# Eureka Math<sup>™</sup> Tips for Parents

## Grade 6 Module 1

### Ratios and Unit Rates

In this 29-lesson module, students are introduced to ratios and rates and use ratio language and notation to solve real-world problems. Students will explore tape diagrams, double number line diagrams, ratio tables, equations and the coordinate plane to develop deep understanding, enabling them to become proficient and confident mathematicians in middle school.



#### Key Words

*Ratio:* A pair of nonnegative numbers, A:B, where both are not zero, and describes a relationship between the quantities.

*Rate:* Indicates how many units of one quantity there are for every 1 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.

**Rate unit:** The unit of measure of the rate. (e.g. in the rate 2.5 mph, the rate unit is miles per hour)

*Equivalent Ratios*: Ratios tha have the same value.

*Percent:* Percent of a quantity is a rate per 100.

Associated Ratios: Ratios that are related, e.g. if the ratio of the number of boys to the number of girls is 1:2, we can also determine the ratio of the number of girls to the total number of children is 2:3. We can further determine the ratio of the number of girls to the number of boys is 2:1.

**Double Number Line Diagrams:** A math model that is often used when quantities have different units and is a visual representation for showing multiple equivalent ratios.

**Ratio Table:** A table listing pairs of numbers that represent equivalent ratios.

*Tape Diagrams:* Drawings that look like a segment of tape, used to illustrate number relationships. Also known as strip diagrams, bar model, fraction strip, or length model.

## + How Can You Help At Home?

- Ask your child what they learned in school today and ask them to show you an example.
- Reinforce fast recall of multiplication and division facts by playing math games using flashcards. See how many facts your child can answer in 20 seconds. Then, see if they can answer more questions the next time by playing again!

#### What Came Before this Module:

In Grade 5, students studied multiplicative comparisons, which is the foundation for their understanding of comparing quantities in a ratio relationship. In addition, students worked to develop fluency in operations with whole numbers, fractions and decimals.

#### What Comes After this Module:

Students will divide fractions using various strategies and arithmetic operations.

## Key Common Core Standards:

- Understand ratio concepts and use ratio reasoning to solve problems.
  - Use ratio language to describe the relationship between two quantities.
  - Use rate language in the context of a ratio relationship.
  - Solve real-world problems using ratio and rate reasoning.

## Model in the Spotlight! Double Number Line

Suppose you want to determine how many pages of homework Megan will complete in 8 hours if she can complete 3 pages in 2 hours, assuming she completes the homework at a constant rate.

You can represent the situation using a double number line diagram to visibly show the ratio relationship of 3 pages for every 2 hours. If you extend the double number line diagram, you can see that in 8 hours, Megan will complete 12 pages of homework.



## Welcome to A Story of Ratios!

Grade 6

Module

There are several models used in *A Story of Ratios* that will foster deep knowledge of important concepts in middle school mathematics.

#### Read on to learn a little bit about Eureka Math, the creators of A Story of Ratios:

*Eureka Math* is a complete, PreK–12 curriculum and professional development platform. It follows the focus and coherence of the Common Core State Standards (CCSS) and carefully sequences the progression of mathematical ideas into expertly crafted instructional modules.

This curriculum is distinguished not only by its adherence to the CCSS; it is also based on a theory of teaching math that is proven to work. That theory posits that mathematical knowledge is conveyed most effectively when it is taught in a sequence that follows the "story" of mathematics itself. This is why we call the middle school portion of *Eureka Math* "*A Story of Ratios*." The sequencing has been joined with methods of instruction that have been proven to work, in this nation and abroad. These methods drive student understanding beyond process, to deep mastery of mathematical concepts.

The goal of *Eureka Math* is to produce students who are not merely literate, but fluent, in mathematics. Your student has an exciting year of discovering the story of mathematics ahead!

Sample Problem from Module 1: (Example taken from Module 1, Lesson 8)

Your middle school has 900 students.  $\frac{1}{3}$  of the students bring their lunch instead of buying lunch at school. What is the value of the ratio of the number of students who do bring their lunch to the number of students who do not?





