Unit B - *Equations on the Coordinate Plane*

Overview

The purpose of this unit is to use math to analyze situations in which the rate of change is constant and to model those situations using linear equations. Students should make a connection between tabular, algebraic, and graphic representations of relations. In later units students will use the concepts and skills from this unit to work with quadratic and exponential functions.

21st Century Capacities: Analyzing, Presentation

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP4 Model with Mathematics
MP7 Look for and make use of structure
MP8 Look for and express regularity in repeated reasoning

CCSS.MATH.CONTENT.HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.
CCSS.MATH.CONTENT.HSA.SSE.A.1.B Interpret complicated expressions by viewing one or more of their parts as a single entity.
CCSS.MATH.CONTENT.HSA.CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
CCSS.MATH.CONTENT.HSA.CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
CCSS.MATH.CONTENT.HSA.REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
CCSS.MATH.CONTENT.HSA.REI.D.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
CCSS.MATH.CONTENT.HSA.REI.D.11 Explain why the x-

Transfer:

Students will be able to independently use their learning in new situations to...

1. Model relationships among quantities. (Analyzing)
2. Represent and interpret patterns in numbers, data and objects. (Analyzing and Presentation)
3. Draw conclusions about graphs, shapes, equations, or objects. (Analyzing and Presentation)

Meaning:

UNDERSTANDINGS: *Students will understand that:*	ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*
1. Mathematicians apply the mathematics they know to solve problems occurring in everyday life. 2. Mathematicians examine relationships to discern a pattern, generalizations, or structure. 3. Mathematicians can describe patterns, relations, and/or functions to access strategies to solve problems.	A. How can change be described? B. How can a variable/ expression / equation/graph tell a story? C. How do you express and describe a pattern and use it to make predictions and solve a problem? D. How can the solutions to an equation or inequality be represented?

coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.[*] CCSS.MATH.CONTENT.HSA.REI.D.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.MATH.CONTENT.HSF.IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.[*] CCSS.MATH.CONTENT.HSF.IF.C.7.A Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.MATH.CONTENT.HSF.BF.A.1 Write a function that describes a relationship between two quantities.[*] CCSS.MATH.CONTENT.HSF.BF.A.1.A Determine an explicit expression, a recursive process, or steps for calculation from a context. CCSS.MATH.CONTENT.HSF.LE.A.1.B Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. CCSS.MATH.CONTENT.HSF.LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). CCSS.MATH.CONTENT.HSF.LE.B.5 Interpret the parameters in a linear or exponential function in terms of a context. CCSS.MATH.CONTENT.HSG.GPE.B.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). CCSS.MATH.CONTENT.HSS.ID.C.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Acquisition:	
Students will know…	*Students will be skilled at…*
1. That situations that have a constant rate of change can be modeled with a linear equation 2. Slope of a line can tell you what the function of a graph looks like in graphical form 3. Point-slope and slope - y intercept form of a line 4. The meaning of the slope and intercepts of a function in context 5. Any point on a graph is a solution to the equation or inequality….conversely, any point not on the graph is not a solution 6. When using linear programing - vertex points are often key points in solving the problem 7. Vocabulary: vertical, horizontal, slope, rise, run, parallel, perpendicular, intercept, solution, system, intersection, vertex	1. Graphing a linear equation using a table, slope and y-intercept, and/or intercepts 2. Finding the slope of a function from an equation, graph or table 3. Comparing functions in table, equation, or graphical form 4. Using linear models to predict 5. Graphing linear inequalities 6. Graphing absolute value functions 7. Finding the solution to a system of equations by graphing, elimination algorithm and by substitution 8. Modeling situations using a system of equations 9. Solving systems of inequalities by graphing 10. Using linear programing to model and find solutions to problems