Richmond Public Schools
Curriculum Framework
Algebra 1

Strand: Equations and Inequalities

A.6 The student will

a.   determine the slope of a line when given an equation of the line, the graph of the line, or two points on the line;

b.   write the equation of a line when given the graph of the line, two points on the line, or the slope and a point on the line; and

c.   graph linear equations in two variables.

EOC Algebra I assessments will include a <u>Desmos Calculator</u>

Suggested Pacing

Second Nine Weeks

A.6a   3 blocks- Slope and Slope-Intercept Form Unit

A.6bc 6 blocks - Equations and Graphs of Lines Unit

Related Standards

Spiral Down

8.16 The student will

   a) recognize and describe the graph of a linear function with a slope that is positive, negative, or zero;

   b) identify the slope and y-intercept of a linear function, given a table of values, a graph, or an equation in y = mx + b form;

   c) determine the independent and dependent variable, given a practical situation modeled by a linear function;

Spiral Up

G.3 The student will solve problems involving symmetry and transformation. This will include

   a) investigating and using formulas for determining distance, midpoint, and slope;

   b) applying slope to verify and determine whether lines are parallel or perpendicular;

   d) determining whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods.

d) graph a linear function given the equation in $y = mx + b$ form; and

e) make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs.

7.10 The student will

a) determine the slope, m, as rate of change in a proportional relationship between two quantities and write an equation in the form $y = mx$ to represent the relationship;

b) graph a line representing a proportional relationship between two quantities given the slope and an ordered pair, or given the equation in $y = mx$ form where m represents the slope as rate of change;

c) determine the y-intercept, b, in an additive relationship between two quantities and write an equation in the form $y = x + b$ to represent the relationship;

d) graph a line representing an additive relationship between two quantities given the y-intercept and an ordered pair, or given the equation in the form $y = x + b$, where b represents the y-intercept; and

e) make connections between and among representations of a proportional or additive relationship between two quantities using verbal descriptions, tables, equations, and graphs.

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Essential Questions	Common Misconceptions

A.6a
How is slope the same or different in an equation of a line, graph of a line, or from two points on a line?
   Slope is rate of change. Slope is represented by the letter m in the equation of a line(slope intercept formula), $y=mx+b$. Slope of a line on a graph is found by using rise/run. Slope from two points on a line is found through the slope formula $(y_2-y_1)\backslash(x_2-x_1)$.
 	
What does it mean if a line has a slope that is positive, negative, zero, or undefined?
   A positive slope is a line that moves in an upward direction to the right. A negative slope is a line that moves in a downward direction to the right. A zero slope is a line that moves in a horizontal direction, nether upwards or downwards. A undefined slope is a line that is vertical that does not move.
 	
A.6b
 	
How do you determine the best method to use when writing the equation of a line?
   If m and b are given, plug them into the slope intercept formula. If a graph is given, identify the y-intercept(b) and perform rise/run to identify slope(m) and plug them in in slope intercept formula. If you are only given two points, use the slope formula to find slope (m): $(y_2-y_2)/(x_2-x_1)$, then use point slope formula: $(y-y_1)=m(x-x_1)$ plug in slope and (x_1,y_1) and manipulate the equation into slope intercept form(solve the equation for y).
 	
What is the relationship between the slopes of parallel lines?
   The slopes to parallel lines are equivalent.
	● Students memorize how to find slope from word problems, graphs, tables, equations, and a few data points, but they have no idea what it actually means.
	
	● Students mostly succeeded in finding the slope of line given in algebraic representation form, whereas they could not demonstrate sufficient achievement in situations that required transferring between graphical and algebraic representations.
	
	● Students may think of a graph as a "picture" of the data rather than a representation of it.
	
	● Students may be confused by the used of the term No Slope instead of the term Zero Slope.
	
	● Students need a refresher on solving literal equations from Algebra I in order to change point-slope formula into slope-intercept. Also, standard form into slope-intercept form.

What is the relationship between the slopes of perpendicular lines?

The slopes to perpendicular lines are negative reciprocals of each other.

How can you write the equation of a line parallel or perpendicular to a given line through a given point?

First identify the slope of the given line. Use the point-slope formula, $(y-y_1)=m(x-x_1)$, and manipulate into the slope intercept form with the given point and slope. To make any equation parallel, keep the same slope change the y-intercept. To make any equation perpendicular, change the slope to the negative reciprocal and use the point-slope formula with the given point then manipulate the equation into slope intercept form.

A.6c

How can you graph a linear equation?

Make sure the equation is in slope intercept form. Then plot the y-intercept, and perform rise/run (slope) from that point.

How do you describe transformations of linear equations based on the parent function y = x?

If a number is being multiplied to x the graph will either be vertically shrunk or stretched. If a number is being added or subtracted from x not inside parentheses the line is being moved vertically up or down.

