CHAPTER 3

# Family Letter

## *Section A*

### What We Are Learning

**Number Theory**

### Vocabulary

These are the math words we are learning:

**composite number** a whole number that has more than two positive factors

**greatest common divisor (GCD)** the greatest whole number that divides evenly into each number in a group

**least common multiple (LCM)** the common multiple with the least value

**multiple** the product of that number and a nonzero whole number

**prime factorization** when a composite number is written as a product of its prime factors

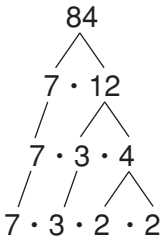
**prime number** a whole number greater than one that has exactly two positive factors

*Dear Family,*

The student will be learning about prime factorization, greatest common divisor, and least common multiple. These concepts will help the student compute fractions.

Finding the **prime factorization** of a number is one way to find its prime factors. A prime number is a special number that only has two factors, 1 and itself. The student will learn to find the prime factorization of a number by using a factor tree and a step diagram. This is how the student will use a factor tree to find the prime factors of a composite number.

**Use a factor tree to find the prime factorization of 84.**



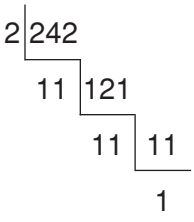

Write 84 as the product of two positive factors.

Continue factoring until all the factors are prime.

The prime factorization of 84 is $7 \cdot 3 \cdot 2 \cdot 2$.
Using exponents, this is written as $2^2 \cdot 3 \cdot 7$.

This is how the student will use a step diagram to find the prime factors of a composite number.

**Use a step diagram to find the prime factorization of 242.**




Divide the number by the smallest prime number possible. $242 \div 2 = 121$.
121 is not divisible by 2, so use the next prime number that will divide evenly into 121.
Divide 11 by 11.

The quotient is 1.

The prime factorization of 242 is $11^2 \cdot 2$.

Prime factorization is very helpful when writing fractions in simplest form. The student will also use prime factorization to find the **greatest common divisor (GCD)** and the **least common multiple (LCM)** of two or more given numbers.

To determine the GCD of two or more numbers, the student will list *all* the factors of each given number and then circle the greatest number that each list has in common. Another method the student will learn is to list the *prime* factors of each given number, circle the matching factors, and then find the product of these common factors.

### Find the greatest common divisor of 24 and 40.

| | |
|---|---|
| $24 = (2) \cdot (2) \cdot (2) \cdot 3$<br>$40 = (2) \cdot (2) \cdot (2) \cdot 5$ | Write the prime factorization of each number and circle the common factors. |
| $2 \cdot 2 \cdot 2 = 8$ | Multiply the common factors. |

The GCD is 8.

The factors of a number are those numbers that form the product. The **multiple** of a number is the product of that number and another nonzero whole number.
For example, the multiples of 8 are 8, 16, 24, 32, ...

The student will find the least common multiple of two or more numbers by listing all the multiples of each number and then finding the least value that is in each list. Or the student can find the prime factorization of each number and then multiply the factors in each list. If some of the factors are repeated, the student should only multiply those factors once.

### Find the least common multiple (LCM) of 15 and 35.

| | |
|---|---|
| $15 = 3 \cdot (5)$ | Write the prime factorization of each number. |
| $35 = 7 \cdot (5)$ | Circle the common factors. |
| 3, 7, 5 | List the factors of each number, using the circled factors only once. |
| $3 \cdot 7 \cdot 5 = 105$ | Multiply the factors in the list. |

The LCM is 105.

The skills and concepts the student will learn in this section will help the student as he or she begins to work with fractions and more complex numbers. Review basic multiplication and division facts to help the student recognize simple factors.

## Sincerely,

CHAPTER 3

# Family Letter

## *Section B*

### What We Are Learning

**Understanding Fractions**

### Vocabulary

These are the math words we are learning:

**equivalent fractions** fractions that name the same amount or part

**improper fraction** a fraction in which the numerator is greater than the denominator

**mixed number** a number that contains both a whole number and a fraction

**rational numbers** numbers that can be written as fractions, with integers for numerators and denominators

**repeating decimal** a decimal which repeats a pattern forever

**terminating decimal** a decimal that comes to an end

*Dear Family,*

The student will be learning about rational numbers. The set of rational numbers includes whole numbers, integers, fractions, and some decimals.

Since fractions are such an integral part of rational numbers, the student needs to know how to find equivalent fractions. The student will create equivalent fractions by multiplying or dividing **both** the numerator and the denominator of a given fraction by the same number. Here is an example of how to find two equivalent fractions.

**Find two fractions equivalent to the fraction $\frac{10}{15}$.**

$\frac{10}{15} = \frac{10 \cdot 2}{15 \cdot 2}$ Multiply the numerator and the denominator by 2.

$= \frac{20}{30}$

$\frac{10}{15} = \frac{10 \div 5}{15 \div 5}$ Divide the numerator and the denominator by 5.

$= \frac{2}{3}$

$\frac{10}{15} = \frac{20}{30} = \frac{2}{3}$

Knowing how to find equivalent fractions will help the student determine whether two given fractions with unlike denominators are equivalent. By finding a common denominator, the student will compare the numerators to see if, in fact, the fractions are equal.

The student will also learn to convert between mixed numbers and improper fractions. This process is helpful when multiplying and dividing fractions, and when simplifying more complex expressions. The following steps should be followed when converting between mixed numbers and improper fractions.

| **Converting from an improper fraction to a mixed number.** | **Converting from a mixed number to an improper fraction.** |
|---|---|
| **Convert $\frac{17}{5}$ to a mixed number.**<br>Divide the numerator by the denominator.<br>$\frac{17}{5} = 3\frac{2}{5}$ *Use the quotient and the remainder to write the mixed number.* | **Convert $7\frac{4}{9}$ to an improper fraction.**<br>Multiply the denominator and the whole number, and then add the numerator.<br>*Think:* $9 \times 7 + 4 = 67$<br>$\frac{67}{9}$ *Use the result to write the improper fraction.* |

Another type of conversion the student will learn is between decimals and fractions. To convert a *fraction to a decimal,* the student will divide the numerator by the denominator. In some cases, the student might be asked to round this answer to a specified place value.

To convert a *decimal to a fraction,* the student will need to recall what he or she has previously learned about place value. The place value of the last digit in the decimal correlates to the value of the denominator. For example, in the decimal 0.45, the "5" is in the hundredths place, so the fractional form of this number is $\frac{45}{100}$.

The student will then write this fraction in simplest form by dividing both the numerator and denominator by the greatest common divisor, in this case 5. So, $0.45 = \frac{45}{100} = \frac{9}{20}$.

Practice with the student the process of converting decimals and fractions and converting mixed numbers and improper fractions. These are skills which the student needs to master in order to be successful in later chapters.

## Sincerely,