

Grade 6 Mathematics Item Specification C1 TG

<p>Task Model 1</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>6.EE.C.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.</p> <p>Evidence Required: 1. The student writes an equation to express one quantity versus another quantity using dependent and independent variables.</p> <p>Tools: Calculator</p>	<p>Prompt Features: The student is prompted to give an equation that uses dependent and independent variables to relate two quantities.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> • Equations should be in the form of $y = kx$ or $y = x \pm c$ where k and c are positive rational numbers. • Context should be familiar to students 11 to 13 years old. • Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> ○ Equations are in the form $y = kx$ or $y = x \pm c$ where k and c are positive integers. ○ Equations are in the form $y = kx$ or $y = x \pm c$ where k and c are fractions, mixed numbers, or decimals. <p>TM1 Stimulus: The student is presented with independent and dependent quantities in a real-world context.</p> <p>Example Stem: Emily studies 40 minutes after lunch for a science exam. She studies x more minutes that evening.</p> <p>Enter an equation that represents the total number of minutes, y, Emily studies for the science exam.</p> <p>Rubric: (1 point) Student gives a correct equation (e.g., $40 + x = y$).</p> <p>Response Type: Equation/Numeric</p>
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Task Model 2

Response Type:
Multiple Choice,
single correct
response

DOK Level 2

6.EE.C.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.

Evidence Required:

2. The student identifies the relationship between dependent and independent variables from graphs and tables and relates them to equations.

Tools: Calculator

Prompt Features: The student is prompted to identify the correct graph that represents a relationship between quantities that are related in a real-world context.

Stimulus Guidelines:

- Graph values should be linear in the form of $y = kx$ or $y = x \pm c$ where k and c are positive rational numbers.
- The coordinate plane should be limited to Quadrant I.
- Context should be familiar to students 11 to 13 years old.

TM2a

Stimulus: The student is presented with two related quantities in a real-world context.

Example Stem: Jack saves \$6.00 each week.

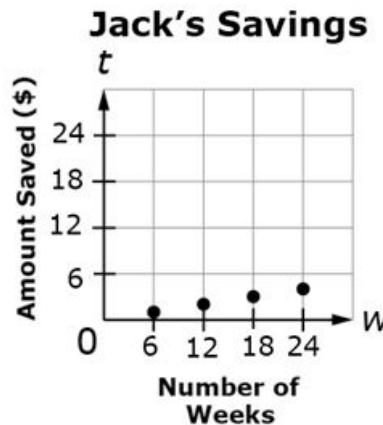
- Let w represent the number of weeks that Jack saves \$6.00.
- Let t represent the total amount saved, in dollars.

Which graph shows the relationship between t , the amount of money Jack saves, and w , the number of weeks he has been saving?

A.



B.



Task Model 2

Response Type:
Multiple Choice,
single correct
response

DOK Level 2

6.EE.C.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.

Evidence Required:

2. The student identifies the relationship between dependent and independent variables from graphs and tables and relates them to equations.

Tools: Calculator

C.



D.



Answer Choices: Answer choices will be a graph with three to five ordered pairs plotted. Distractors will include switching the two variables and/or incorrectly plotting the points.

Rubric: (1 point) Student selects the correct graph (e.g., D).

