Unit 2 - *Relations and Functions*

Overview

Students will appreciate the importance of functions and their domains and will use input/output language throughout unit. A significant part of this unit is transformations on parent functions, having students understand how parameters affecting the inputs differ from the parameters affecting the outputs. Graph analysis is introduced but somewhat limited in scope. Students will also explore systems of linear equations, systems of inequalities, and linear programming to see real world applications.

21st Century Capacities: Analyzing, Presentation

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP2 Reason abstractly and quantitatively
MP3 Construct viable arguments and critique the reasoning of others
MP4 Model with Mathematics
MP6 Attend to precision

A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.CED.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. For example, represent inequalities describing nutritional and cost constraints on

Transfer:

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

1. Model relationships among quantities based on given constraints
2. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing)
3. Justify reasoning using clear and appropriate mathematical language. (Presentation)

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. Mathematicians can describe patterns, relations, and/or functions to access strategies to solve problems.
2. Mathematicians represent and analyze mathematical situations and structures using algebraic symbols to communicate thinking.
3. Mathematicians use models to represent and make meaning of quantitative relationships.
4. Mathematicians analyze change and make predictions in various contexts.

ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*

A. How can I break a problem down into manageable parts?
B. How do you express and describe a pattern and use it to make predictions and solve a problem?
C. How can change be described?
D. Does this solution make sense?

combinations of different foods. F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.★ F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. larger maximum. F.BF.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. F.BF.4 Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) = 2 x3 or f(x) = (x+1)/(x-1) for x ≠ 1.	***Acquisition***	
	Students will know… 1. The distance and midpoint formulas 2. What a linear function is and its different representations--verbally, graphically, numerically, and algebraically 3. Input, output can be swapped to find inverses through graphs, tables and algebraically 4. What are parent functions and their different representations--verbally, graphically, numerically, and algebraically 5. How parameters in functions transform graphically and point to point. 6. For a relation to be a function, each input has one output 7. Vocabulary: domain, range, input, output, constraint, relation, function, inverse function, interval notation, inequalities, piecewise, parent functions	*Students will be skilled at…* 1. Graphing two variable equations and inequalities 2. Writing linear equations in slope-intercept, point-slope, and standard forms 3. Identifying the slope (unit rate of change) and y-intercept 4. Given a graph, writing the equation 5. Given a problem statement, writing the equation (and solve if appropriate) 6. Determining the domain and range from a graph 7. Determining solutions from a graph 8. Evaluating functions given the input or output 9. Graphing piecewise functions from the equations and determining the equations from a piecewise graph. 10. Determining inverse functions from graphs, tables, and algebraically 11. Composing a new function by f(g(x)) and g(f(x))