

7thth Grade Math

Module 1: Ratios and Proportional Relationships

Math Parent Letter

This document is created to give parents and students a better understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material which is taught in the classroom. Module 1 of Eureka Math (Engage New York) builds on ratios, rates, and unit rates to formally define proportional relationships and the constant of proportionality.



Focus Area Topic B:

Unit Rate & Constant of Proportionality

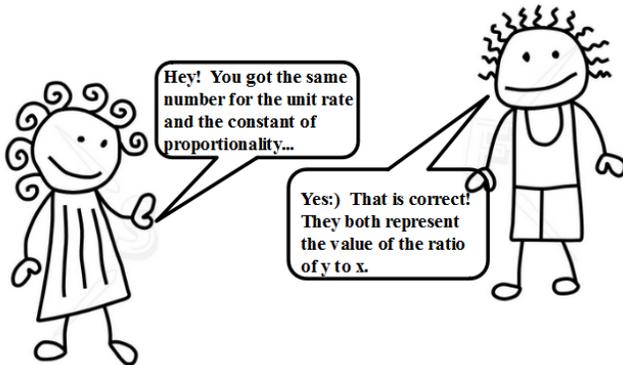
Words to Know:

Constant of Proportionality- If a proportional relationship is described by the set of ordered pairs that satisfies the equation $y = kx$, where k is a positive constant, then k is called the constant of proportionality; e.g., If the ratio of y to x is 2 to 3, then the constant of proportionality is $2/3$ and $y = 2/3 x$.

Constant – Specifies a unique number.

Variable – A placeholder for where we might expect to see a number.

Equivalent Ratios - Ratios that have the same value.



CAUTION

Savannah used proportional reasoning to determine how many students could attend a field trip according to the cost. Savannah determined that 8.5 students could attend the field trip. **Does this make sense? Can 0.5 of a student attend the field trip?**

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Constant of Proportionality

Students learn to identify the constant of proportionality by finding the unit rate in a collection of equivalent ratios.

Example Problem and Answer

The Cougar Basketball team was raising money to attend a basketball tournament at Disney World. They decided to sell stuffed bread. James sold 22 stuffed breads and submitted \$99. Michael sold 18 breads for \$81. Sam sold 35 breads for \$157.50. Isaac sold 15 breads for \$67.50.

Create a chart to represent the number of breads sold, money submitted, and the constant of proportionality.

Solution:

# Breads	Money Submitted	
22	\$99	$\frac{99}{22} = 4.5$
18	\$81	$\frac{81}{18} = 4.5$
35	\$157.50	$\frac{157.50}{35} = 4.5$
15	\$67.50	$\frac{67.50}{15} = 4.5$

The constant of proportionality is 4.5.

Question: What is the meaning of the constant of proportionality?

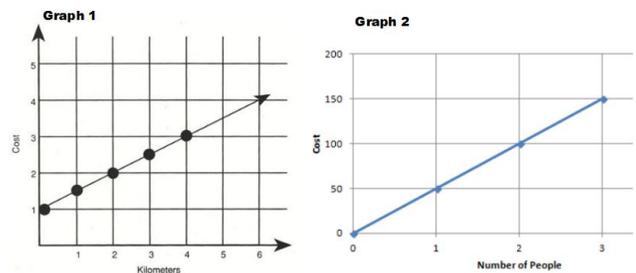
Answer: For each bread sold, a player submitted \$4.50.

Question: If Joe sold 42 breads, how much money would he submit?

Solution & Answer: $42 \times \$4.50 = \189 ; Joe would submit \$189.



One graph is proportionate, one is not. Which is proportionate? How do you know?



Answer: Graph 2 is proportionate because it passes through the origin and contains the point (1, 50) representing the unit rate of \$50 for every person.

