5.4 Equations of Linear Relations

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5.4 Equations of Linear Relations

Name:_____ Block_____

A) DETERMINE A LINEAR EQUATION FROM A GRAPH.

Reminder!

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

'm' = slope, $m = \frac{\text{rise}}{\text{run}}$

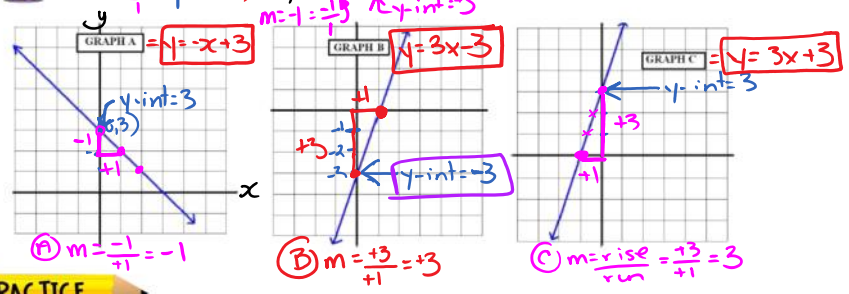
'b' = y-intercept ⊕ or ⊖

Investigation: Match the three equations with the graphs below using ~~a table of values~~ a graph *must be in $y = mx + b$ form

i) $y = 3x + 3$ Graph C, $m = \frac{3}{1}$, y-int

ii) $x + y = 3$ Graph A, $-x \quad -x$, $y = -x + 3$, $m = -1 = \frac{-1}{1}$, y-int = +3

iii) $y = 3x - 3$ Graph B, $m = 3 = \frac{3}{1}$, y-int = -3



A) $m = \frac{-1}{+1} = -1$

B) $m = \frac{+3}{+1} = +3$

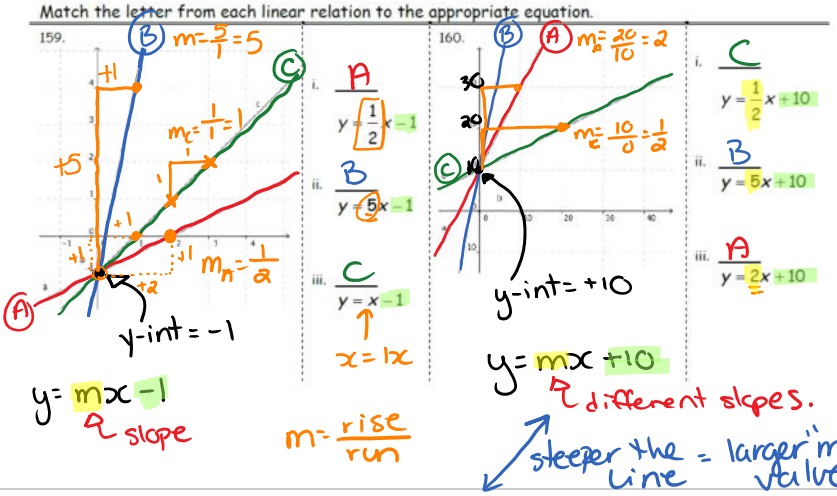
C) $m = \frac{\text{rise}}{\text{run}} = \frac{+3}{+1} = 3$

$3 = \frac{3}{1}$ ↕ -3

$\frac{1}{3} \neq 3$

PRACTICE

Match the letter from each linear relation to the appropriate equation.



159. $m = \frac{5}{1} = 5$; $m_C = \frac{1}{1} = 1$; $m_A = \frac{1}{2}$

i. A $y = \frac{1}{2}x - 1$

ii. B $y = 5x - 1$

iii. C $y = x - 1$, $x = 1x$

$y = mx - 1$ ↳ slope

$m = \frac{\text{rise}}{\text{run}}$

160. A) $m = \frac{20}{10} = 2$; $m = \frac{10}{0} = \frac{1}{0}$

i. C $y = \frac{1}{2}x + 10$

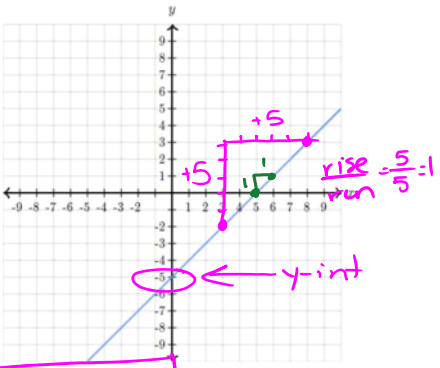
ii. B $y = 5x + 10$

iii. A $y = 2x + 10$

$y = mx + 10$ ↳ different slopes.

