MAFS.912.F-LE.1.2 Also assesses MAFS.912.F-BF.1.1 Also assesses MAFS.912.F-IF.1.3	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table). Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. *b.* Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.* 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.*
Item Types	Editing Task Choice – May require choosing an expression, function, or definition of a variable. Equation Editor – May require creating a value, creating an expression, creating a function, or showing steps for a calculation. GRID – May require ordering of steps for a calculation from a context. Hot Text – May require dragging and dropping values or expressions to construct a function. Multiple Choice – May require selecting a choice from a set of possible choices. Multiselect – May require choosing equivalent functions. Open Response – May require explaining and interpreting a resulting function. Table Item – May require completing missing cells in a table.
Clarifications	Students will write a linear function, an arithmetic sequence, an exponential function, or a geometric sequence when given a graph that models a real-world context. Students will write a linear function, an arithmetic sequence, an exponential function, or a geometric sequence when given a verbal description of a real-world context.

	Students will write a linear function, an arithmetic sequence, an exponential function, or a geometric sequence when given a table of values or a set of ordered pairs that model a real-world context. Students will write an explicit function, define a recursive process, or complete a table of calculations that can be used to mathematically define a real-world context. Students will write a function that combines functions using arithmetic operations and relate the result to the context of the problem. Students will write a function to model a real-world context by composing functions and the information within the context. Students will write a recursive definition for a sequence that is presented as a sequence, a graph, or a table.
Assessment Limits	In items where the student must write a function using arithmetic operations or by composing functions, the student should have to generate the new function only. In items where the student constructs an exponential function, a geometric sequence, or a recursive definition from input-output pairs, at least two sets of pairs must have consecutive inputs. In items that require the student to construct arithmetic or geometric sequences, the real-world context should be discrete. In items that require the student to construct a linear or exponential function, the real-world context should be continuous.
Stimulus Attributes	Items should be set in a real-world context. Items may use function notation. In items where the student builds a function using arithmetic operations or by composition, the functions may be given using verbal descriptions, function notation or as equations.
Response Attributes	For F-BF.1.1b and c, the student may be asked to find a value. For F-LE.1.2 and F-BF.1.1, items may require the student to apply the basic modeling cycle. In items where the student writes a recursive formula, the student may be expected to give both parts of the formula. The student may be required to determine equivalent recursive formulas or functions. Items may require the student to choose an appropriate level of accuracy.

	Items may require the student to choose and interpret the scale in a graph. Items may require the student to choose and interpret units.
Calculator	Neutral

Sample Item	Item Type
	Equation Editor

Chantel drew a picture of her dog on a piece of paper that is 12 centimeters long. She used a copy machine to enlarge her drawing. She used the 115% setting to make each new copy. She then used each new copy to generate the next copy, using the same copier setting.

Enter a recursive formula that will give the length of each new copy.

$a_1 =$

$a_n =$