

Core Content

Cluster Title: Define, evaluate, and compare functions.
Standard: Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
Concepts and Skills to Master
<ul style="list-style-type: none"> Understand that functions describe relationships where one variable determines a unique value of the other. Recognize a graph of a function as the set of ordered pairs consisting of an input and corresponding output.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Graph ordered pairs on the coordinate plane. Evaluate expressions for a given value. 	
Academic Vocabulary	
function, input, output, dependent, independent	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> Explore functions that arise from real-life relationships where one variable determines a unique value of another. Use a variety of representations to have students identify functions and relations that are not functions. 	<p><i>illuminations.nctm.org/ActivityDetail.aspx?ID=215</i> NCTM. (9-12 Activity: Function Matching)</p> <p>Lloyd, Gwendolyn, et al. <i>Developing Essential Understanding of Expressions, Equations, and Functions Grades 6-8</i>. NCTM, 2011.</p>
Sample Formative Assessment Tasks	
Skill-Based Task	Problem Task
<ul style="list-style-type: none"> Could the set of ordered pairs, (2,5), (3,5), (4,6), (2,8), (6,7) describe the number of seconds since you left home and the number of meters you've walked? Is this a function? Justify your answers. Does the set of students in the classroom and their birthdays represent a function? Justify your answer. 	Find three examples of relationships in the real world that can be represented by functions and three relationships that are not functions.

Core Content

Cluster Title: Define, evaluate, and compare functions.
Standard: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.
Concepts and Skills to Master
<ul style="list-style-type: none"> Compare two linear functions each represented a different way and describe similarities and differences in slopes, y-intercepts, and values.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Determine slopes and y-Intercepts. 	
Academic Vocabulary	
slope, intercept, rate of change, function, linear, non-linear	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> Given one representation of a function, create the others. Put students in small groups. Give groups scenarios and ask each group to create a different representation of the scenario (table, equation, graph). Identify attributes (slope, y-intercept, values) of a function in its equation, graph, or a table. 	Lloyd, Gwendolyn, et al. <i>Developing Essential Understanding of Expressions, Equations, and Functions Grades 6-8</i> . NCTM, 2011.
Sample Formative Assessment Tasks	
Skill-Based Task Is $y=2(x+5)$ the same as the function described as “twice a quantity plus 5”?	Problem Task Billy argues that the equation $y=4x+5$ is equivalent to the equation of the line that goes through (2,6) and (3,10). How did he arrive at this conclusion? Is he correct? Justify your answer.

Core Content

Cluster Title: Define, evaluate, and compare functions.
Standard: Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.
Concepts and Skills to Master
<ul style="list-style-type: none"> Distinguish between linear and non-linear functions given their algebraic expression, a table, or a graph. Recognize functions written in the form $y = mx + b$ are linear and that every linear function can be written in the form $y = mx + b$.

Supports for Teachers

Critical Background Knowledge											
<ul style="list-style-type: none"> Generate and plot ordered pairs from an equation. Understand linear slope as a constant rate of change. 											
Academic Vocabulary											
collinear, linear, nonlinear											
Suggested Instructional Strategies	Resources										
<ul style="list-style-type: none"> Examine constant and non-constant rates of change in tables of values. Explore growing patterns generated from a variety of contexts to explore linear and nonlinear relationships. 											
Sample Formative Assessment Tasks											
Skill-Based Task Determine which of the following equations are linear: $y = x^2 + 5x + 6$ $y = x(2 + x)$ $y = x^3$ $y = 7x + 6$ $y = \frac{1}{x}$ $y = \frac{x}{2}$	Problem Task Hermione argues that the table below represents a linear function. Is she correct? How do you know? <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>2</td> <td>4</td> <td>8</td> <td>16</td> </tr> <tr> <td>y</td> <td>1</td> <td>3</td> <td>5</td> <td>7</td> </tr> </table>	x	2	4	8	16	y	1	3	5	7
x	2	4	8	16							
y	1	3	5	7							