Algebra 1 Chapter 5 Notes

Name: _____

Chapter 5: Linear Functions

Date: _____ Period: _____

5.1 NOTES PART 1

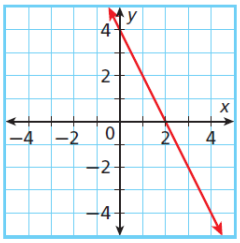
IDENTIFYING LINEAR FUNCTIONS

Example 1: Identifying a Linear Function by Its Graph

linear function: _____

Try it out! Identify whether each graph represents a function. Explain. If the graph does represent a function, is the function linear?

A



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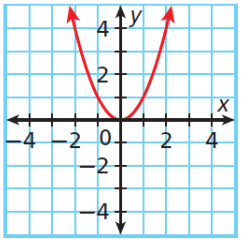

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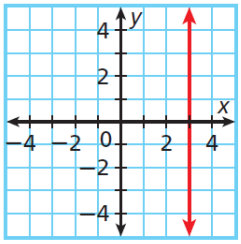


5.1 NOTES PART 2

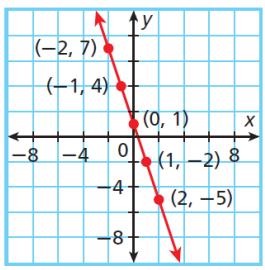
IDENTIFYING LINEAR FUNCTIONS

Example 2: Identifying a Linear Function by Using Ordered Pairs

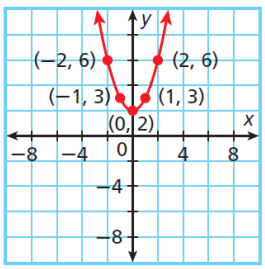
Try it out! Tell whether each set of ordered pairs satisfies a linear function. Explain.

A. {(-2,7), (-1,4), (0,1), (1, -2), (2,5)}

x	y



B. {(-2, 6), (-1, 3), (0, 2), (1, 3), (2, 6)}



x	y

5.1 NOTES PART 3

IDENTIFYING LINEAR FUNCTIONS

Example 3: Graphing Linear Functions

linear equation: ____

standard form of a linear equation: ____

1.)____

2.) ____

3.) ____

Linear		Not Linear	
$3x + 2y = 10$	*Standard form*	$3xy + x = 1$	*x and y are multiplied.*
$y - 2 = 3x$	*Can be written as* $3x - y = -2$	$x^3 + y = -1$	*x has an exponent other than 1.*
$-y = 5x$	*Can be written as* $5x + y = 0$	$x + \frac{6}{y} = 12$	*y is in a denominator.*

***In this section, you will be asked to tell whether each function is linear. If it is, you will need to graph the function. Graphing is the same process as what you learned last chapter. Get *y* by itself and then choose THREE values of *x* to generate ordered pairs. We will do examples of these in class.

5.2 NOTES PART 1

USING INTERCEPTS

Example 1: Finding Intercepts

y-intercept: ____

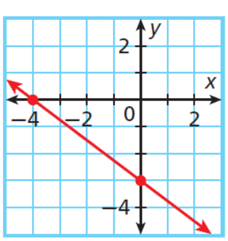
____

x-intercept: ____

____

Try it out! Find the *x* and *y* intercepts.

A.