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Understanding the Standard	Essential Knowledge and Skills
- Changes in slope may be described by dilations or reflections or both. - Changes in the *y*-intercept may be described by translations. - Linear equations can be graphed using slope, *x*- and *y*-intercepts, and/or transformations of the parent function. - The slope of a line represents a constant rate of change in the dependent variable when the independent variable changes by a constant amount. - The equation of a line defines the relationship between two variables. - The graph of a line represents the set of points that satisfies the equation of a line. - A line can be represented by its graph or by an equation. Students should have experiences writing equations of lines in various forms, including standard form, slope-intercept form, or point-slope form. - Parallel lines have equal slopes. - The product of the slopes of perpendicular lines is -1 unless one of the lines has an undefined slope. - Slope can be described as a rate of change and will be positive, negative, zero, or undefined.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** - Determine the slope of the line, given the equation of a linear function. (a) - Determine the slope of a line, given the coordinates of two points on the line. (a) - Determine the slope of a line, given the graph of a line. (a) - Recognize and describe a line with a slope or rate of change that is positive, negative, zero, or undefined. (a) - Write the equation of a line when given the graph of a line. (b) - Write the equation of a line when given two points on the line whose coordinates are integers. (b) - Write the equation of a line when given the slope and a point on the line whose coordinates are integers. (b) - Write the equation of a vertical line as $x = a$. (b) - Write the equation of a horizontal line as $y = c$. (b) - Write the equation of a line parallel or perpendicular to a given line through a given point. (b)

	● Graph a linear equation in two variables, including those that arise from a variety of practical situations. (c) ● Use the parent function $y = x$ and describe transformations defined by changes in the slope or y-intercept. (c)
Vocabulary	**Instructional Activities Organized by Learning Objective**
Linear Equation Slope: Positive, Negative, Undefined, Zero Standard Form of a Linear Equation Slope Intercept Form of a Linear Equation Point-Slope Form of a Linear Equation Function Independent Variable Dependent Variable Parallel Lines Perpendicular Lines X- and Y-Intercepts Parent Function Slope Formula	**Virginia Department of Education** ● Slippery Slope ● Slope-2-Slope ● Equation of Lines **Textbook** Virginia Glencoe, Algebra I, ©2012, Carter, et al, McGraw-Hill School Education Group, page(s) 167 - 178 **Eureka**
Assessment	
RPS PowerSchool Unit Test – RPS A.6 Common Assessment Test ID#: **Mastery Checks** Slope A Slope B Slope C Slope D	

Eureka - (Insert Lesson Title)			
Eureka Grade	**Module**	**Topic**	**Lesson(s)**

Notes
A.6a
==Understand==/==Apply:== (dependent upon given equation): I can determine the slope of the line, given the equation of a linear function.
==Understand:== I can determine the slope of a line, given the coordinates of

Slope in Standard Form A
Slope intercept/Standard form B
Slope intercept/Standard form C
Slope intercept/Standard Form D
Graphing and writing linear equations
Student Performance Analysis(slides 46-51)

two points on the line.
Understand: I can determine the slope of a line, given the graph of a line.
Understand: I can recognize and describe a line with a slope or rate of change that is positive, negative, zero, or undefined.
A.6b
Apply: I can write the equation of a line when given the graph of a line.
Apply: I can write the equation of a line when given two points on the line.
Apply: I can write the equation of a line when given the slope and a point on the line.
Understand: I can write the equation of a vertical line as x = a.
Understand: I can write the equation of a horizontal line as y = c.
Apply: I can write the equation of a line parallel or perpendicular to a given line through a given point.
A.6c
Apply/Analyze: (practical): I can graph a linear equation in two variables, including those that arise from a variety of practical situations.
Analyze: I can use the parent function y = x and describe transformations defined by changes in the slope or y-intercept.
Calculating the Slope
How to Graph a Linear Equation Using Slope and y

Resources
- **Print**
  - *Virginia End-of-Course Coach*, © 2012, Triumph Learning, Algebra I, page(s) 72 – 93
- **Technology-based**
  - **PowerPoints**
    - Find slope
    - Slope of a line
    - Graph linear equations
  - **Quia**
    - Finding the Slope
  - **Mathplayground**

- - ■ [Vertical (undefined slope) and Horizontal (zero slope) Equations](#)
  - ○ Rags to Riches
    - ■ [Given two points write y=mx+b](#)

Station Activities
[Equation of a Line Matching](#)

Cross-Curricular Connections	Tiered Differentiations
History/Economics: - In order to calculate the rate that profit is earned, a linear equation can be used. For example, when x amount of computers are sold, d dollars are earned in profit. **Any situation where a linear equation or quadratic equation can be used to model the situation, the slope and equation can be found and used in context.	 **Tier 3:Recall and Reproduction** Example 1: Students will create their name using linear lines. Stating nonlinear if the letter does not make a line. [Slope Letters](#)

	Example 2: Students can determine the slope given task cards created by the teacher with a graph, 2 points, and or equations **Tier 2: Basic Concepts and Skills** Students will be able to write equations given task cards created by the teacher with a graph, 2 points, and or equations by determining the slope and y-intercept. **Tier 1: Strategies Thinking and Reasoning** Students can graph a linear equation in two variables, including those that arise from a variety of practical situations. Students can use the parent function $y = x$ and describe transformations defined by changes in the slope or y-intercept.