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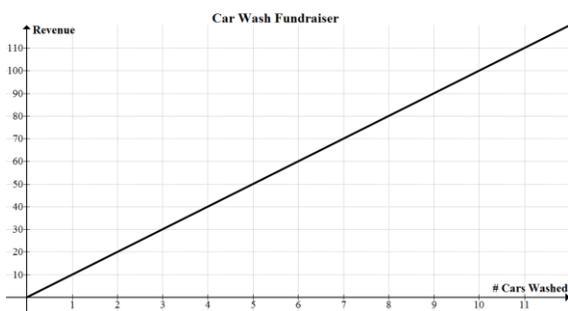
Unit Rate & Constant of Proportionality



Students derive the constant of proportionality from the description of a real-world context and relate the equation representing the relationship to a corresponding ratio table and/or graphical representation.

Example Problem and Answer

The Lady Lion softball team needed to raise money to fund travel expenses for their playoff game in Monroe. The Lady Lions conducted a car wash at the Acadiana Mall. Below is a graph representing a portion of the revenue made from the car wash.



Task:

Write at least 4 ordered pairs from the graph and explain the meaning of each coordinate related to the scenario.

Solution:

(1, 10) means 1 car was washed for \$10 of revenue
 (3, 30) means 3 cars were washed for \$30 of revenue
 (7, 70) means 7 cars were washed for \$70 of revenue
 (10, 100) means 10 cars were washed for \$100 of revenue

Question:

In this scenario, which is the dependent variable – number of cars washed or revenue?

Answer:

The revenue is the dependent variable because the revenue made in the fundraiser depends on the number of cars washed.

Note: The unit rate (from Topic A) is the Constant of Proportionality.

Task:

Determine the constant of proportionality and explain what it means in this scenario.

Answer:

The constant of proportionality is 10/1 which means the Lady Lions received \$10 of revenue for each car washed.

Task:

Write an equation to represent the relationship.

Answer:

$R = 10C$; R represents Revenue; C represents # of Cars

Focus Area Topic B:

Unit Rate & Constant of Proportionality

Example Problem and Solution

Jada and her mom are making apple pies for the school fair. They have purchased apples by the pound and created a chart of the pounds of apples purchased and the cost.

Pounds of Apples	Cost
2	\$3
5	\$7.50
6	\$9
9	
	\$16.50

Task:

Fill in the missing values of the chart.

Answer: 9 pounds costs \$13.50; You can purchase 11 pounds for \$16.50

Question:

Is cost of the apples proportionate to the pounds purchased? If yes, state the constant of proportionality and its meaning.

Answer & Solution:

Yes, cost is proportional to pounds purchased because every ratio of cost to number of pounds of apples is the same. The constant of proportionality is \$1.50. This means the cost per pound of apples is \$1.50

$$\frac{3}{2} = 1.5 \quad \frac{7.5}{5} = 1.5 \quad \frac{9}{6} = 1.5$$

Task:

Write an equation that will relate to the pounds of apples purchased and the cost.

Solution:

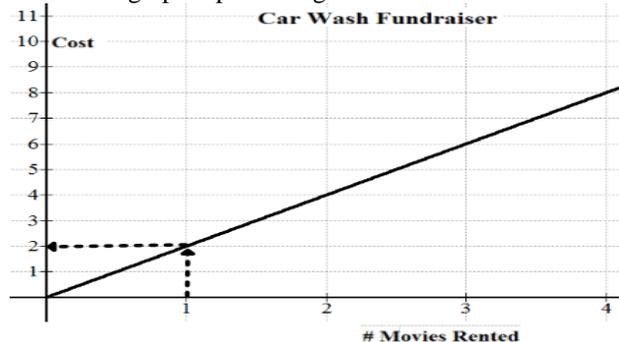
$C = 1.5A$; C represents the cost; A represents the amount of pounds purchased. *The constant of proportionality is the multiplier of the equation.*

Question: If Jada bought 16 pounds of apples, what would be the cost?

Solution & Answer: $C = 1.5(16)$; $C = 24$; The cost would be \$24



Below is a graph representing Movie Rentals and Cost.



Note: The unit rate is must be the value of the y-coordinate of the point on the graph, which has an x-coordinate of one.

Question: Which ordered pair represents the unit rate?

Answer: (1, 2); see the dotted arrows on the graph for guidance.

