Dear Family,

The next unit in your child's mathematics class is ***Bits and Pieces III: Computing with Decimals and Percents***. It is the third and final unit in the development of understanding fractions, decimals, and percents.

UNIT GOALS

Like the work done to develop fraction operations, students will engage in many problem situations as they develop algorithms for adding, subtracting, multiplying, and dividing decimals. They will explore percents in the context of tip, tax, discount, and total cost.

Students have two ways of making sense of what decimals mean—extending the place-value system on which our number system is built or interpreting decimals as fractions. In order to have the most complete understanding of and skill with computation, students need to understand each of these meanings. Then they use them to examine why decimal algorithms for addition, subtraction, multiplication, and division make sense. Depending on the operation, the fraction interpretation or the place value interpretation may help in finding short-cut algorithms. Students will draw upon and use the ideas developed in *Bits and Pieces I* and *Bits and Pieces II*. For example, students will use the algorithm they developed for multiplying fractions in *Bits and Pieces II* to help them develop and understand an algorithm for multiplying decimals.

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 is a reasonable estimate for the answer? Or, About how large will the sum (difference, product, or quotient) be?
- How do these decimals compare to fractions?
- What strategies or algorithms would help you solve this problem?
- Why are percents useful in 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 *BITS AND PIECES III*

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

- Ask your child for an explanation of the ideas in a problem. For example, why do you line up the decimals when adding and subtracting decimal numbers?
- At times, students may be working with ideas and algorithms that are different from the ones you learned. Encourage your child to share these methods with you as a way to help them make sense of what they are studying.
- When shopping or eating in a restaurant with your child, ask him or her to estimate what the tax will be on a purchase or what the tip should be for a meal.

A few important mathematical ideas that your child will learn in *Bits and Pieces III* are given on the back. As always, if you have any questions or concerns about this unit or your child's progress in class, please feel free to call.

Sincerely,

Important Concepts	Examples
Addition and Subtraction of Decimals **DECIMALS AS FRACTIONS** Write decimals as fractions, find common denominators, add or subtract the fractions, and express the answers as decimals. This confirms that when adding or subtracting, one must compute with digits of the same place value. **PLACE-VALUE INTERPRETATION** Students consider the place value of digits and what that means when adding or subtracting numbers.	Zeke buys cider for \$1.97 and donuts for \$0.89. The clerk said the bill was \$10.87. What did the clerk do wrong? The cider is \$1.97 $= \frac{197}{100}$ and the donuts are \$0.89 $= \frac{89}{100}$. So the cost is $\frac{197}{100} + \frac{89}{100} = \frac{286}{100} = 2.86$. In $1.97 + 0.89$, we add hundredths to hundredths ($1.9\underline{7} + 0.8\underline{9}$), tenths to tenths ($1.\underline{9}7 + 0.\underline{8}9$), and ones to ones ($\underline{1}.97 + \underline{0}.89$). The clerk incorrectly added dollars and pennies (ones and tenths, tenths and hundredths).
Multiplication of Decimals **DECIMALS AS FRACTIONS** Write decimals as fractions, multiply, write the answer as a decimal, and relate the number of decimal places in the factors to the answer. **PLACE-VALUE INTERPRETATION** Students see why counting decimal points make sense and use the short-cut algorithm: multiply the decimals as whole numbers and adjust the place of the decimal in the product.	We can look at a problem using equivalent fractions. $0.3 \times 2.3 = \frac{3}{10} \times 2\frac{3}{10} = \frac{3}{10} \times \frac{23}{10}$ The product as a fraction is $\frac{69}{100}$, as a decimal 0.69. The 100 in the denominator shows that there should be two decimal places (hundredths) in the answer. The denominator of the fraction tells us the place value needed in the decimal. Using the fact that $25 \times 31 = 775$ students reason about a related product: 2.5×0.31 (2.5 is a tenth of 25, 0.31 is a hundredth of 31, so the product is a thousandth of 775) $= 0.775$.
Division of Decimals **DECIMALS AS FRACTIONS** Write decimals as fractions with common denominators and divide the numerators. **PLACE-VALUE INTERPRETATION** Write an equivalent problem by multiplying both the dividend and the divisor by the same power of ten until both are whole numbers.	$3.25 \div 0.5 = \frac{325}{100} \div \frac{5}{10} = \frac{325}{100} \div \frac{50}{100} = 325 \div 50 = 6.5$ $37.5 \div 0.015 = \frac{375}{10} \div \frac{15}{1{,}000} = \frac{37{,}500}{1{,}000} \div \frac{15}{1{,}000} = 37{,}500 \div 15 = 2{,}500$ This makes a whole number problem with the same quotient as the original decimal problem. The fraction approach explains why moving decimal places works. $0.015\overline{)37.5} = 0.015 \times 1{,}000\overline{)37.5 \times 1{,}000} = 15\overline{)37500}$
Decimal Forms of Rational Numbers **FINITE (OR TERMINATING) DECIMALS** are decimals that "end." The simplified fraction has prime factors of only 2s or 5s in the denominator. **FNFINITE REPEATING DECIMALS** are decimals that "go on forever" but show a repeating pattern. These fractions have prime factors other than 2 or 5 in the simplest denominator form.	$\frac{1}{2} = 0.5$, $\frac{1}{8} = 0.125$, $\frac{12}{75} = 0.16$. $\frac{4}{25} = \frac{16}{100} = 0.16$ In simplified fraction form $\frac{12}{75} = \frac{4}{25}$ has only factors of five $\left(\frac{4}{5 \times 5}\right)$ in the denominator. $\frac{1}{3} = 0.333\ldots$, $\frac{2}{3} = 0.666\ldots$, $\frac{8}{15} = 0.533\ldots$, $\frac{3}{7} = 0.42857142\ldots$ In simplified fraction form $\frac{26}{150} = \frac{13}{75} = \frac{13}{3 \times 5 \times 5} = 0.1733333\ldots$.
Using Percents **PERCENT OF A PRICE** "A CD costs \$7.50. The sales tax is 6%. How much is the tax?" **ON WHAT AMOUNT THE PERCENT WAS FIGURED** "Customers left Jill \$2.50 as a tip. The tip was 20% of the total. How much was the bill?" **WHAT PERCENT ONE NUMBER IS OF ANOTHER NUMBER** "Sam got a \$12 discount off a \$48 purchase. What percent discount did he get?"	6% of \$7.50 = *cost of tax* 1% of \$7.50 $= \frac{1}{100}$ of \$7.50 = \$7.50 ÷ 100 = 0.075 6 of the 1%'s will give me 6%. So, 6% of \$7.50 = \$0.45. 20% of *some number* equals \$2.50 Find how many 20%s it takes to make 100%. In this case we need five. So, 5 × \$2.50 gives us \$12.50. Find *what* % 12 is of 48. Students can solve this by computing how many 12s in 48. It takes four, so the percent is $\frac{1}{4}$ of 100% or 25%.

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://PHSchool.com/cmp2parents