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. ~~*Include recognizing even and odd functions from their graphs and algebraic expressions for them.*~~
Concepts and Skills to Master
• Perform vertical translations on linear and exponential graphs. • Find the value of k given f(x) replaced by f(x) + k on a graph of a linear or exponential function. • Relate the vertical translation of a linear function to its y-intercept. • Describe what will happen to a function when $f(x)$ is replaced by $f(x)+k$ for different values of k.

Supports for Teachers

Critical Background Knowledge	
• Graphing linear and exponential functions	
Academic Vocabulary	
Translation, transformation, y-intercept, vertical shift	
Suggested Instructional Strategies	**Resources**
• Use graphing technology to explore translations of functions.	www.shodor.org/
Sample Formative Assessment Tasks	
Skill-based Task Graph the following on a single set of axes: $f(x)=2^x$ $f(x)=2^x+1$ $f(x)=2^x+2$ $f(x)=2^x-1$ $f(x)=2^x-2$	**Problem Task** Compare and contrast the graph of any function, $f(x)$, and the graph of $f(x)+k$.

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