

## Core Content

<b>Cluster Title: Analyze functions using different representations.</b>
<b>Standard:</b> F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Graph lines expressed in slope-intercept form or standard form by hand.</li> <li>Graph exponential functions by hand.</li> <li>Use technology to model complex exponential functions.</li> <li>Identify intercepts in graphs of linear and exponential functions.</li> </ul>

## Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>Graph points on the coordinate plane</li> </ul>	
<b>Academic Vocabulary</b>	
<ul style="list-style-type: none"> <li>Linear, exponential, intercept, end behavior</li> </ul>	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>Allow students to develop graphs from tables and use those graphs to generalize graphing strategies.</li> <li>Graph equations generated from real-life contexts.</li> </ul>	<ul style="list-style-type: none"> <li>Kuta Software Worksheets (free online)</li> <li>Geogebra (free online)</li> </ul>
<b>Sample Formative Assessment Tasks</b>	
<b>Skill-based Task</b>	<b>Problem Task</b>
<ul style="list-style-type: none"> <li>Graph the function <math>f(x) = 2x - 3</math>.</li> <li>Graph the function <math>y = 2^x</math>.</li> </ul>	The population of salmon in a lake triples each year. The current population is 472. Model the situation graphically. Include the last three years and the next two. Model the situation with a function.

★Modeling

## Core Content

<b>Cluster Title: Analyze functions using different representations.</b>
<b>Standard:</b> F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.</i>
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>• Compare slopes and intercepts of two linear functions where one is represented algebraically, graphically, numerically, in tables, or in a description and the other is modeled using a different form of representation.</li> <li>• Compare growth rate and intercepts of two exponential functions where one is represented algebraically, graphically, numerically, in tables, or in a description and the other is modeled using a different form of representation.</li> </ul>

## Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>• Find slope and intercepts of linear functions.</li> <li>• Find intercepts and growth rates of exponential functions.</li> </ul>	
<b>Academic Vocabulary</b>	
<ul style="list-style-type: none"> <li>• function, slope, rate of change, intercept, interval, growth rate</li> </ul>	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>• Compare two functions expressed in different representations. Ask: Which is growing at a faster rate? Which one begins at a higher value? Why does it increase faster than the other? How do you know?</li> <li>• Match functions expressed using different representations that have the same properties.</li> </ul>	<ul style="list-style-type: none"> <li>• Exponential functions on the Web: <a href="http://faculty.gvsu.edu/goldenj/exponential.html">http://faculty.gvsu.edu/goldenj/exponential.html</a></li> <li>• Geogebra (free online)</li> <li>• Graphing Calculators</li> </ul>
<b>Skill-based Task</b> Which has a greater slope? <ul style="list-style-type: none"> <li>• <math>f(x) = 3x + 5</math></li> <li>• A function representing the number of bottle caps in a shoebox where 5 are added each time</li> </ul>	<b>Problem Task</b> Create a graphic organizer to highlight your understanding of functions and their properties by comparing two functions using at least two different representations.