First I created a tape diagram. In the tape diagram  $\frac{1}{3}$  of the students bring their lunch instead of buying lunch at school. I determined that 300 students bring their lunch, leaving 600 students who buy their lunch. One unit of the tape diagram represents 300, and 2 units of the tape diagram represent 600. This creates a ration of 1:2. As such, the value of the ratio of the number of students who bring their lunch to the number of students who buy their lunch is  $\frac{1}{2}$ .



# Eureka Math™Tips for Parents

## Grade 6 Module 2

#### Arithmetic Operations Including Division of Fractions

In this 19-lesson module, students complete their understanding of the four operations as they study division of whole numbers, division by a fraction, division of decimals and operations on multi-digit decimals. This expanded understanding serves to complete their study of the four operations with positive rational numbers, preparing students for understanding, locating, and ordering negative rational numbers and working with algebraic expressions.

Below is an example of how a fraction bar model can be used to represent the quotient in a division problem.

$$\frac{3}{4} \div \frac{1}{12}$$

Draw a model to represent the quotient.



The chart below shows the relationships between various fractions and may be a great tool for your child throughout this module.



What Came Before this Module: Students added, subtracted and multiplied fractions and decimals (to the hundreths place). They divided a unit fraction by a non-zero whole

number as well as divided a whole

number by a unit fraction.

What Comes After this Module: Students will extend the number line (both horizontally and vertically) to include the opposites of whole numbers and will use the number line as a model to relate integers and other rational numbers to statements of order in real-world contexts.

#### Key Words

*Greatest Common Factor:* The greatest common factor of two whole numbers (not both zero) is the greatest whole number that is a factor of each number. For example, the GCF of 24 and 36 is 12 because when all of the factors of 24 and 36 are listed, the largest factor they share is 12.

Least Common Multiple: The least common multiple of two whole numbers is the least whole number greater than zero that is a multiple of each number. For example, the LCM of 4 and 6 is 12 because when the multiples of 4 and 6 are listed, the smallest or first multiple they share is 12.

*Multiplicative Inverses*: Two numbers whose product is 1 are multiplicative inverses of one another. In the example below, three-fourths and four-thirds are multiplicative inverses of one another because their product is 1.

 $\frac{3}{4} \times \frac{4}{3} = \frac{4}{3} \times \frac{3}{4} = 1$ 

### + How Can You Help At Home?

- Ask your child what they learned in school today and ask them to show you an example.
- Reinforce fast recall of multiplication and division facts by playing math games using flashcards. See how many facts your child can answer in 25 seconds. Then, see if they can answer more questions the next time by playing again!
- Challenge your child to create three different examples of multiplicative inverses using the example given in the *Key Words* section of this newsletter.

## Key Common Core Standards:

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
  - Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
- Compute fluently with multi-digit numbers and find common factors and multiples.
  - Fluently divide multi-digit numbers using the standard algorithm.
  - Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
  - Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1 100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

#### Eureka Math, A Story of Ratios

Our model in the spotlight is the **area model**. This model helps break a problem into smaller parts, making the problem easier to understand and solve. The key feature of the area model used in this module is that it represents the quotient of two numbers as a rectangular region comprised of unit squares. Below is a problem that can be solved using an area model. The solution is also shown below.

**Problem:** Imagine that you have  $\frac{2}{5}$  of a cup of frosting that you need to share equally between three desserts. How would you write this as a division question?



Below are examples of how to use a *fraction bar* and a *number line* to solve problems seen in this module.

Fraction Bar Example:





Here we have 4 groups of  $\frac{2}{9}$ . Therefore, the answer is 4.

Number Line Example:

Molly's friend Xavier purchased  $\frac{11}{8}$  cups of strawberries, and he eats  $\frac{3}{4}$  cup servings. How many servings has he purchased?



There are 1 and  $\frac{5}{6}$  servings.





## Grade 6 Module 2

Spotlight on a

model

frequently

used in this

For more information visit commoncore.org