

### ELG 6.7: Represent and analyze quantitative relationships between dependent and independent variables.

#### Vertical Progression:

4 <sup>th</sup> Grade	<p><b>4.OA.C Generate and analyze patterns.</b></p> <ul style="list-style-type: none"> <li>○ <b>4.OA.C.5</b> Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.</li> </ul>
5 <sup>th</sup> Grade	<p><b>5.OA.A Write and interpret numerical expressions.</b></p> <ul style="list-style-type: none"> <li>○ <b>5.OA.A.2</b> Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as <math>2 \times (8 + 7)</math>. Recognize that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.</i></li> </ul> <p><b>5.OA.B Analyze patterns and relationships</b></p> <ul style="list-style-type: none"> <li>○ <b>5.OA.B.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.</li> </ul>
6 <sup>th</sup> Grade	<p><b>ELG 6.7 Represent and analyze quantitative relationships between dependent and independent variables.</b></p> <ul style="list-style-type: none"> <li>○ <b>6.EE.C.9</b> 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. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation <math>d = 65t</math> to represent the relationship between distance and time.</i></li> </ul>
7 <sup>th</sup> Grade	<p><b>ELG 7.4 Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</b></p> <ul style="list-style-type: none"> <li>○ <b>7.EE.B.3</b> Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies</li> <li>○ <b>7.EE.B.4</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</li> <li>○ <b>7.EE.B.4.a</b> Solve word problems leading to equations of the form <math>px + q = r</math> and <math>p(x + q) = r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. <i>For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?</i></li> </ul>

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#### Students will demonstrate command of the ELG by:

- Writing an equation to represent the relationship of two quantities in a real-world problem
- Using tables and graphs to analyze the relationship between two quantities
- Making connections among the table, graph, and equation that represents the relationship between two quantities
- Identifying the dependent and independent variables in a situation

#### Vocabulary:

- dependent variable
- independent variable
- equation
- variable

#### Sample Instructional/Assessment Tasks:

##### 1) Standard(s): 6.EE.C.9

**Source:** Adapted from <https://www.illustrativemathematics.org/content-standards/6/EE/C/9/tasks/806>

##### Item Prompt:

Stephanie is helping her band collect money to fund a field trip. The band decided to sell boxes of chocolate bars. Each bar sells for \$1.50 and each box contains 20 bars. Below is a partial table of monies collected for different numbers of boxes sold.

Boxes Sold, $b$	Money Collected, $m$
1	\$30.00
2	
3	
4	
5	\$150.00
6	
7	
8	

- Complete the table above for values of  $m$ .
- Write an equation for the amount of money,  $m$ , that will be collected if  $b$ , boxes of chocolate bars are sold. Which is the independent variable and which is the dependent variable?
- Graph the equation using the ordered pairs from the table above.
- Calculate how much money will be collected if 100 boxes of chocolate bars are sold.
- The band collected \$1530.00 from chocolate bar sales. How many boxes did they sell?

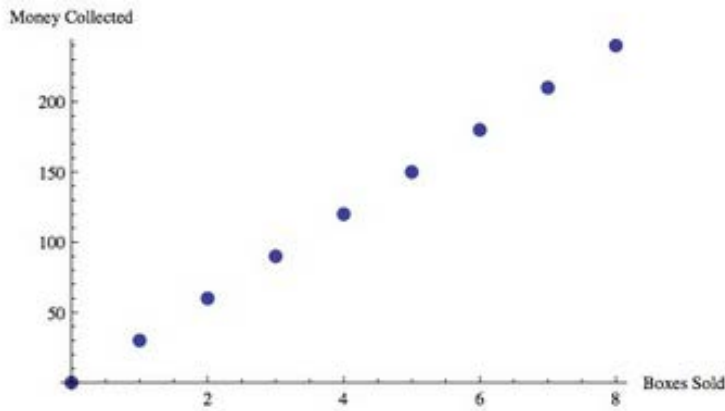
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**Correct Answer:**

Boxes Sold ( $b$ )	Money Collected ( $m$ )
1	\$30.00
2	\$60.00
3	\$90.00
4	\$120.00
5	\$150.00
6	\$180.00
7	\$210.00
8	\$240.00

b.  $m = 30b$

c.



d. \$3000

e. 51 boxes

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**2) Standard(s): 6.EE.C.9**

Source: Engage NY <https://www.engageny.org/file/14626/download/math-g6-m4-teacher-materials.pdf>

**Item Prompt:**

Kyla spends 60 minutes of each day exercising. Let  $d$  be the number of days, and let  $m$  represent the total minutes of exercise in a given time frame. Show the relationship between the number of days and the total minutes of each exercise.


Independent Variable \_\_\_\_\_

Dependent Variable \_\_\_\_\_

Equation \_\_\_\_\_

**Solution:**

Kyla spends 60 minutes of each day exercising. Let  $d$  be the number of days, and let  $m$  represent the total minutes of exercise in a given time frame. Show the relationship between the number of days and the total number of minutes.

Tables may vary.

<i># of Days</i>	<i># of Minutes</i>
<b>0</b>	<b>0</b>
<b>1</b>	<b>60</b>
<b>2</b>	<b>120</b>
<b>3</b>	<b>180</b>
<b>4</b>	<b>240</b>

Independent Variable Number of Days

Dependent Variable Total Number of Minutes

Equation  $m = 60d$