B. $3x - 2y = 12$

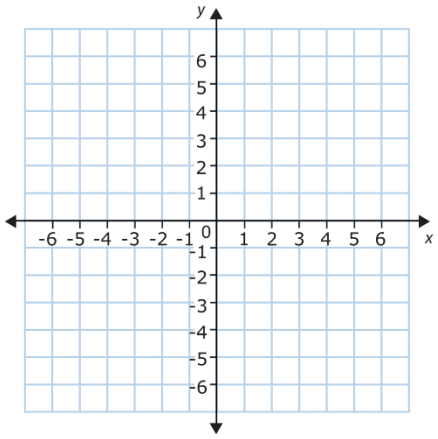
5.2 NOTES PART 2

USING INTERCEPTS

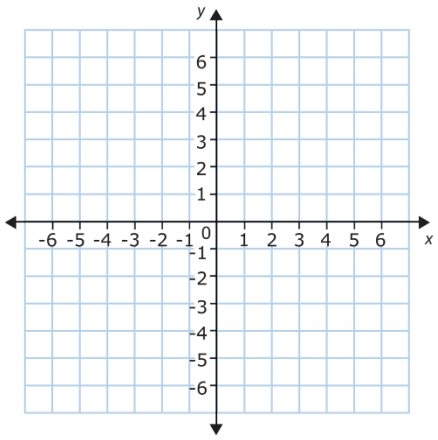
Example 2: Graphing Linear Equations by Using Intercepts

Try it out! Use intercepts to graph the line described by each equation.

A. $\frac{2}{3}y = 4 - \frac{1}{2}x$



B. $2x - 4y = 8$



5.3 NOTES PART 1

RATE OF CHANGE AND SLOPE

Example 1: Finding Slope

rate of change: _____

Slope of a Line

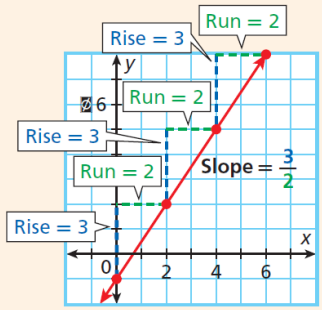
The **rise** is the difference in the ***y*-values** of two points on a line.

The **run** is the difference in the ***x*-values** of two points on a line.

The **slope** of a line is the ratio of rise to run for any two points on the line.

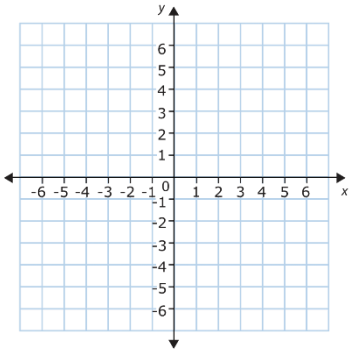
$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x}$$

(Remember that ***y*** is the **dependent variable** and ***x*** is the **independent variable**.)



Try it out! Find the slope of the line.

A. Find the slope of the line that contains (0, -3) and (5, -5).



5.3 NOTES PART 2

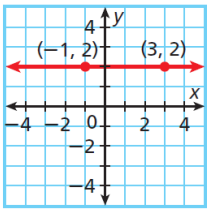
RATE OF CHANGE AND SLOPE

Example 3: Finding Slopes of Horizontal and Vertical Lines

All _____ lines have a slope of _____.

All _____ lines have a slope of _____.

A



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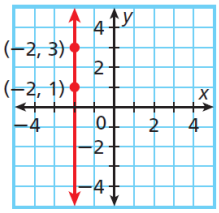
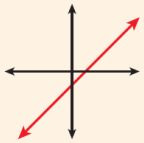
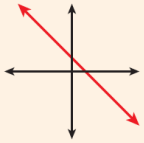
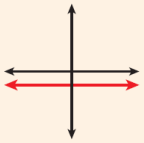
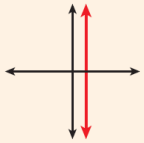


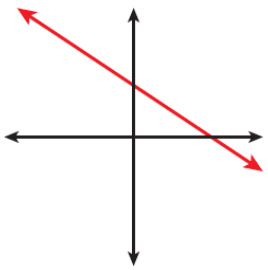
5.3 NOTES PART 3

RATE OF CHANGE AND SLOPE

Example 4: Describing Slope

Positive Slope	Negative Slope	Zero Slope	Undefined Slope
			
Line rises from left to right.	Line falls from left to right.	Horizontal line	Vertical line

Try it out! Tell whether the slope of each line is positive, negative, zero, or undefined.



5.4 NOTES PART 1

THE SLOPE FORMULA

Example 1: Finding Slope by Using the Slope Formula

slope (*m*): _____

_____

Let's say we have _____ points. One point we'll call _____, the other _____.

