

Core Content

Cluster Title: Build new functions from existing functions.
Standard 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. <i>Include recognizing even and odd functions from their graphs and algebraic expressions for them.</i>
Concepts and Skills to Master
<ul style="list-style-type: none"> • Perform translations, reflections, and dilations on any function with and without technology. • Describe the effect of a transformation on a function. • Identify functions that are even, odd, or neither.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> • Understanding transformations on functions (II.2.F.BF.3) • Visual understanding of whether a function is even, odd, or neither (II.2.F.BF.3) • Recognizing the graphs of common parent functions 	
Academic Vocabulary	
even function, odd function, translation, reflection, dilation	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Explore parent functions and their transformations using graphing technology. 	
Sample Formative Assessment Tasks	
<p>Skill-Based Task: Describe the graphical relationship between the two functions.</p> <p>1) $f(x) = 2^x + 7$ and $g(x) = 2^{x+1} + 7$</p> <p>2) $h(x) = \sin 2x + 5$ and $k(x) = \sin(2x + 5)$</p> <p>3) $t(x) = (x + 1)(x + 3)$ and $v(x) = 5(x - 1)(x + 1)$</p>	<p>Problem Task: Find a function that is both even and odd. Find a function that is neither even nor odd.</p>

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Cluster Title: Build new functions from existing functions.
Standard F.BF.4: Find inverse functions.
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. For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.
Concepts and Skills to Master
<ul style="list-style-type: none"> Determine whether or not a given function has an inverse, and find the inverse if it exists (including rational, radical, trigonometric, and exponential functions).

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Solve a function for a specified variable (I.A.REI.3) 	
Academic Vocabulary	
inverse, $f(x)$, $f^{-1}(x)$	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> Compare graphs of $f(x)$ and $f^{-1}(x)$ to establish relationships between domain and range. 	
Sample Formative Assessment Tasks	
<p>Skill-Based Task: For the following functions, find the inverse if it exists:</p> $f(x) = \frac{2x + 5}{x - 7}$ $g(x) = 3 \cdot 2^x + 1$ $h(x) = \sqrt{x + 5} - \sqrt{x + 1}$	<p>Problem Task: Explain to your classmate the clues you use to determine whether or not a function has an inverse.</p>