Response Type: Multiple choice, single correct response

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<p>Task Model 2</p> <p>Response Type: Matching Tables</p> <p>DOK Level 2</p> <p>6.EE.C.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.</p> <p>Evidence Required: 2. The student identifies the relationship between dependent and independent variables from graphs and tables and relates them to equations.</p> <p>Tools: Calculator</p>	<p>Prompt Features: The student is prompted to use a table or a graph to identify correct statements about a relationship between two quantities.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> • Table and graph values should be linear in the form of $y = kx$ or $y = x \pm c$ where k and c are positive rational numbers. • Tables should have three to five rows of data. • The coordinate plane should be limited to Quadrant I. • Context should be familiar to students 11 to 13 years old. <p>TM2b Stimulus: The student is presented with a relationship between two quantities represented by a table or a graph.</p> <p>Example Stem 1: Jack saves the same amount of money each week as shown in the table.</p> <ul style="list-style-type: none"> • Let w represent the number of weeks that Jack saves. • Let t represent the total amount saved, in dollars. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="padding: 5px;">Number of Weeks w</th> <th style="padding: 5px;">Total Amount Saved t</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">\$ 6</td> </tr> <tr> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">\$12</td> </tr> <tr> <td style="text-align: center; padding: 5px;">3</td> <td style="text-align: center; padding: 5px;">\$18</td> </tr> <tr> <td style="text-align: center; padding: 5px;">4</td> <td style="text-align: center; padding: 5px;">\$24</td> </tr> </tbody> </table> <p>Determine whether each statement is true. Select True or False for each statement.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Statement</th> <th style="padding: 5px;">True</th> <th style="padding: 5px;">False</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">The equation $t = 6 + w$ represents the relationship between the number of weeks and the total amount saved.</td> <td style="width: 50px;"></td> <td style="width: 50px;"></td> </tr> <tr> <td style="padding: 5px;">The total amount saved is 6 times the number of weeks.</td> <td></td> <td></td> </tr> <tr> <td style="padding: 5px;">The number of weeks that Jack saves depends on the total amount of money Jack saves.</td> <td></td> <td></td> </tr> </tbody> </table> <p>Rubric: (1 point) Student correctly identifies each statement as being either true or false (e.g., F, T, F).</p> <p>Response Type: Matching Tables</p>	Number of Weeks w	Total Amount Saved t	1	\$ 6	2	\$12	3	\$18	4	\$24	Statement	True	False	The equation $t = 6 + w$ represents the relationship between the number of weeks and the total amount saved.			The total amount saved is 6 times the number of weeks.			The number of weeks that Jack saves depends on the total amount of money Jack saves.		
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Task Model 2

**Response Type:
Matching Tables**

DOK Level 2

6.EE.C.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.

Evidence Required:

2. The student identifies the relationship between dependent and independent variables from graphs and tables and relates them to equations.

Tools: Calculator

Example Stem 2: Jack saves the same amount of money each week as shown in the graph.

- w represents the number of weeks that Jack saves.
- t represents the total amount saved, in dollars.



Determine whether each statement is true. Select True or False for each statement.

Statement	True	False
Jack saved a total of \$12 at the end of week 2.		
The equation $t = 6w$ represents the relationship between the number of weeks and the total amount saved.		
The total amount of money Jack saves depends on the number of weeks that Jack saves.		

Rubric: (1 point) Student correctly identifies each statement as being either true or false (e.g., T, T, T).

Response Type: Matching Tables

Task Model 2

Response Type:
Equation/Numeric

DOK Level 2

6.EE.C.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.

Evidence Required:

2. The student identifies the relationship between dependent and independent variables from graphs and tables and relates them to equations.

Tools: Calculator

Prompt Features: The student is prompted to use a table or a graph to analyze a relationship between two quantities.

Stimulus Guidelines:

- Table and graph values should be linear in the form of $y = kx$ or $y = x \pm c$ where k and c are positive rational numbers.
- Tables should have three to five rows of data.
- The coordinate plane should be limited to Quadrant I.
- Context should be familiar to students 11 to 13 years old.

TM2c

Stimulus: The student is presented with a relationship between two quantities represented by a table or a graph.

Example Stem 1: Jack saves the same amount of money each week as shown in the table.


- Let w represent the number of weeks that Jack saves.
- Let t represent the total amount saved, in dollars.

Number of Weeks <i>w</i>	Total Amount Saved <i>t</i>
1	\$ 6
2	\$12
3	\$18
4	\$24

Enter the total amount of money, in dollars, that Jack saves after 6 weeks.

Rubric: (1 point) Student enters the correct value (e.g., 36).

