Homework

Unit 3 · Lesson 9: Constant of Proportionality

Name: _____

Date: _____

Objective: *Identify the constant of proportionality and write in equation form.*

Vocabulary

Proportional Relationship: a relationship between two equal ratios

$$\frac{5 \text{ apples}}{2 \text{ dollars}} = \frac{20 \text{ apples}}{8 \text{ dollars}}$$

Written form is $y = kx$; where k is constant, using the ordered data pairs (x, y).

Constant of Proportionality: the factor multiplied by the x-value to get the corresponding y-value. The unit rate and constant of proportionality both represent the value of the ratio of $y : x$.

$$y = kx$$

k is the constant of proportionality.

$$k = \frac{y}{x}$$

Steps:

To find the constant of proportionality, use the following:

Table: convert one entry to a ratio; the equivalent fraction with 1 in the denominator is the constant of proportionality.

Coordinate Plane: write one coordinate (x, y) as the fraction $\frac{y}{x}$; the equivalent fraction with 1 in the denominator is the constant of proportionality.

Linear Equation $y = kx$: the coefficient k is the constant of proportionality.

Verbal Description: the constant of proportionality is the unit rate.

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Directions: Identify the constant of proportionality and create an equation that represents the relationship.

Example # 1

The amount of sugar needed for a cookie recipe is proportional to the number of cookies, as shown in the table. What is the constant of proportionality?

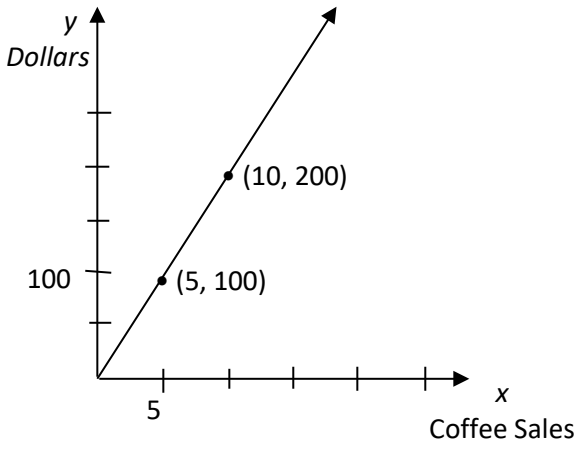
Sugar (tbsp)	Cookies
2	12
3	18
4	24

Solution:

- Identify the unit rate using words: $\frac{\text{cookies}}{\text{tbsp sugar}}$
- Identify the given ratios: $\frac{\text{cookies}}{\text{tbsp sugar}} \rightarrow \frac{12}{2}, \frac{18}{3}, \frac{24}{4}$
- Identify the unit rate: $\frac{12}{2}=\frac{6}{1}$, $\frac{18}{3}=\frac{6}{1}$, $\frac{24}{4}=\frac{6}{1}$
- The constant of proportionality is $\frac{6}{1}$ or 6.
- The equation to represent this proportional relationship is: $y = 6x$.

Example # 2

The graph below shows Jerry's earnings for coffee sales. Find and interpret the constant of proportionality.



Solution:

- Identify the units being used: He earns y dollars for x coffee sales.
- Unit rate in words: $\frac{y \text{ dollars}}{x \text{ coffee sales}}$.
- Identify the unit rates for each given data point, $\frac{100}{5}=\frac{20}{1}$ and $\frac{200}{10}=\frac{20}{1}$.
- The constant of proportionality for the given data points is $\frac{20}{1}$.
- The unit rate means that Jerry earns $20 per coffee sale.
- The proportional relationship between what Jerry earns for coffee sales can identified by the equation $y = 20x$.

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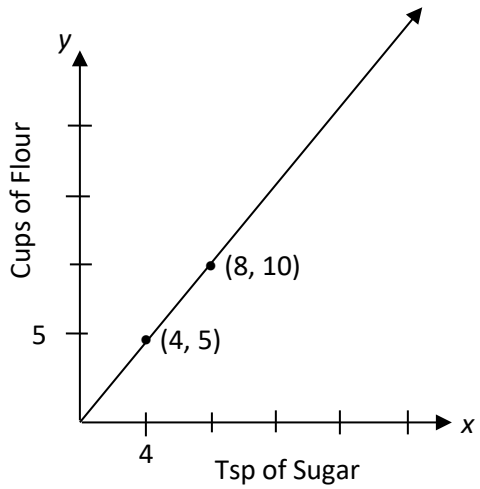
Directions: Determine the constant of proportionality and create an equation.

1. The amount of oil needed for a bread recipe is proportional to the quantity of nuts, as shown in the table.

Oil x	Nuts y	$\frac{y}{x}$
2	$\frac{1}{3}$	
3	$\frac{1}{2}$	
4	$\frac{2}{3}$	

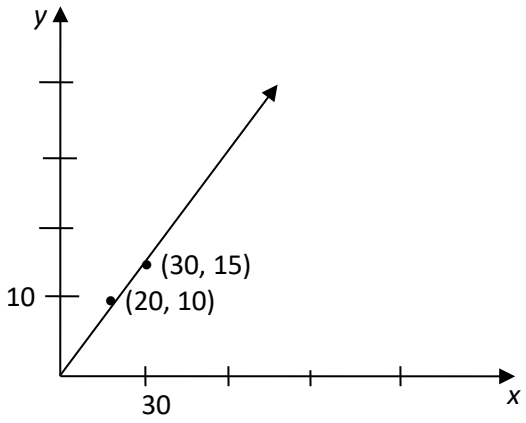
2. The graph below shows the proportions of sugar to flour in Fran's cake recipe.



3. The number of miles that Matt bikes is proportional to the number of hours that he rides.

Miles x	Hours y	$\frac{y}{x}$
4	6	
18	27	
12	18	

4. The graph shows a proportional relationship between y and x.



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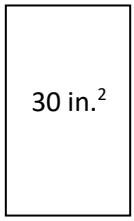
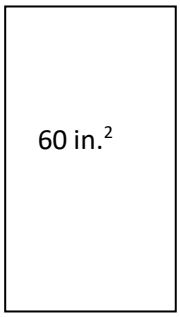
5. The price of a poster is proportional to its area.



$20



$40

6. The amount of beans needed for a soup recipe is proportional to the amount of water. Two cups of lentils are needed for every eight cups of water.

Explain the steps you used to solve problem number _____.

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