steeper the line = larger 'm' value

Example #1:
Using the graph on the right, answer the following questions:



1. What is the value of the **y intercept**?

-5

2. What is the **slope** *(rate of change)?*

= 1

3. What is the general equation of a line?

$y = mx + b$

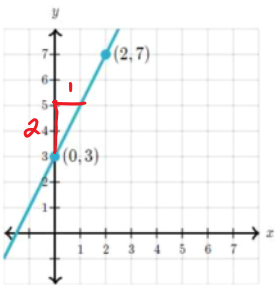
4. What is the equation of this line?

$y = 1x - 5$ = $y = x - 5$

slope y-int

PRACTICE

1.



What is the value of the **y intercept**?

=3

What is the **slope** *(rate of change)?*

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

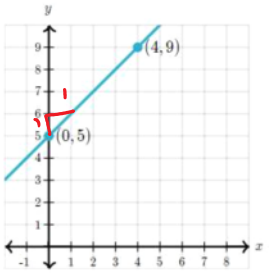
What is the general equation of a line?

$y = mx + b$

What is the equation of this line?

$y = 2x + 3$

2.



What is the value of the **y intercept**?

=5

What is the **slope** *(rate of change)?*

$m = \frac{1}{1} = 1$

What is the general equation of a line?

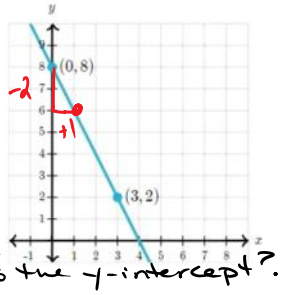
$y = mx + b$

What is the equation of this line?

$y = x + 5$

2

3.



What is the y-intercept?

= 8

What is the **slope** *(rate of change)?*

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

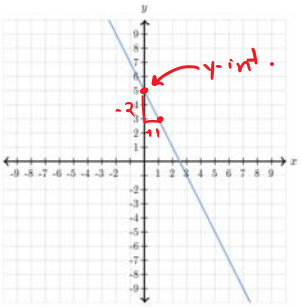
What is the general equation of a line?

$y = mx + b$

What is the equation of this line?

$y = -2x + 8$

4.



What is the value of the **y intercept**?

= 5

What is the **slope** *(rate of change)?*

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

What is the general equation of a line?

$y = mx + b$

What is the equation of this line?

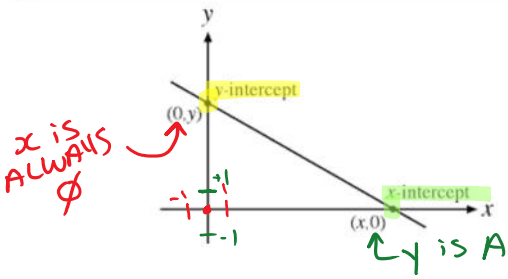
$y = -2x + 5$

B) FINDING THE X AND Y INTERCEPTS

We have looked at the terms ***x-intercept and y-intercept*** before. Now we will look at ways TO FIND the x and y intercepts using the equation for a linear relation.

Every *y*-intercept has an *x*-coordinate of ∅.

Every *x*-intercept has a *y*-coordinate of ∅.



x is ALWAYS ∅

y is ALWAYS ∅

3

NOT in slope-intercept form: $y = mx + b$

OH NO.

① re-arrange ② solve for x and y intercepts and connect.

