Build a function that models a relationship between two quantities (F.BF.1)

Standard II.F.BF.1: Write a quadratic or exponential 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.*

Concepts and Skills to Master
• Recognize patterns in a table, geometric model, or other representation to determine an explicit expression and a recursive process for a linear, exponential, or quadratic context. • Combine linear, exponential, or quadratic functions using addition, subtraction, or multiplication.

Related Standards: Current Course	Related Standards: Future Courses
II.F.IF. all, II.F.BF all, II.F.LE.3, II.A.CED.2	III.F.BF.all, III.F.IF.all, III.F.LE.3, III.F.TF.5, P.F.BF.1, P.F.BF.4, P.F.TF.7, P.G.GPE.2, P.G.GPE.3

Support for Teachers

Critical Background Knowledge
• Determine an explicit expression, a recursive process, and combine standard function types (I.F.BF.1) • Write arithmetic and geometric sequences both recursively and with an explicit formula (I.F.BF.2) • Use function notation (I.F.IF.2) • Recognize sequences as functions (I.F.IF.3) • Distinguish between and construct linear and exponential functions (I.LE.2)

Academic Vocabulary
explicit, recursive

Resources
Curriculum Resources: http://www.uen.org/core/core.do?courseNum=5620#71485

Build new functions from existing functions (F.BF.3)
Standard II.F.BF.3: 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. Focus on quadratic functions and consider including absolute value functions. 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.

Concepts and Skills to Master
- Describe verbally and graphically what will happen when $f(x)$ is replaced by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x+k)$, where k is any real number. Focus on linear, exponential, and quadratic functions and the absolute value of those functions.   - Use technology to explain the effects of transformations on functions.   - Recognize even and odd functions from their graphs and algebraic expressions.   - Given a graph of $f(x)$ and $f(x) + k$, $kf(x)$, $f(kx)$, or $f(x+k)$, on the same coordinate axis, find the value of k.

Related Standards: Current Course	Related Standards: Future Courses
II.A.SSE.1, II.F.BF.3, II.F.IF.7, II.F.IF.8, II.F.IF.9	III.A.SSE.1, III.F.BF.3, III.F.IF.7, III.F.IF.8, III.F.IF.9, P. N.VM.5, P. N.VM.7, P. N.VM.8, P.F.TF.4

Support for Teachers

Critical Background Knowledge
- Identify the effect of vertical translations of graphs of linear and exponential functions on their equations (I.F.BF.3)   - Use geometric descriptions of rigid motions to transform figures and predict the effect of transformation (I.G.CO.6)   - Graph functions with and without technology (I.F.IF.7)

Academic Vocabulary
even function, odd function, dilation, symmetry

Resources
Curriculum Resources: http://www.uen.org/core/core.do?courseNum=5620#71485