Then the slope of the line with these points is:

Let's Try it! Find the slope of the lines with the following points.

A. (4, -2) and (-1, 2)

B. (5, -7) and (6, -4)

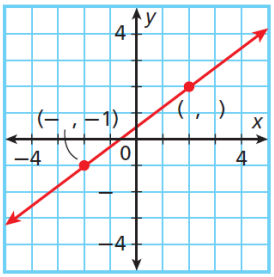
5.4 NOTES PART 2

THE SLOPE FORMULA

Example 2: Finding Slope from Graphs and Tables

Sometimes you aren't given two points directly, but you can find two points on a graph or table.

A.



B.

x	2	2	2	2
y	0	1	3	5

5.4 NOTES PART 3

THE SLOPE FORMULA

Example 3: Finding Slope from an Equation

Step 1: Find the _____ (plug in _____ for _____)

Find the _____ (plug in _____ for _____)

Step 2: Write the *x* and *y* intercepts as ordered pairs.

x-intercept = _____ and *y*-intercept = _____

Step 3: Use the slope formula with the ordered pairs to find the slope.

Try it out! Find the slope of the line described by $2x + 3y = 12$.

5.5 NOTES PART 1

DIRECT VARIATION

Example 1: Identifying Direct Variations from Equations

direct variation: _____

constant of variation: _____

Try it out! Tell whether each equation represents a direct variation. If so, identify the constant of variation.

A. $y = 4x$ B. $-3x + 5y = 0$ C. $2x + y = 10$

5.5 NOTES PART 2

DIRECT VARIATION

Example 2: Identifying Direct Variations from Ordered Pairs

To determine if a relationship is direct variation, write an equation to describe the data. If the equation is in the form $y = kx$, then the relationship is direct variation.

Try it out! Tell whether each relationship is a direct variation. Explain.

A.

x	1	3	5
y	6	18	30

B.

x	2	4	8
y	−2	0	4

5.6 NOTES PART 1

SLOPE-INTERCEPT FORM

Example 1: Graphing by Using Slope and y-intercept

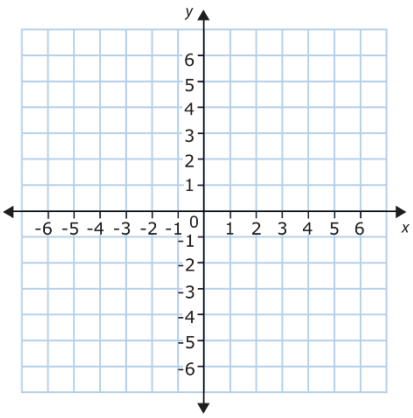
Remember 1.) The _____ is located on the *y*-axis. START HERE!!!

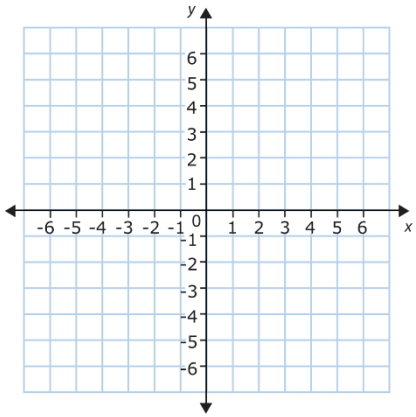
2.) Slope = Start moving from the *y*-intercept.

Try it out! Graph each line given the slope and *y*-intercept.

A. slope = $\frac{3}{4}$; *y*-intercept = -2

B. slope = -2 ; *y*-intercept = 4





5.6 NOTES PART 2

SLOPE-INTERCEPT FORM

Example 2: Writing Linear Equations in Slope-Intercept Form

Slope-intercept form =

Try it out! Write the equation that describes each line in slope-intercept form.

A. slope = $\frac{1}{3}$, *y*-intercept = 6

B. slope = -5, *y*-intercept = 2

C. slope = $\frac{1}{-2}$, (6, 5) is on the line

D. slope = -1, (4, 0) is on the line

Try it out! Identify the slope and *y*-intercept in the following equations.

