Unit 2 -- Introduction to the Parent Functions (Linear, Exponential & Quadratic): 12 hours; testing dates 9/9-9/10

	CCSS Standard	**EOY Evidence Statement Text (PBA has add'l text not noted here for subclaim D)**	**EOY/PBA Clarifications from Evidence Statement**	SMP	Calc-ulator	
F-LE	Distinguish between situations that can be modeled with linear functions and with exponential functions.					
		Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, A-CED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers. EOY: HS-Int 3.1 Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, A-CED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions. EOY: HS-Int 3.2	i) F-LE is the primary content and at least one of the other listed content elements will be involved in tasks as well. i) F-LE is the primary content and at least one of the other listed content elements will be involved in tasks as well. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required.	4,2	yes	
F-LE.1a	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals					
		Express reasoning about linear and exponential growth. Content scope: F-LE.1a PBA Only: HS.C.10.1		3	yes	
F-LE.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.					
F-LE.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.					

F-LE.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).	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). EOY: F-LE.2-1	i) Tasks are limited to constructing linear and exponential functions with domains in the integers, in simple context (not multi-step).	1,2,5		
		Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing linear and/or exponential function models, where exponentials are limited to integer exponents. EOY: F-LE.2-2	i) Prompts describe a scenario using everyday language. Mathematical language such as "function," "exponential," etc. is not used. ii) Students autonomously choose and apply appropriate mathematical techniques without prompting. For example, in a situation of doubling, they apply techniques of exponential functions. iii) For some illustrations, see tasks at http://illustrativemathematics.org under F-LE.	1,2,4, 6	Item Specific	
		Given a verbal description of a linear or quadratic functional dependence, write an expression for the function and demonstrate various knowledge and skills articulated in the Functions category in relation to this function. EOY: F-INT.1-1	i) Given a verbal description of a functional dependence, the student would be required to write an expression for the function and then, e.g., identify a natural domain for the function given the situation; use a graphing tool to graph several input-output pairs; select applicable features of the function, such as linear, increasing, decreasing, quadratic, nonlinear; and find an input value leading to a given output value. e.g., a functional dependence might be described as follows: "The area of a square is a function of the length of its diagonal." The student would be asked to create an equation such as $f(x)=\frac{1}{2}x^2$ for this function. The natural domain for the function would be the positive real numbers. The function is increasing and nonlinear, and so on. e.g., a functional dependence might be described as follows: "The slope of the line passing through the points $(1, 3)$ and $(7, y)$ is a function of y." The student would be asked to create an equation such as $s(y)=\frac{3-y}{1-7}$ for this function. The natural domain for this function would be the real numbers. The function is increasing and linear, and so on.	1,2,8	Neutral	
F-LE.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.					
F-LE.5	Interpret the parameters in a linear or exponential function in terms of a context.					

F-IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. EOY & PBA		2	Neutral	
F-IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. EOY	See illustrations for F-IF.2 at http://illustrativemathematics.org	6,7	Item Specific	
F-IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*					
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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★	For a linear or quadratic 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; intervals where the functions is increasing, decreasing, positive, or negative; relative maximums and minimums; end behavior; and symmetries.* EOY	i) See illustrations for F-IF.4 at http://illustrativemathematics.org, e.g., http://illustrativemathematics.org/illustrations/649, http://illustrativemathematics.org/illustrations/637, http://illustrativemathematics.org/illustrations/639	6,4	Item Specific	
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.* ★	Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to linear functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute-value functions), and exponential functions with domains in the integers. *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 this function.* EOY : F-IF.5-1	tasks have a real-world context	2	Neutral	

		Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to quadratic functions. *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 this function.* EOY: F-IF.5-2	tasks have a real-world context	2	Neutral	
		Understand the concept of a function and use function notation. EOY F-IF.A.Int.1	i) Tasks require students to use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. ii) About a quarter of tasks involve functions defined recursively on a domain in the integers.	2	Item Specific	
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. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	Identify the effect on the graph of replacing $f(x)$ by $f(x)+k$, $kf(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs limiting the function types to linear and quadratic functions. EOY: F-BF.3-1	i) Tasks do not involve recognizing even and odd functions. ii) Experimenting with cases and illustrating an explanation are not assessed here.	3,5, 7	Item Specific	
		Identify the effect on the graph of a quadratic function of replacing $f(x)$ by $f(x)+k$, $kf(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases using technology. EOY: F-BF.3-4	i) Illustrating an explanation is not assessed here. (See Sub-claim C on the PBA)	3,5, 8	Item Specific	
		Express reasoning about transformations of functions. Content Scope: F.BF.3, limited to linear and quadratic functions. Tasks will not involve ideas of even or odd functions. PBA: HS.C.9.1		3	Yes	