Example #1:

Graph the line $2x + y = 8$. Plot the x-intercept and the y-intercept and connect the points

To find the y-intercept:

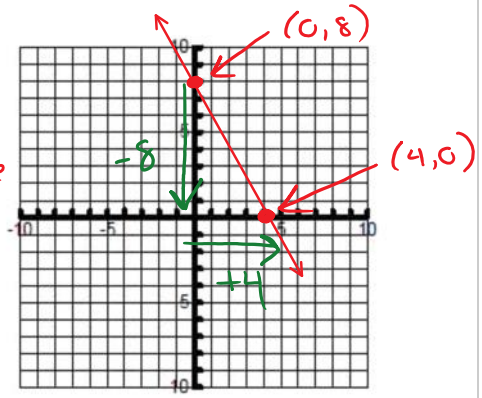
1) when a line crosses the y-axis, $x = 0$ *always*
2) substitute $x = 0$ into the equation for the line
3) solve for 'y' as the unknown variable.

$2x + y = 8$

$2(0) + y = 8$

$0 + y = 8$

coordinate (x, y) $(0, 8)$



To find the x-intercept:

1) when a line crosses the x-axis, $y = 0$ *always*
2) substitute $y = 0$ into the equation for the line
3) rearrange and solve for 'x' as the unknown variable.

$2x + y = 8$

$2x + (0) = 8$

$\frac{2x}{2} = \frac{8}{2}$

$x = 4$

coordinate (x, y) $(4, 0)$

$m = \frac{\text{rise}}{\text{run}} = \frac{-8}{+4} = -2$

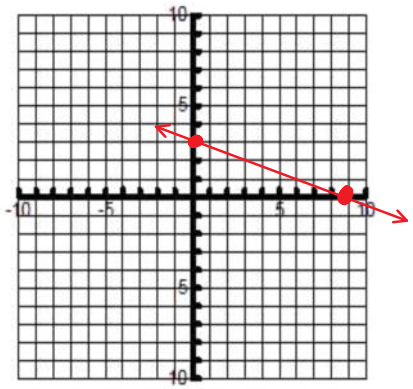
$y = mx + b$

$y = -2x + 8$

PRACTICE

1. Using the method above, graph the line

$2x = 18 - 6y$



x-intercept: when $y = 0$

$2x = 18 - 6(0)$

$\frac{2x}{2} = \frac{18 - 0}{2}$

$x = 9 \Rightarrow (9, 0)$

y-intercept: when $x = 0$

$2x = 18 - 6y$

$2(0) = 18 - 6y$

$0 = 18 - 6y$

$+6y \quad +6y$

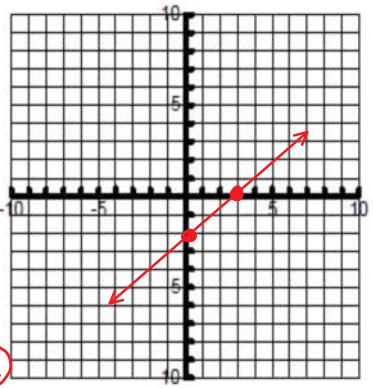
$\frac{6y}{6} = \frac{18}{6}$

$y = 3 \Rightarrow (0, 3)$

4

2. Using the method above, graph the line:

$2x - 3y = 6$



x-intercept: when $y = 0$

$2x - 3(0) = 6$

$2x - 0 = 6$

$\frac{2x}{2} = \frac{6}{2}$

$x = 3 \Rightarrow (3, 0)$

y-intercept: when $x = 0$

$2x - 3y = 6$

$2(0) - 3y = 6$

$0 - 3y = 6$

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

$y = -2$ $(0, -2)$

3. Consider the line defined by:

$4x + 2y = 6$

a) Determine the x-intercept and *write the coordinates* of this point.

$4x + 2(0) = 6$

$4x + 0 = 6$

$\frac{4x}{4} = \frac{6}{4}$

simplify

$x = \frac{6}{4} = \frac{3}{2}$, $\left(\frac{3}{2}, 0\right)$

b) Determine the y-intercept and *write the coordinates* of this point.

$4(0) + 2y = 6$

$0 + 2y = 6$

$\frac{2y}{2} = \frac{6}{2}$

$y = 3$, $(0, 3)$

Homework	Required	Extra Practice	Extension
Assignment #5.4 pg 194-199	2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 15	1, 10, 12, 14, 16	17, 18, 19, 20
Chapter Review (practice test) Pg 201 - 203	2, 3, 4, 6, 7, 8, 10a, 11,12	1, 5, 9, 10b, 13	