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

B. $y = 3x$

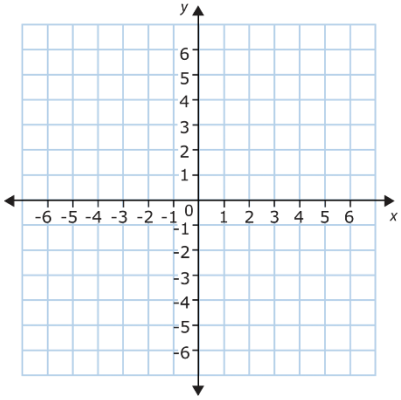
5.6 NOTES PART 3

SLOPE-INTERCEPT FORM

Example 3: Using Slope-Intercept Form to Graph

Try it out! Write each equation in slope-intercept form. The graph the line described by the equation.

A. $3x + 2y = 8$



5.7 Notes Part 1

Point-Slope Form

Example 1: Using Slope and a Point to Graph

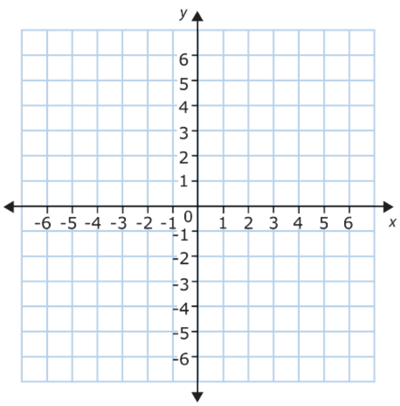
When given the <u>slope</u> and <u>a point on the line</u>:

1.) Graph the __________ first.

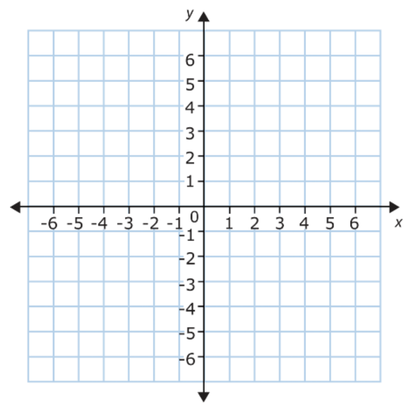
2.) Beginning at the point, use the slope to move in the correct directions. Then plot the new point.

Try it out! Graph the line with the given slope that contains the given point.

A. slope = 3 ; point = (1, 1)



B. slope = $\frac{-1}{2}$; point = (-4, 5)



5.7 Notes Part 2

Point-Slope Form

Example 2: Writing Linear Equations in Point-Slope Form

point-slope form:

Try it out! Write an equation in point-slope form for the line with the given slope that contains the given point.

A. slope = $\frac{5}{2}$; (-3, 0)

B. slope = -5 ; (-6, -1)

C. slope = 0 ; (1, 4)

5.7 Notes Part 3

Point-Slope Form

Example 3: Writing Linear Equations in Slope-Intercept Form

When given the slope and point on a line, you can write an equation in slope-intercept form.

1.) Use the __________ and __________ to write an equation in ________________________________.

2.) Distribute and solve for _____ to change the equation into slope-intercept form.

Try it out! Write an equation in slope-intercept form for the line with the following:

A. Slope -4 that contains (-1, -2).

B. slope $\frac{2}{3}$ that contains (6, 4).

5.7 Notes Part 4

Point-Slope Form

Example 4: Using Two Points to Write an Equation

These problems involve one extra first step, which is to use the slope formula to find the slope.

Try it out! Write an equation in slope-intercept from for the line through the two points.

A. (1, -4) and (3, 2)

B. (4, -7) and (0, 5)

5.8 NOTES PART 1

SLOPES OF PARALLEL AND PERPENDICULAR LINES

Example 1: Identifying Parallel Lines

parallel lines: _____

_____

Try it out! Identify which lines are parallel.

