

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. (Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.)★

Concepts and Skills to Master

- Distinguish linear, quadratic, and exponential relationships based on equations, tables, and verbal descriptions.
- Given a function in a table or in algebraic or graphical form, identify key features such as x - and y -intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.
- Use key features of an algebraic function to graph the function.

Supports for Teachers

Critical Background Knowledge

- Graph linear and exponential functions from a table or equation.

Academic Vocabulary

increasing, decreasing, interval, intercept, maximum, minimum, symmetry, end behavior, quadratic, vertex

Suggested Instructional Strategies

- Given key features of a quadratic function, sketch the function by hand.
- Use graphing technology to explore and identify key features of a quadratic function.
- Compare key features of linear, exponential, and quadratic functions.
- Use interval notation or symbols of inequality to communicate key features of graphs.

Resources

Sample Formative Assessment Tasks

Skill-Based Task:

Find the maximum height of the path of an arrow modeled by the function $h(t) = -16t^2 + 96t$. During what interval is the arrow going up? Going down? When does it hit the ground?

Problem Task:

time	f(t)
0	300
5	777.5
10	1010
15	997.5
20	740
25	237.5

Create a situation that could have produced the given data. Use appropriate vocabulary and key features to tell the story.

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Standard F.IF.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. (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.)★
Concepts and Skills to Master
<ul style="list-style-type: none"> Identify domains of functions given a graph. Identify a domain in a particular context.

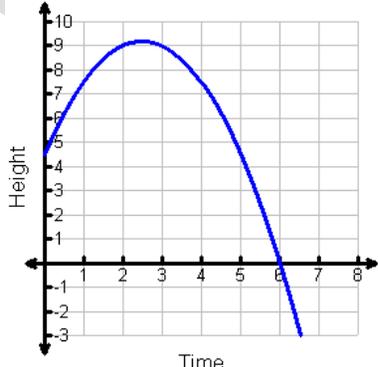
Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Understand the concept of a function and use function notation (I.2.F.IF). Understand domain. 	
Academic Vocabulary	
domain, function, independent variable, dependent variable, discrete, continuous	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> Discuss contexts where the domain of a function should be limited to a subset of integers, positive or negative values, or some other restriction to the real numbers. 	
Sample Formative Assessment Tasks	
Skill-Based Task: If a function describes the area of an enclosure made with 100 ft. of fence, what would be an appropriate domain for the function?	Problem Task: Describe a context where the domain of the function would be: <ul style="list-style-type: none"> All real numbers. Whole numbers. Rational numbers. Integers. Even numbers from 2 to 10 inclusive.

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 in a quadratic function over a given interval from a table or equation. Compare rates of change in quadratic functions with those in linear or exponential functions.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Calculate and interpret the rate of change of a linear or exponential function (I.2.F.IF.6). 	
Academic Vocabulary	
average rate of change, interval, Δ , secant line	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> Compare the graphs of a linear, exponential, and quadratic function over several of the same intervals and discuss average rates of change. In honors courses, discuss the relationship of the slope secant lines as they approximate a tangent line. 	
Sample Formative Assessment Tasks	
<p>Skill-Based Task: Given the function $f(x) = x^2 - 11x + 24$, find and interpret the average rate of change over each interval:</p> <ol style="list-style-type: none"> [0,3] [4,7] [6,8] 	<p>Problem Task:</p>  <p>A potato is launched into the air. Use rates of change over different intervals to describe the flight of the potato.</p>