

Core Content

Cluster Title: Interpret functions that arise in applications in terms of a context.
Standard F.IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*</i>
Concepts and Skills to Master
<ul style="list-style-type: none"> Distinguish rational and radical equations based on equations, tables, and verbal descriptions. Identify key features such as intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior. Use key features of a rational, square root, cube root, polynomial, logarithmic, and trigonometric function to sketch a graph. Interpret key features in terms of context.

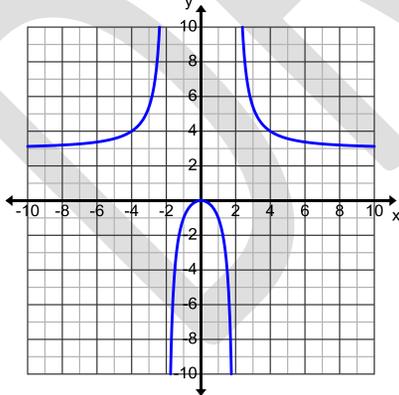
Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Graph and identify key features of linear, exponential, and quadratic functions (I: F.IF.4, II: F.IF.4). 	
Academic Vocabulary	
asymptote, removable discontinuity, increasing, decreasing, interval, intercept, maximum, minimum, symmetry, end behavior, rational, discrete, domain, range	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> Use interval notation or symbols of inequality to communicate key features of graphs. Identify key features in multiple representations (e.g., table, graph, equation, and in context). 	
Sample Formative Assessment Tasks	
Skill-Based Task: The function $C(t) = \frac{5t}{0.01t^2 + 3.3}$ describes the concentration of a drug in the bloodstream over time. Graph the function. Identify and interpret the intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.	Problem Task: Draw a graphical representation predicting the temperatures for the next seven days. Identify and interpret key features.

Core Content

Cluster Title: Interpret functions that arise in applications in terms of a context.
Standard F.IF.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.</i>
Concepts and Skills to Master
<ul style="list-style-type: none"> Identify appropriate values for the domain of a function based on context. Identify the domain of a function from the graph.

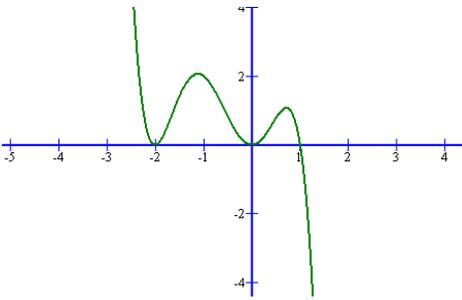
Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Understanding the domain of a function Using set and interval notation to represent domain (Secondary I: F.IF.5) 	
Academic Vocabulary	
domain, function, independent variable, dependent variable, discrete, continuous, asymptotes	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> This standard should be incorporated when analyzing any function. 	<ul style="list-style-type: none"> TI Math – It's a Radical, Rational Universe!
Sample Formative Assessment Tasks	
<p>Skill-Based Task:</p> <p>State the domain for the following graph in both set and interval notation.</p> 	<p>Problem Task:</p> <p>The pH scale measures how basic or acidic a substance is. The scale ranges for 0 – 14 with 0 being the most acidic and 14 being the most basic. In chemistry, the pH solution is defined by $pH = -\log(H^+)$, where H^+ is the hydrogen ion concentration of the solution in moles per liter. Find all possible hydrogen ion concentration for solutions with pH values that lie between 2 and 5. Justify your answer graphically.</p>

Core Content

Cluster Title: Interpret functions that arise in applications in terms of a context.
Standard F.IF.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
Concepts and Skills to Master
<ul style="list-style-type: none"> Calculate the rate of change over a given interval for rational, square root, cube root, polynomial, logarithmic, and trigonometric functions within a context. Calculate the rate of change when presented as an equation or table. Estimate the rate of change from a graph.

Supports for Teachers

Critical Background Knowledge															
<ul style="list-style-type: none"> Calculating and interpreting the rate of change in linear, exponential, and quadratic functions (I: F.IF.6, II: F.IF.6) 															
Academic Vocabulary															
average rate of change, interval, secant line, Δ															
Suggested Instructional Strategies	Resources														
<ul style="list-style-type: none"> Compare rates of change in radical and rational functions with those of quadratic, exponential, and linear functions. 															
Sample Formative Assessment Tasks															
<p>Skill-Based Task: (Data taken from Wikibooks Trig Functions) The following table shows the average daylight hours in Alaska for each month. Months are represented by the number of months after January.</p> <table border="1"> <tr> <td>Month</td> <td>0</td> <td>2</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> </tr> <tr> <td>Daylight Hours</td> <td>5.7</td> <td>10.4</td> <td>16.9</td> <td>19.2</td> <td>14.3</td> <td>8.5</td> </tr> </table> <p>Calculate the average rate of change from March to September.</p>	Month	0	2	4	6	8	10	Daylight Hours	5.7	10.4	16.9	19.2	14.3	8.5	<p>Problem Task: Given the following graph:</p> <ol style="list-style-type: none"> Identify all the intervals where the average rate of change is negative. Identify two intervals where one has a greater average rate of change than the other. Find two points on the graph where the average rate of change is zero. 
Month	0	2	4	6	8	10									
Daylight Hours	5.7	10.4	16.9	19.2	14.3	8.5									