Dear Family,
The next unit in your child's course of study in mathematics class this year is *Let's Be Rational*. This is the second of three number units that focus on developing concepts and procedures for fractions, decimals, and percents.

UNIT GOALS

In this unit, the focus is on understanding and developing systematic ways to add, subtract, multiply, and divide fractions. While working on this unit, students investigate many interesting problem situations. Out of these experiences, students will develop algorithms for fraction computation. In addition, students will use number sense, benchmarks, and operation sense to estimate solutions for computational situations to decide if exact answers are reasonable. Computations with decimals and percents will be the focus of a later unit, *Decimal Operations*.

HELPING WITH HOMEWORK

You can help with homework and encourage sound mathematical habits as your child studies this unit by asking questions such as:

- *What models or diagrams might be helpful in understanding the situation and the relationships among the quantities in the problem?*
- *What models or diagrams might help decide which operation is useful in solving a problem?*
- *What is a reasonable estimate for the answer?*
- *What strategies or algorithms would help you solve this problem?*

In your child's notebook, you can find worked-out examples from problems done in class, notes on the mathematics of the unit, and descriptions of the vocabulary words.

HAVING CONVERSATIONS ABOUT THE MATHEMATICS IN *LET'S BE RATIONAL*

You can help your child with his or her work for this unit in several ways:

- There are many different approaches for adding, subtracting, multiplying, and dividing fractions. At times, students may be working with ideas and algorithms that are different from the ones you learned. Be open to these approaches. Encourage your child to share these methods with you as a way to help them make sense of what they are studying.
- Ask your child to tell you about a problem that he or she has enjoyed solving. Ask for an explanation of the ideas in the problem.
- Look over your child's homework and make sure all questions are answered and explanations are clear.

COMMON CORE STATE STANDARDS

While all of the Standards for Mathematical Practice are cultivated by teachers and developed by students throughout the curriculum, students spend significant time modeling the mathematics through diagrams, number lines, and symbolic representations. *Let's Be Rational* focuses largely on understanding when and how to use algorithms for computing fractions with all four operations (addition, subtraction, multiplication and division).

A few important mathematical ideas that your child will learn in *Let's Be Rational* are given on the back.

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As always, if you have any questions or concerns about this unit or your child's progress in class, please feel free to call. All of us here are interested in your child and want to be sure that this year's mathematics experiences are enjoyable and promote a firm understanding of mathematics.

Sincerely,

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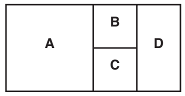
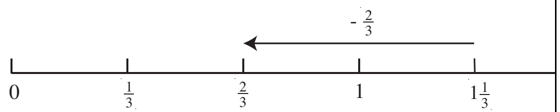
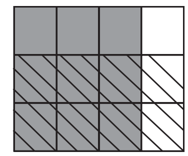
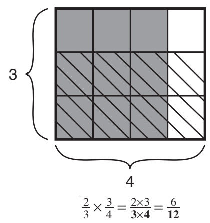
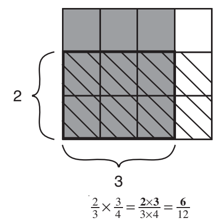
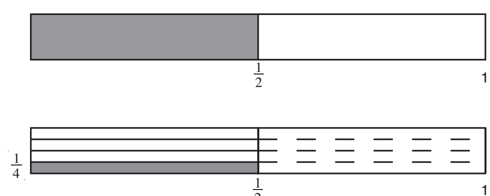
Important Concepts	Examples
Addition and Subtraction of Fractions Students model and symbolize problems to develop meaning and skill in addition and subtraction. Students learn to find common denominators so that the numerators can be added or subtracted.	 To find the sum of A + B on the rectangle, or $\frac{1}{2} + \frac{1}{8}$, students need to use equivalent fractions to rename $\frac{1}{2}$ as $\frac{4}{8}$. The area model helps students visualize A, $\frac{1}{2}$, as 4 eighth-size sections or $\frac{4}{8}$. By writing the number sentence, $\frac{4}{8} + \frac{1}{8} = \frac{5}{8}$, students see why it is necessary to rename fractions when adding and subtracting. The *number-line model* helps make the connection to fractions as numbers or quantities. This number line illustrates $1\frac{1}{3} - \frac{2}{3} = \frac{2}{3}$. 
Developing the Multiplication Algorithm Students notice that multiplication is easy for proper fractions because they can just multiply the numerators and multiply the denominators. Models can support understanding why this works.	An area model can show $\frac{2}{3} \times \frac{3}{4}$. Shade a square to show $\frac{3}{4}$. To represent taking $\frac{2}{3}$ of $\frac{3}{4}$, cut the square into thirds the opposite way and use hash marks on two of the three sections. The overlap sections represent the product, $\frac{6}{12}$.  The <u>denominators</u> partition and repartition the whole. Breaking the fourths into three parts each makes 12 pieces.   The <u>numerator</u> is keeping track of how many of the parts are being referenced. You need to take 2 out of 3 sections from each $\frac{1}{4}$ part. This can be represented by the product of the numerators 2 × 3. In the algorithm, when you multiply the denominators (3 × 4), you are resizing the whole to have the correct number of parts.
Developing a Division Algorithm As students work toward trying to develop and use algorithms they may need to continue to draw pictures to help them think through the problem. Our goal in the development of algorithms is to help students develop an efficient algorithm. Students may have various ways to think about division of fractions.	<u>Multiplying by the Denominator and Dividing by the Numerator</u>. With $9 \div \frac{1}{3}$, the reasoning follows: I have to find the total number of $\frac{1}{3}$s in 9. There are three $\frac{1}{3}$s in 1, so there are 9 × 3 of the $\frac{1}{3}$s in 9. $9 \div \frac{1}{3} = 9 \times 3 = 27$. With $\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times 4 \div 3$. Multiplying by 4 tell how many $\frac{1}{4}$s are in a whole. Dividing by 3 adjusts this to account for needing 3 of the $\frac{1}{4}$s in this problem. Multiplying by the denominator of the divisor then dividing by the numerator is the same as multiplying by the reciprocal. So, $\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times 4 \div 3 = \frac{2}{3} \times \frac{4}{3}$.
	<u>Multiplying by the Reciprocal</u> If students draw a diagram for $\frac{1}{2} \div 4$, they may reason, "I divided the $\frac{1}{2}$ into four parts so I could find $\frac{1}{4}$ of the half". Here students are relating the problem $\frac{1}{2} \div 4$ to $\frac{1}{2} \times \frac{1}{4}$. This type of reasoning, the diagram, and the number sentences, help students move from the division problem to multiplying by the reciprocal. 
	<u>Common Denominator Approach</u> Students rewrite $\frac{7}{9} \div \frac{1}{3}$ as $\frac{7}{9} \div \frac{3}{9}$. The common denominator allows the reasoning that if you have 7 one-ninth sized pieces and want to find out how many groups of 3 one-ninth sized pieces you can make, then $\frac{7}{9} \div \frac{3}{9} = 7 \div 3 = 2\frac{1}{3}$.

On the **CMP Parent Web Site**, you can learn more about the mathematical goals of each unit. See the glossary, and examine worked-out examples of ACE problems.
http://www.math.msu.edu/cmp/parents/home

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