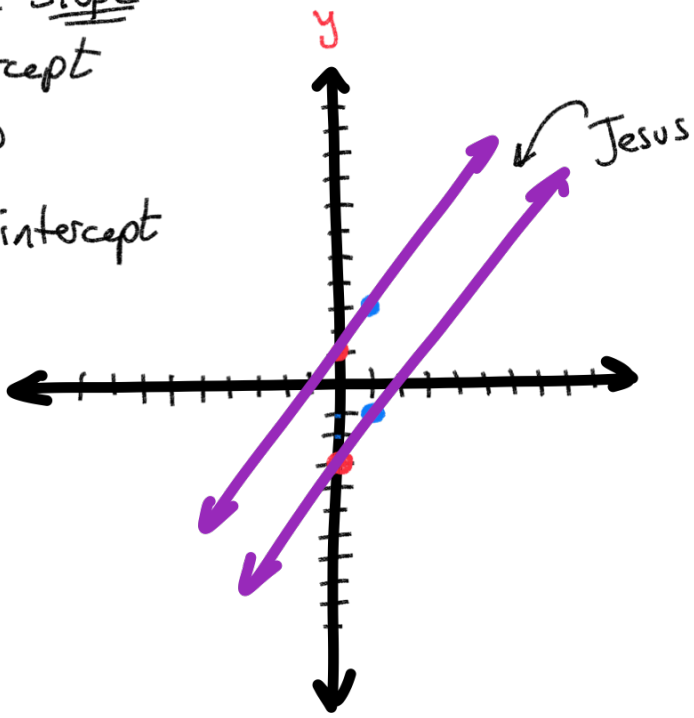
slope $\quad$ y-intercept

$y = 2x - 3$

1.) Graph y-int

2.) Use slope

$\frac{2}{1} \rightarrow \frac{\text{rise}}{\text{run}} \rightarrow \frac{2 \text{ up}}{1 \text{ right}}$



$y = 2x + 1$

1.) Graph y-int $\quad$ 2.) Use slope 2 → $\frac{2 \text{ up}}{1 \text{ right}}$

Find a line parallel to the line $[y = \frac{1}{4}x - 2]$ that goes through (4, 8)

$y = mx + b$

Given slope : $\frac{1}{4}$

Find slope → $\frac{1}{4}$

Parallel slope: $\frac{1}{4}$ (same)

x, y

pt: (4, 8) $m = \frac{1}{4}$

$y = mx + b$

$8 = (\frac{1}{4})(4) + b$

$8 = \frac{4}{4} + b$

$8 = 1 + b$

$-1 \quad -1$

$7 = b$

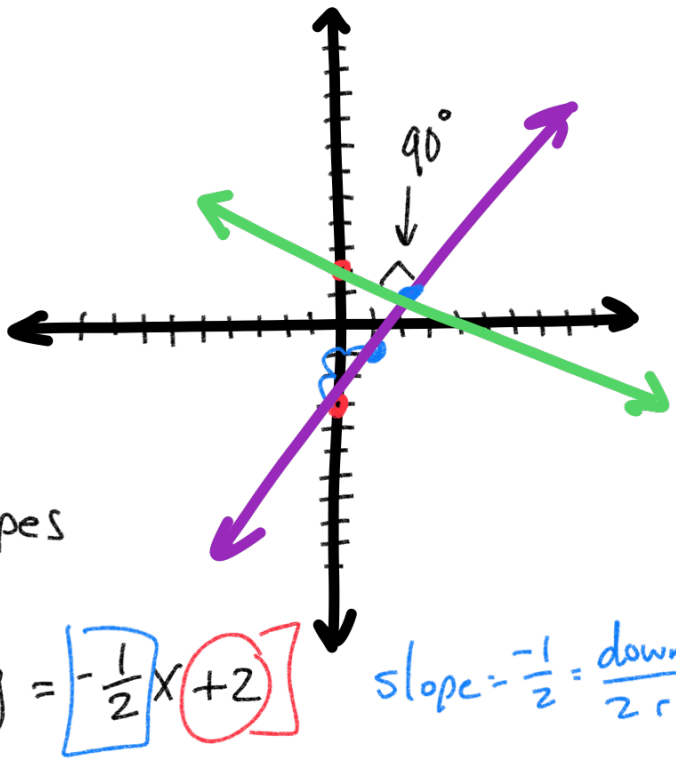
$y = mx + b$

$\boxed{y = \frac{1}{4}x + 7}$

Perpendicular lines intersect at 90°

$y = \boxed{2}x \boxed{-3}$

slope $-\frac{2}{1} = \frac{\text{up } 2}{1 \text{ right}}$



Perpendicular line have opposite [change sign] inverse [flip] slopes

Given slope : $2 \rightarrow \frac{-2}{1} \rightarrow \boxed{-\frac{1}{2}}$

$[y = \boxed{-\frac{1}{2}}x \boxed{+2}]$

slope $-\frac{-1}{2} = \frac{\text{down } 1}{2 \text{ right}}$

Find the equation for a line perpendicular to $y = 3x - 2$ that goes through $(6, -9)$

Given slope: 3

Perpendicular slopes: $3 \rightarrow \frac{-3}{1} \rightarrow -\frac{1}{3} = m$ (opposite, inverse (flip))

$y = mx + b$

$-9 = \left(-\frac{1}{3}\right)(6) + b$

$-9 = -\frac{6}{3} + b$

$-9 = -2 + b$

$+2 \quad +2$

$-7 = b$

stays

$y = mx + b$

$y = -\frac{1}{3}x - 7$

$y = mx + b$

slope y-int

Find the perpendicular line

to $3x - 4y = 12$

that goes through $(3, 2)$

$y = mx + b$

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

$3x - 4y = 12$

$-3x \quad -3x$

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

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

perpendicular slope: opp inv

$\frac{3}{4} \rightarrow -\frac{3}{4} \rightarrow \boxed{-\frac{4}{3}}$

$y = mx + b$

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

$2 = -4 + b$

$+4 \quad +4$

$6 = b$

$y = mx + b$

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