CHAPTER 2

Family Letter

Section A

What We Are Learning

Operations with Rational Numbers

Vocabulary

These are the math words we are learning:

least common denominator the least common multiple of two or more denominators

rational number any number that can be written as a fraction

reciprocals two numbers whose product is equal to one; also known as **multiplicative inverses**

repeating decimal a decimal in which one or more digits repeat infinitely

terminating decimal a decimal number that ends or terminates

Dear Family,

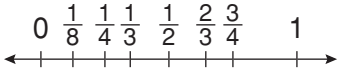
Up to this point, the student has been working with whole numbers and integers to solve equations and evaluate expressions. In this section the student will be introduced to the set of **rational numbers.** This set of numbers is important because it includes fractions and decimals.

A rational number is any number that can be written as a fraction $\frac{n}{d}$, where n and d are integers and $d \neq 0$. Decimals that repeat or terminate are rational numbers.

The student will learn to evaluate expressions using the four basic operations, and solve simple equations and inequalities using numbers from the set of rational numbers.

The student will also learn to compare and order rational numbers. A number line is useful in this process. The numbers on a number line run from least to greatest from left to right. To compare rational numbers, find each on the number line. The number furthest to the right is greatest.

$\frac{1}{2} \square \frac{1}{3}$



$\frac{1}{2}$ is farther right than $\frac{1}{3}$ so $\frac{1}{2} > \frac{1}{3}$. You can use this technique to put a series of rational numbers in order from greatest to least or least to greatest.

Family Letter

Section A continued

The student will also learn to add, subtract, multiply, and divide rational numbers. When adding or subtracting fractions, there are some basic steps that must be followed.

- If the denominators are the same then ONLY add or subtract the numerators and keep the denominator the same. Write the answer in simplest form.

$$\frac{7}{12} + \frac{3}{12} = \frac{7 + 3}{12} = \frac{10}{12} = \frac{5}{6}$$

- If the denominators are not the same, you must find a common denominator and then rewrite the fractions using the common denominator. Add or subtract as instructed.

$$\frac{3}{4} - \frac{1}{6} = \frac{3}{4}\left(\frac{3}{3}\right) - \frac{1}{6}\left(\frac{2}{2}\right) = \frac{9}{12} - \frac{2}{12} = \frac{7}{12}$$

To multiply fractions, multiply the numerators and multiply the denominators.

To divide fractions, multiply the dividend by the **reciprocal** of the divisor. To find the reciprocal, just flip the numerator and the denominator.

$$\frac{7}{8} \div \frac{2}{5} = \frac{7}{8} \cdot \frac{5}{2} = \frac{7 \cdot 5}{8 \cdot 2} = \frac{35}{16} = 2\frac{3}{16}$$

Discuss with the student the importance of rational numbers in everyday situations.

Sincerely,

CHAPTER 2

Family Letter

Section B

What We Are Learning

Equations with Rational Numbers

Dear Family,

In this section, the student will learn to solve equations that involve rational numbers. As with equations involving integers, the variable must be isolated to find its value. For example:

Solve $x - 2.5 = 3.8$.

$x - 2.5 = 3.8$

$+2.5 \quad +2.5$ Add 2.5 to both sides.

$x = 6.3$

Check:

$x - 2.5 = 3.8$

$6.3 - 2.5 \stackrel{?}{=} 3.8$ Substitute 6.3 for x.

$3.8 = 3.8$ ✓

Solve $\frac{1}{3}x = 7$.

$\frac{1}{3}x = 7$

$3 \times \frac{1}{3}x = 7 \times 3$ Multiply both sides by 3.

$x = 7 \times 3$ Simplify.

$x = 21$

Check:

$\frac{1}{3}x = 7$

$\frac{1}{3}(21) \stackrel{?}{=} 7$ Substitute 21 for x.

$7 = 7$ ✓

The steps for solving two-step equations with decimals are the same as for solving two-step equations with integers and whole numbers. When a two-step equation contains fractions, though, it is often easier to first eliminate the fractions by multiplying both sides of the equation by the least common denominator of the fractions.

Solve $\frac{3}{4}x + \frac{1}{7} = \frac{3}{7}$.

$$\frac{3}{4}x + \frac{1}{7} = \frac{3}{7}$$

$$\frac{3}{4}x + \frac{1}{7} - \frac{1}{7} = \frac{3}{7} - \frac{1}{7}$$ Subtract $\frac{1}{7}$ both sides.

$$\frac{3}{4}x = \frac{2}{7}$$

$$\frac{4}{3} \cdot \frac{3}{4}x = \frac{2}{7} \cdot \frac{4}{3}$$ Multiply both sides by $\frac{4}{3}$.

$$x = \frac{8}{21}$$

Check:

$$\frac{3}{4}x + \frac{1}{7} = \frac{3}{7}$$

$$\frac{3}{4}\left(\frac{8}{21}\right) + \frac{1}{7} \stackrel{?}{=} \frac{3}{7}$$ Substitute $\frac{8}{21}$ for x.

$$\frac{3}{4}\left(\frac{8}{21}\right) + \frac{1}{7} - \frac{1}{7} \stackrel{?}{=} \frac{3}{7} - \frac{1}{7}$$ Subtract $\frac{1}{7}$ from both sides.

$$\frac{3}{4}\left(\frac{8}{21}\right) \stackrel{?}{=} \frac{2}{7}$$

$$\frac{\cancel{3}}{\cancel{4}_{1}}\left(\frac{\cancel{8}^{2}}{\cancel{21}_{7}}\right) \stackrel{?}{=} \frac{2}{7}$$ Simplify.

$$\frac{2}{7} = \frac{2}{7}$$ ✔

Solving equations to find the value of a variable is an invaluable skill in the student's mathematical education.

Sincerely,