Unit 3 - *Functions and Transformations*

Overview

Students will understand the importance of functions - they give us the ability to predict because they have only one output given an input. There is an emphasis on input/output language throughout unit. Piecewise, compositions, and inverses are explored. A significant part of this unit is about transformations, having students understand how parameters affecting the inputs differ from the parameters affecting the outputs. The ABCD method of transforming functions (with point mapping) will really help for when many different parameters are used at once. Graph analysis is introduced but somewhat limited in scope.

21st Century Capacities: Synthesizing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP 1 Make sense sense of problems and persevere in solving them
MP2 Reason abstractly and quantitatively
MP5 Use appropriate tools strategically
MP7 Look for and make use of structure

CCSS.MATH.CONTENT.HSF.IF.B.4For 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. *Key features include: intercepts; symmetries; end behavior; and periodicity*.*
CCSS.MATH.CONTENT.HSF.IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
CCSS.MATH.CONTENT.HSF.IF.C.7
Graph functions expressed symbolically and show key

Transfer:

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

1. Use appropriate tools to make reaching solutions more efficient, accessible and accurate.(synthesizing)
2. Draw conclusions about graphs, shapes, equations, or objects. (synthesizing)

Meaning:

UNDERSTANDINGS: *Students will understand that:*	ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*
1. Parameters have various transforming effects on a function. 2. Function notation simply defines which function and what input to use.	A. How do I know I've solved the problem right? B. What is the most efficient way to solve this problem? C. How do predictable patterns help us simplify tasks

Acquisition:

Students will know…	*Students will be skilled at…*
1. Functions can be used for making predictions in math	1. Using interval notation 2. Reading and representing function notation

features of the graph, by hand in simple cases and using technology for more complicated cases.* CCSS.MATH.CONTENT.HSF.IF.C.7.B Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. CCSS.MATH.CONTENT.HSF.IF.C.7.C Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. CCSS.MATH.CONTENT.HSF.BF.B.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. CCSS.MATH.CONTENT.HSF.BF.B.4 Find inverse functions. CCSS.MATH.CONTENT.HSF.BF.B.4.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. CCSS.MATH.CONTENT.HSF.BF.B.4.B(+) Verify by composition that one function is the inverse of another. CCSS.MATH.CONTENT.HSF.BF.B.4.C(+) Read values of an inverse function from a graph or a table, given that the function has an inverse. CCSS.MATH.CONTENT.HSF.BF.B.4.D(+) Produce an invertible function from a non-invertible function by restricting the domain.	2. The domain of a function are the possible inputs for which outputs exist 3. Inverses swap inputs and outputs 4. How the parameters of a function change the parent function graph 5. Vocabulary: function, inverse function, piecewise function, transformation, interval notation, function notation, symmetry, continuous, domain, range, intercept, inequality, input, output, composition, composite function, parent functions, inverse, reflection, shift, parameter	3. Interpreting characteristics of graphs 4. Graphing and evaluating piecewise functions 5. Graphing inverse functions 6. Find and verify inverse functions 7. Function composition 8. Function transformations