Unit 3 – Graphic Organizer - FRONT

Writing the Equation of the Line – Given the slope and a point.

EXAMPLE: The line has a slope of $-\frac{1}{2}$ and passes through the point (2, 7).

$y = mx + b$
$7 = (-\frac{1}{2})(2) + b$
$7 = -1 + b$
$8 = b$

Slope Intercept Form: $y = -\frac{1}{2}x + 8$

$y = -\frac{1}{2}x + 8$
$\frac{1}{2}x + y = 8$
$x + 2y = 16$

Standard Form: $x + 2y = 16$

YOUR TURN: The line has a slope of 3 and passes through the point (-2, -5).

$y = mx + b$
$-5 = 3(-2) + b$
$-5 = -6 + b$
$1 = b$

Slope Intercept Form: $y = 3x + 1$

Standard Form: $-3x + y = 1$

Writing the Equation of the Line – Given two points.

EXAMPLE: The line passes through the points (2, 5) and (3, 0).

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 5}{3 - 2} = \frac{-5}{1}$$

$y = -5x + b$
$5 = -5(2) + b$
$5 = -10 + b$
$15 = b$

Slope Intercept Form: $y = -5x + 15$

Standard Form: $5x + y = 15$

YOUR TURN: The line passes through the points (2, 7) and (-1, -2)

$m = \frac{-2-7}{-1-2} = \frac{-9}{-3} = 3$

$y = 3x + b$
$7 = 3(2) + b$
$7 = 6 + b \rightarrow b = 1$

Slope Intercept Form: $y = 3x + 1$

Standard Form: $-3x + y = 1$

Writing the Equation of the Line – Given a **parallel** line and a point.

EXAMPLE: The line is parallel to the line $y = -\frac{1}{4}x + 2000$ and passes through the point (8, 3).

Parallel Lines Have Equal Slopes!

$y = -\frac{1}{4}x + b$
$3 = -\frac{1}{4}(8) + b$
$3 = -2 + b$
$5 = b$

Slope Intercept Form: $y = -\frac{1}{4}x + 5$

$y = -\frac{1}{4}x + 5$
$\frac{1}{4}x + y = 5$
$x + 4y = 20$

Standard Form: $x + 4y = 20$

YOUR TURN: The line is parallel to $y = -2x + 10000$ and passes through the point (5, -3).

$m = -2$

$y = -2x + b$
$(-3) = -2(5) + b$
$-3 = -10 + b$
$7 = b$

Slope Intercept Form: $y = -2x + 7$

Standard Form: $2x + y = 7$

Writing the Equation of the Line – Given a **perpendicular** line and a point.

EXAMPLE: The line is perpendicular to $y = 2x + 10$ and passes through the point (6, -4).

Perpendicular lines have opposite reciprocal slopes! Old Slope = 2; New Slope = $-\frac{1}{2}$.

$y = -\frac{1}{2}x + b$
$-4 = -\frac{1}{2}(6) + b$
$-4 = -3 + b$
$-1 = b$

Slope Intercept Form: $y = -\frac{1}{2}x - 1$

Standard Form: $x + 2y = -2$

YOUR TURN: The line is perpendicular to $y = -3x + 900$ and passes through the point (-6, 1).

Old slope: -3 New slope: $\frac{1}{3}$

$-6 = \frac{1}{3}(1) + b$
$-6 = \frac{1}{3} + b \rightarrow -\frac{19}{3} = b$

Slope Intercept Form: $y = \frac{1}{3}x - \frac{19}{3}$

Standard Form: $-x + 3y = -19$

Unit 3 – Graphic Organizer - BACK

Writing the Equation of the Line – When the slope is ZERO.

EXAMPLE: The line has a slope of zero and passes through the point (3, 4).

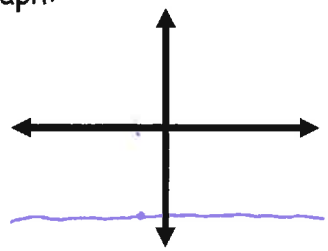
Because the slope is zero, it is a special case. This is a y = # line and will be horizontal. The equation will be y = 4. The 4 came from the y-value of the point that was given.

Equation of the Line: y = 4

YOUR TURN: The line has a slope of zero and passes through the point (-1, -5).

Equation of the Line: y = -5

Graph:



Writing the Equation of the Line – When the slope is UNDEFINED.

EXAMPLE: The line passes through the point (2, 5) and (2, -1).

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1-5}{2-2} = \frac{-6}{0}$ = UNDEFINED!

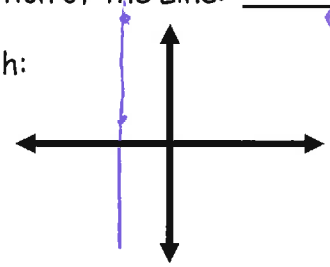
This line has an undefined slope, so it is a special case. It is an x = # line and will be vertical. The equation will be x = 2. The 2 came from the x-value of the points that were given.

Equation of the Line: x = 2

YOUR TURN: The line passes through the points (-3, 1) and (-3, 9).

Equation of the Line: x = -3

Graph:



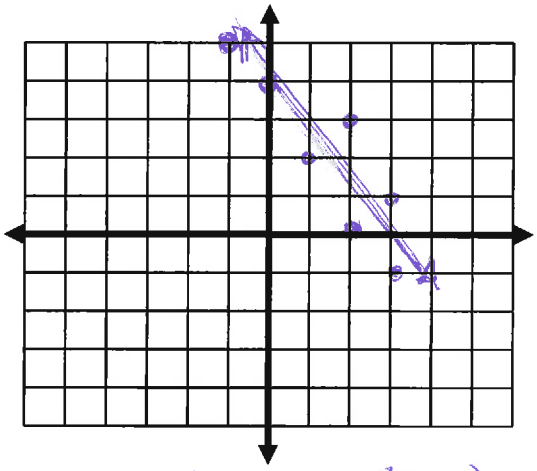
Finding a Line of Best Fit

- Step 1 – Plot the points to create a scatterplot.
- Step 2 – Use a rule to sketch a line of best fit.
- Step 3 – Select two points (not necessarily ones you plotted) **that are on the line**.
- Step 4 – Use those two points to calculate the slope.
- Step 5 – Use the slope and one of the points to calculate the y-intercept.
- Step 6 – Write the equation of the line in slope-intercept form.
- Step 7 – DOES IT MAKE SENSE? Check to see if the slope should be positive or negative…is it correct? Estimate the y-intercept by looking at your graph…is it close to what you calculated?

Try the example on the right on your own. See if it is close to my answer (remember – answers will vary!).

One Possible Answer: $y = -\frac{4}{3}x + 4$

x	y
-1	5
0	4
2	3
1	2
3	1
2	0
3	-1



Two Points: (0, 4) & (3, 0)

$\frac{0-4}{3-0} = \frac{-4}{3}$ ↑ y-intercept

Slope-Intercept Form: $y = -\frac{4}{3}x + 4$