

Core Content

Cluster Title: Represent and analyze quantitative relationships between dependent and independent variables.

Standard 9: Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.*

MASTERY Patterns of Reasoning**Conceptual:**

Recognize that a change in the independent variable creates a change in the dependent variable (i.e., as x changes y also changes).

Identify relationships between tables, graphs, and equations.

Understand that tables are useful for organizing and displaying data.

Recognize when quantitative relationships between dependent and independent variables are linear.

Procedural:

Make a table, graph, or equation to represent a problem context.

Organize and display data using tables and graphs.

Representational:

Create and analyze visual representations such as tables and graphs to justify an equation.

Supports for Teachers

Critical Background Knowledge**Conceptual:**

Recognize that variables can be replaced with numbers.

For an equation to be true, expressions on either side of the equal sign must be equivalent.

Understand that graphs are useful for organizing and displaying data.

Understand that coordinates in a coordinate plane represent data from a real world context.

<p>Procedural: Create a graph using order pairs from a set of data (e.g., from a table).</p> <p>Representational: Represent real-world contexts by graphing points in the first quadrant of the coordinate plane. Model values with charts, graphs, manipulatives and story contexts.</p>	
<p>Academic Vocabulary Graph, table, equation, variable, independent variable, dependent variable, equivalent</p>	
<p>Instructional Strategies Used</p>	
<p>Use a real-world context where students must make sense of the relationship between the dependent and independent variables, such as:</p> <p>The class has a jar that has 5 Skittles in it to begin with. Each student is given 7 Skittles. Begin with letting students add their 7 Skittles individually. Ask how many Skittles would be in the jar after x number of students. Have the students make a table where the beginning point of the table at student 0 is 5, matching what is happening in the jar. Ask the students to predict how many Skittles would be there after 10, 15, or 20 students. Have the students verbalize a rule for any number of students using the given situation and the table. Have students write an equation to represent the situation. Create a line graph showing the relationship to number of Skittles in the jar and number of students. Make sure to connect coordinate points on the graph to quantities on the table, to quantities in the equation. Have the students identify the dependent and independent variable in the table, the graph, and the equation.</p>	<p>Resources Used</p>
<p>Extension: Wacky Water World</p>	<p>http://fcit.usf.edu/math/lessons/activities/wackyT.htm</p>

Extension: Walk the Plank	http://fcit.usf.edu/math/lessons/activities/plankT.htm
Assessment Tasks Used	
Skill-based Task: Use this list of ordered pairs to create a table, a graph, and an equation: 0, 3 1, 5 2, 7 3, 9 4, 11	Problem Task: Imagine that you are training for a 13-mile race. On the first day you run 1.5 miles. Each day you run 0.5 mile longer than you ran on the previous day. How many days will it take you to work up to 13 miles? Create a table, graph, and equation and explain the relationship between the dependent and independent variables. If a jar had 4 pennies inside, and you added 7 pennies each day, how many pennies will there be after day one? Day two? Day three? Day ten? Day one hundred? Have students create a table and graph the results. Also have them identify the equation for this situation ($p = 7d + 4$).