

Core Content

Cluster Title: Use functions to model relationships between quantities.

Standard: Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Concepts and Skills to Master

- Determine and interpret the initial value and rate of change given two points, a graph, a table of values, a geometric representation, or a story problem (verbal description) of a linear relationship.
- Write the equation of a line given two points, a graph, a table of values, a geometric representation, or a story problem (verbal description) of a linear relationship.

Supports for Teachers

Critical Background Knowledge

- Understand the meaning of slope and y -intercept.
- Write an equation as $y = mx + b$ given a graph.

Academic Vocabulary

linear relationship, y -intercept, slope

Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Use a real-world application to generate a table of values. Use the table to construct a function that models the relationship. • Connect to other standards in the Expressions and Equations Domain. 	<p><i>illuminations.nctm.org</i>. NCTM.</p>

Sample Formative Assessment Tasks

Skill-Based Task

- The student council is planning a ski trip to Sundance. There is a \$220 deposit for the lodge and the tickets will cost \$70 per student. Construct a function, build a table, and graph the data showing how much it will cost for the students' trip.
- Find the equation of the line that goes through $(3,5)$ and $(-5,7)$.

Problem Task

Wally created the table below for a function he knows to be linear. He thinks something must be wrong with his table because he can't find the original function from the table. Find the error and the original function. Explain your strategy for finding the error.

3.2	6.4	9.6	12.8	16	19.2	22.4	25.6
17.8	30.6	43.4	56.2	66	81.8	94.6	107.4

Core Content

Cluster Title: Use functions to model relationships between quantities.
Standard: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Concepts and Skills to Master
<ul style="list-style-type: none"> Describe attributes of a function by analyzing a graph. Create a graphical representation given the description of the relationship between two quantities.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Understand basic graphing conventions. This standard is a good place to begin exploring function. 	
Academic Vocabulary	
increasing and decreasing rates of change, linear, nonlinear, initial value	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> Tell a story based on a graph. Given a story, draw a graph. 	Friel, Susan, et. al. <i>Navigating through Algebra</i> . NCTM, 2001.

Sample Formative Assessment Tasks	
<p>Skill-Based Task</p> <p>The following is a graph of the heart rate of a man running on a treadmill. When is his heart rate changing at the greatest rate? What is happening when the graph is horizontal? Does the decreasing graph show a constant rate of change?</p>	<p>Problem Task</p> <p>Graph your distance from the school over time for the hours from 6 a.m. to 9 a.m.</p>

