Richmond Public Schools
Curriculum Framework
Algebra II

Strand: Functions

AII.6   For absolute value, square root, cube root, rational, polynomial, exponential, and logarithmic functions, the student will
a) recognize the general shape of function families; and   b) use knowledge of transformations to convert between equations and the corresponding graphs of functions.

Suggested Pacing
3 Class Periods

Spiraling Standards	

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;
    d) graph a linear function given the equation in $y = mx + b$ form; and make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs.
 	
 A.7-The student will investigate and analyze linear and quadratic function families and their characteristics both algebraically and graphically, including
      f) connections between and among multiple representations of functions using verbal descriptions, tables, equations, and graphs
	AFDA.2-The student will use knowledge of transformations to write an equation, given the graph of a linear, quadratic, exponential, and logarithmic function.
	
	 MA.1-The student will investigate and identify the properties of polynomial, rational, piecewise, and step functions and sketch the graphs of the functions.
	
	 MA.2-The student will investigate and identify the characteristics of exponential and logarithmic functions to graph the function, solve equations, and solve practical problems.

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Essential Questions	Common Misconceptions
What are different representations of functions? What is the transformational approach to graphing? What is the connection between the algebraic and graphical representation of a transformation? What is the relationship between exponential and logarithmic functions? How can the calculator be used to investigate these functions (absolute value, square root, cube root, rational, polynomial, exponential, and logarithmic)?	Students may confuse vertical and horizontal shifts represented in an equation students may not recognize over which axis reflection has occurred Student may confuse types of functions Students may not recognize which function is the parent function

Understanding the Standard	Essential Knowledge and Skills

● The transformation of a function, called a pre-image, changes the size, shape, and/or position of the function to a new function, called the image.
 	
● The graphs/equations for a family of functions can be determined using a transformational approach.
 	
● The graph of a parent function is an anchor graph from which other graphs are derived using transformations.
 	
● Transformations of functions may require the domain to be restricted.
 	
● Transformations of graphs include
 	
    Translations (horizontal and/or vertical shifting of a graph);
    Reflections (over the *x*-axis and/or *y*-axis); and
    Dilations (horizontal or vertical stretching and compressing of graphs).
    The reflection of a function over the line $y = x$ represents the inverse of a function.
	The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to
	
	● Recognize the general shape of function families. (a)
	
	● Recognize graphs of parent functions. (a)
	
	● Identify the graph of a function from the equation. (b)
	
	● Write the equation of a function given the graph. (b)
	
	● Graph a transformation of a parent function, given the equation. (b)
	
	● Identify the transformation(s) of a function. Transformations of exponential and logarithmic functions, given a graph, should be limited to a single transformation. (b)
	
	● Investigate and verify transformations of functions using a graphing utility. (a, b)

Vocabulary	Instructional Activities Organized by Learning Objective

function, parent function, transformation, translation, reflection, dilation, inverse, exponential, logarithmic, absolute value, square root, cube root, polynomial, pre-image, image, size, shape, position, horizontal, vertical, shape, position, anchor graph, domain, range, x-axis, y-axis, coordinate plane, coordinates, ordered pair	**Textbook**
	
	Eureka Math Algebra 1 Module 3
	Eureka Math Algebra 2 Module 3 Topic C
	Algebra 2, ©2012, Price, et al, McGraw-Hill page(s)350-400
	
	Notes
	Functions (Math is Fun)
	
	Resources
	   ● **Print**
	Coach book, Virginia edition, lesson 20,22,23 & 25 of chapter 3
	VDOE Lesson Plan AII.6a,b
	
	   ● **Technology-based**
	Matching Equations with Parent Function (Smartboard Exchange)
	Families of Functions (Smartboard Exchange)
	Types of Functions (Quizlet)
	
	Station Activities
	
	Types of Functions Match
	Function Scavenger Hunt

Assessment	
Common Assessment AII.6a Common Assessment AII.6b	
Cross-Curricular Connections	**Tiered Differentiations**
English-Students may write a story illustrating what is happening in the graph of a function. **CTE**-Function can be used to illustrate profit, loss, manufacturing, supply, demand, etc.	**Tier 1**-Students will give the equation based on the graph of the transformation. **Tier 2**-Students will identify the transformation that was made based on the graph or equation. **Tier 3**-Students will identify transformed functions when given the parent function

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