Graphing and Writing Linear Equations Notes

3 Methods for Graphing:

1) Use a t-table
2) Use slope-intercept form
3) Use x and y intercepts   **Determine which is easiest to use!

Graphing:

Standard Form: (Ax + By = C) Graph using intercepts

Slope Intercept Form: (y = mx+b), graph using slope and intercept or a t-table

Neither: rewrite to the form of your choice and graph
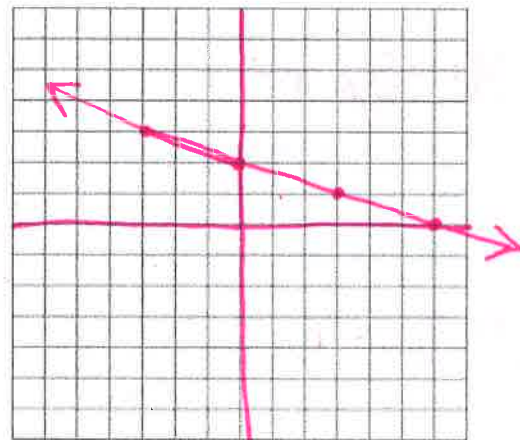
Graphing with slope-intercept:

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

Start by graphing the y-intercept

From the y-intercept, apply "rise over run" using your slope

Repeat from the new point.

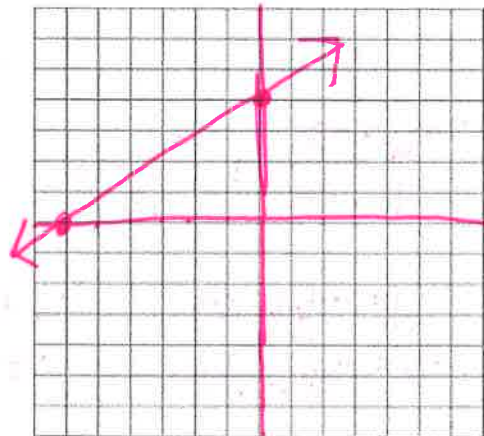$$m = -\frac{1}{3}$$
$$b = 2$$

Graphing with Intercepts:

$$-2x + 3y = 12$$

Let y = 0 to find your x-intercept.

Let x = 0 to find your y-intercept.

Graph both points.

$$-2(0) + 3y = 12$$
$$3y = 12$$
$$y = 4$$

$$-2x + 3(0) = 12$$
$$-2x = 12$$
$$x = -6$$

Writing Linear Equations

Slope-intercept form: $y = mx + b$

m is the ___*slope*___

b is the ___*y-intercept*___

Examples:

Write the equation in slope intercept form given the slope and y-intercept.

1) m = -3, (0,-2)

$y = -3x - 2$

2) m = -2/5, (0,5)

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

Write the equation in slope intercept form of the line having the given slope and containing the given point.

1) m = 3/2 , (4, -1)

$y = \frac{3}{2}x - 7$

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

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

$-1 = 6 + b$

$-7 = b$

2) m = -3 , (-2, 4)

$y = -3x - 2$

$y = -3x + b$

$4 = -3(-2) + b$

$4 = 6 + b$

$-2 = b$

Find the equation given two points:

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

1) Given (-5,-3) and (10, -6)

$\frac{-6 - -3}{10 - -5} = \frac{-3}{15} = -\frac{1}{5} = m$

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

$-6 = -\frac{1}{5}(10) + b$

$-6 = -2 + b$

$-4 = b$

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

2) Given (-1,3) and (2,1)

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

$1 = -\frac{2}{3}(2) + b$

$1 = -\frac{4}{3} + b$

$\frac{7}{3} = b$

$\boxed{y = -\frac{2}{3}x + \frac{7}{3}}$

Parallel and Perpendicular Lines:

Parallel Lines have the ___same___ slopes.

Perpendicular lines have ___opposite reciprocal___ slopes.

Tell whether the graph of each pair of equations are parallel, perpendicular, or neither.

$Y = 2x - 4$ $y = 2x - 3$ same slope

$2x - y = 3$

$-y = -2x + 3$

$y = 2x - 3$

parallel

$y = \frac{1}{2}x + 9$ $y = -2x + 4$ opp. recip.

$4x + 2y = 8$

$2y = -4x + 8$

$y = -2x + 4$

perpendicular

Find the equation given the following information:

$(2,4)$ m = undefined

Undefined slope = vertical line
x value stays the same

$$X = 2$$

Passing through $(5, 4)$ and $(5,9)$

$$\frac{9-4}{5-5} = \frac{5}{0} = m$$

undefined slope

$$X = 5$$

$(2,4)$ m = 0

zero slope = horizontal line
y value stays the same

$$y = 4$$

$y = 0x + b$

$y = 0(2) + 4 \rightarrow y = 4$

Passing through $(3,4)$ and $(5,4)$

$$\frac{4-4}{5-3} = \frac{0}{2} = 0 = m$$

$$y = 4$$

Find the equation of a line passing through $(2,1)$ that is parallel to $y = -1x + 7$
↳ same slope

$1 = -1(2) + b$

$1 = -2 + b$

$3 = b$

$$y = -1x + 3$$

Find the equation of a line passing through $(3,-2)$ that is perpendicular to $y = x - 2$

$m = 1$ perpendicular = -1

$-2 = -1(3) + b$

$-2 = -3 + b$

$1 = b$

$$y = -x + 1$$