Response Type: Equation/Numeric

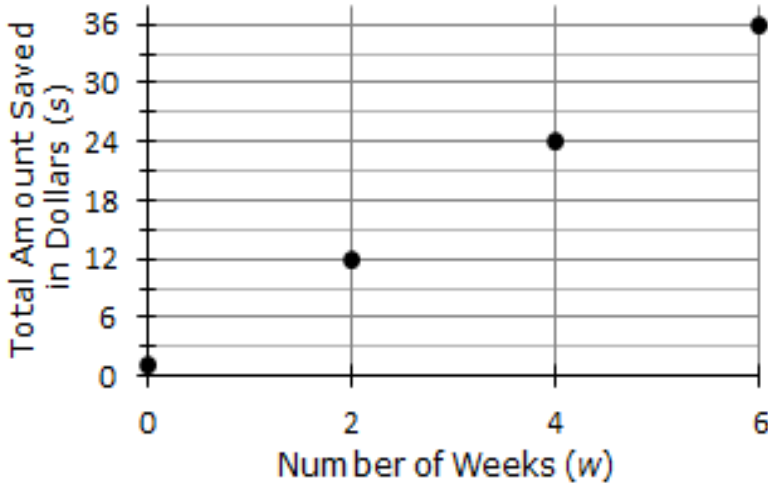
<p>Task Model 2</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other 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.</p> <p>Evidence Required: 2. The student identifies the relationship between dependent and independent variables from graphs and tables and relates them to equations.</p> <p>Tools: Calculator</p>	<p>Example Stem 2: Jack saves the same amount of money each week as shown in the graph.</p> <ul style="list-style-type: none"> • Let w represent the number of weeks that Jack saves. • Let s represents the total amount saved, in dollars. <div style="text-align: center;">  </div> <p>Enter the total amount of money, in dollars, that Jack saves after 6 weeks.</p> <p>Rubric: (1 point) Student enters the correct value (e.g.,36).</p> <p>Response Type: Equation/Numeric</p>
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<p>Task Model 2</p> <p>Response Type: Fill-in Table</p> <p>DOK Level 2</p> <p>6.EE.C.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.</p> <p>Evidence Required: 2. The student identifies the relationship between dependent and independent variables from graphs and tables and relates them to equations.</p> <p>Tools: Calculator</p>	<p>Prompt Features: The student is prompted to complete a table to represent the relationship between two quantities.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> • Table values should be linear in the form of $y = kx$ or $y = x \pm c$ where k and c are positive rational numbers. • Tables should have three to five rows of data. • Context should be familiar to students 11 to 13 years old. <p>TM2d Stimulus: The student is presented with independent or dependent variables in the form of a table.</p> <p>Example Stem: The band members are selling chocolate bars for a fundraiser. The amount of money collected for each box of bars sold is the same.</p> <ul style="list-style-type: none"> • Let n represent the number of boxes sold. • Let d represent the amount of money collected, in dollars. <table border="1" style="margin: 10px auto; text-align: center;"> <thead> <tr> <th>Number of Boxes Sold n</th> <th>Amount of Money Collected, in Dollars d</th> </tr> </thead> <tbody> <tr> <td></td> <td>30</td> </tr> <tr> <td>2</td> <td></td> </tr> <tr> <td>3</td> <td>90</td> </tr> <tr> <td>4</td> <td>120</td> </tr> <tr> <td>6</td> <td></td> </tr> </tbody> </table> <p>Fill in the table for all missing values of n and d.</p> <p>Rubric: (1 point) Student correctly enters all missing values in the table (e.g., 1, 60, and 180).</p> <p>Response Type: Fill-in Table</p> <p>Adapted from http://www.illustrativemathematics.org/standards/k8.</p>	Number of Boxes Sold n	Amount of Money Collected, in Dollars d		30	2		3	90	4	120	6	
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Number of Weeks (w)	Total Amount Saved in Dollars (s)										
0	0										
2	12										
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6	36										