



# MATH NEWS



Grade 7, Module 1, Topic A

## 7th<sup>th</sup> 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 A:

*Proportional Relationships*

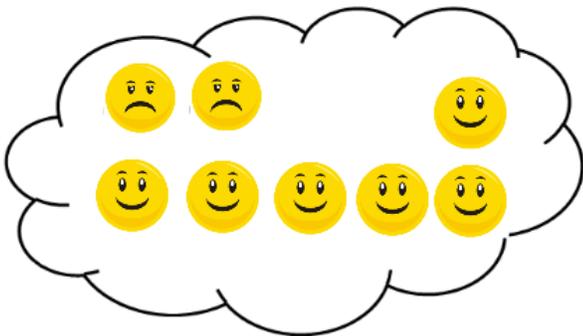
#### Words to Know:

**Ratio** - A pair of nonnegative numbers, A:B, where both are not zero, and that are used to indicate that there is a relationship between two quantities such that when there are A units of one quantity, there are B units of the second quantity.

**Rate** - A rate indicates, for a proportional relationship between two quantities, how many units of one quantity there are for every 1 unit of the second quantity. For a ratio of A:B between two quantities, the rate is A/B units of the first quantity per unit of the second quantity.

**Unit Rate** - The numeric value of the rate, e.g., in the rate 2.5 mph, the unit rate is 2.5.

**Equivalent Ratios** - Ratios that have the same value.



Three ratios that can be written:  
2 frown faces to 6 smiley faces  
1 frown face to 3 smiley faces  
6 smiley faces to 8 total faces  
**Can you make one more?**

### Focus Area Topic A:

*Proportional Relationships*

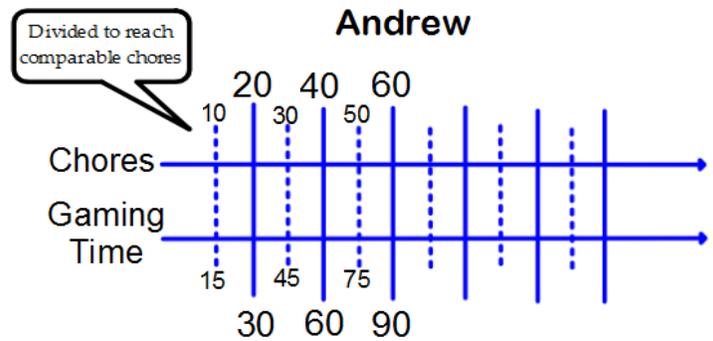
#### Computing Unit Rate

Students are reintroduced to the meanings of value of a ratio, equivalent ratios, rate, and unit rate through a collaborative work task where they record their rates choosing an appropriate unit of rate measurement.

#### Example Problem and Answer

Andrew's parents allow him 30 minutes of gaming time for every 20 chores he completes. Michael, Andrew's older brother, receives 1 hour of gaming for every 50 chores he completes. If both boys complete the same amount of chores, do the boys get the same amount of gaming time? Does one get more gaming time? If so, which boy gets more gaming time? Calculate the unit rate.

Some students may begin by creating a double number line to represent equivalent ratios of chores to gaming time of Andrew's chores to gaming time:



From this double number line, if both boys complete 50 chores, Andrew would receive 75 minutes of gaming and Michael 60 minutes of gaming.

Below is a table utilized to compute the unit rate.

	# chores	Time of Gaming (in minutes)	Ratio of chores to gaming time	Rate	Unit Rate
Andrew	20	30	20 to 30 or 20:30 or equivalent ratio	Approximately 0.67 chores per minute	0.67
Michael	50	60	50 to 60 or 50:60 or equivalent ratio	Approximately 0.83 chores per minute	0.83

Also, from the table, students can notice that the unit rate is not the same for both boys.



## Focus Area Topic A:

### *Proportional Relationships*



Students conceptualize that two quantities are proportional to each other when there exists a constant such that each measure in the first quantity multiplied by this constant gives the corresponding measure in the second quantity.

#### Example Problem and Answer

Jelly Beans can be purchased by the ounce at Bridget's Candy Shop. John has a family of five. The table below represents the weight of jelly beans purchased by John's family and the total cost.

Weight (ounces)	12	14.5	8	10	20
Cost (\$)	7.20	8.70	4.80	6	12

#### Question:

Does everyone pay the same cost per ounce? How do you know?

#### Solution:

Divide each cost value by its corresponding weight.

$$\$7.20 \div 12 = \$0.60$$

$$\$8.70 \div 14.5 = \$0.60$$

$$\$4.80 \div 8 = \$0.60$$

$$\$6.00 \div 10 = \$0.60$$

$$\$12.00 \div 20 = \$0.60$$

Yes, it costs \$0.60 per ounce. Since we want to compare cost per ounce, we can use the unit rate to determine that we want to divide each cost value by each corresponding weight value.

#### Question:

Sam decides he wants more jelly beans to bring home for another time. Sam places his jelly beans on the scale, it weighs 6 ounces. If everyone pays the same rate in this store, how much will his jelly beans cost? How will you calculate the cost?

#### Solution:

\$3.60; 6 ounces multiplied by \$0.60 per ounce

#### Question:

Is the cost proportional to the weight? How do you know?

#### Answer:

Yes, since the cost per ounce is the same for each, it is proportional.

#### Question:

What would the cost be for 0 ounces of jelly beans? Does the relationship from above hold true for 0 ounces?

#### Answer:

\$0; yes, 0 ounces multiplied by \$0.60 = \$0

## Focus Area Topic A:

### *Identifying Proportional & Non-Proportional Relationships through Tables and Graphs*

Students will apply basic understanding by examining situations to decide whether two quantities have a proportional or non-proportional relationship by first checking for a constant multiple between measures of the two quantities, when given a table, and then by graphing on the coordinate plane.

#### Example Problem and Solution

The library charges a late fee of \$0.10 per day for overdue books.

#### Task:

Create a table relating the fee to the number of days overdue.

Number of Days Overdue	Total Fee
1	\$0.10
2	\$0.20
5	\$0.50
6	\$0.60
8	\$0.80
15	\$1.50

#### Question:

Based on the table you created, is the fee proportional to the number of days overdue? How do you know?

#### Answer & Solution:

Yes, fee is proportional to number of days overdue because every ratio of fee to number of days is the same. The ratio is \$0.10.

$$\frac{0.10}{1} = 0.10 \quad \frac{0.20}{2} = 0.10 \quad \frac{0.50}{5} = 0.10 \quad \frac{0.60}{6} = 0.10$$

$$\frac{0.80}{8} = 0.10 \quad \frac{1.50}{15} = 0.10$$



#### Example Problem and Solution

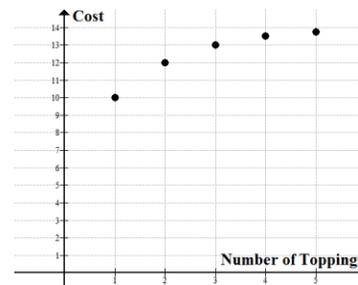
The information below represents the number of toppings on a pizza to the total cost of the pizza.

1 to 10	Total cost of 5 toppings is \$13.75 So 5/\$13.75	2:12	3 to 13	4 /\$13.50
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#### Task:

Create a table then graph and explain if the quantities are proportional to each other or not.

Number of Toppings	Cost
1	\$10
2	\$12
3	\$13
4	\$13.50
5	\$13.75



The graph is not a straight line passing through the origin so the quantities are not proportional to each other. The cost varies depending on the number of toppings.