$3x + y = 8$ $y = \frac{1}{2}x - 5$ $y = 3x + 1$ $y = \frac{1}{2}x + 10$ $y = -3x + 1$

5.8 NOTES PART 2

SLOPES OF PARALLEL AND PERPENDICULAR LINES

Example 2: Identifying Perpendicular Lines

perpendicular: _____

_____

Opposite Reciprocals: $\frac{2}{7}$ $\frac{5}{-3}$ - 9

Try it out! Identify which lines are perpendicular.

$y = 2$ $y = \frac{2}{3}x + 1$ $x = 1$ $2y = -3x + 10$ $y = \frac{3}{2}x - 1$

5.8 NOTES PART 3

SLOPES OF PARALLEL AND PERPENDICULAR LINES

Example 3: Writing Equations of Parallel and Perpendicular Lines

Remember, if you know a _____ and the _____ of a line, you can write an equation for that line in _____ - _____ form.

Try it out!

A. Write an equation in slope-intercept form for the line that passes through (2, -1) and is parallel to the line described by $y = 2x - 3$.

B. Write an equation in slope-intercept form for the line passing through (-5, -2) and is perpendicular to the line described by $y = -4x$.

C. Write an equation in slope-intercept form for the line that passes through (2, 4) and is parallel to the line described by $x = 1$.

D. Write an equation in slope-intercept form for the line passing through (-3, 1) and is perpendicular to the line described by $2y = -2x + 8$.

5.9 NOTES PART 1

TRANSFORMING LINEAR FUNCTIONS

Introduction

family of functions: _____

parent function: _____

_____

transformation: _____

1. _____ 2. _____ 3. _____

5.9 NOTES PART 2

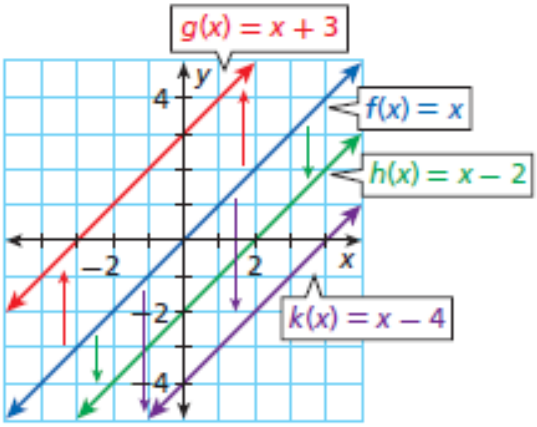
TRANSFORMING LINEAR FUNCTIONS

Example 2: Translating Linear Functions

translation: _____

_____

_____



5.9 NOTES PART 3

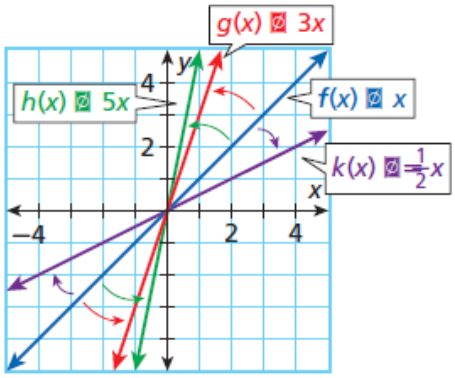
TRANSFORMING LINEAR FUNCTIONS

Example 3: Rotating Linear Functions

rotation: _____

_____

_____



5.9 NOTES PART 4

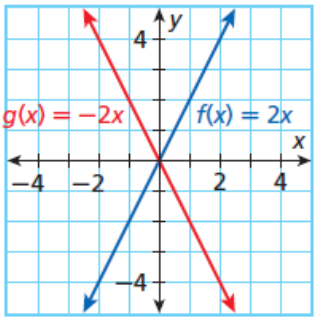
TRANSFORMING LINEAR FUNCTIONS

Example 4: Reflecting Linear Functions

reflection: _____

_____

_____



5.9 NOTES PART 5

TRANSFORMING LINEAR FUNCTIONS

Example 5: Multiple Transformations of Linear Functions

$f(x) = x$ is the _____ _____

$h(x) = 3x$ is a _____

$g(x) = 3x + 1$ is a _____ and _____