

What We Are Learning

Number Theory

Vocabulary

These are the math words we are learning:

composite number
numbers that are divisible by more than two numbers

divisible able to be divided by a number without having a remainder

factor whole numbers that are multiplied to find a product

greatest common factor
the largest of the common factors shared by two or more whole numbers

prime factorization
the process of writing the number as the product of its prime factors

prime number a number divisible by only the number 1 and itself

Dear Family,

Your child is working with divisibility rules, finding prime factors, and determining the greatest common factor of whole numbers. These skills are precursors to the more advanced applications involving fractions.

Knowledge of divisibility rules will allow your child to use mental math and number patterns to determine if a number can be evenly divided into another number. Knowing these rules will also allow your child to see the relationship and patterns in numbers. Have your child use the guidelines and the examples in the table to explain how one determines the divisibility of a particular number.

Divisibility Rules

A number is divisible by ...	Divisible	Not Divisible
2 if the last digit is an even number.	7,992	4,221
3 if the sum of the digits is divisible by 3.	219	451
4 if the last two digits form a number divisible by 4.	5,516	431
5 if the last digit is 0 or 5.	795	977
6 if the number is divisible by both 2 and 3.	132	561
9 if the sum of the digits is divisible by 9.	801	1,712
10 if the last digit is 0.	27,000	1,895

Tell whether the number 846 is divisible by 2, 3, 4, 5, and 6.

2	The last digit is an even number.	Divisible
3	The sum of the digits is 18, which is divisible by 3.	Divisible
4	The last two digits form the number 46. 46 is not divisible by 4.	Not divisible
5	The last digit is not a 0 or a 5.	Not divisible
6	The number is divisible by both 2 and 3.	Divisible

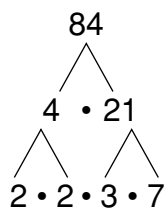
846 is divisible by 2, 3, and 6.

Divisibility rules are the tricks of the trade. However, you need to remember that all numbers are divisible by their factors. Some numbers are divisible by many factors. These are called **composite numbers**.

A number that is only divisible by the number 1 and itself is called a **prime number**. Your child will be writing the factors of a number in terms of the product of that number's prime factors. This is called **prime factorization**.

Write the prime factorization of the number 84.

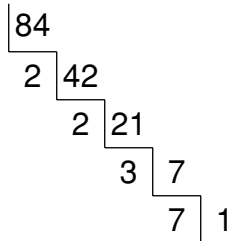
Method 1: Use a tree diagram.



Choose any two factors of 84. Keep finding factors until each branch ends with a prime factor.

The prime factorization of 84 is $2 \cdot 2 \cdot 3 \cdot 7$ or $2^2 \cdot 3 \cdot 7$.

Method 2: Use a ladder diagram.



Choose a prime factor of 84 to begin. Keep dividing by prime factors until the quotient is 1.

Again, the prime factorization of 84 is $2 \cdot 2 \cdot 3 \cdot 7$ or $2^2 \cdot 3 \cdot 7$. Notice how both methods result in the same answer.

Your child will use prime factorization as one way to help find the greatest common factor, GCF, of a set of numbers. Your child will list the prime factors of each number in the set, circle the matching factors, and then multiply those common prime factors. Knowing how to find the GCF is essential when working with fractions.

This section contains important skills that will allow your child to comprehend the concepts and applications that will be studied throughout the rest of this chapter. Review these skills often to help your child become more confident in this topic.

Sincerely,

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Family Fun

Divisibility Squares

Directions

- If a number is divisible by 5, color it blue.
- If a number is divisible by 6, keep it white.
- If a number is divisible by 2 but not by 5 or 6, color it red.

154	32	44	254	392	76
324	912	36	822	762	712
442	18	55	975	108	916
184	444	305	415	234	886
62	12	336	888	126	16
746	98	202	694	242	512

Create your own divisibility square design and pass it on to a friend.

Answers: Blue: 55, 975, 305, 415, 444, 234, 12, 336, 888, 126; Red: 154, 32, 44, 254, 392, 76, 712, 442, 916, 184, 886, 62, 16, 746, 98, 202, 694, 242, 512

What We Are Learning

Understanding Fractions

Vocabulary

These are the math words we are learning:

equivalent fractions

fractions that represent the same value

improper fraction

a fraction whose denominator is larger than its numerator; its value is greater than 1

mixed number a number that contains both a whole number greater than zero and a fraction

proper fraction a fraction whose denominator is smaller than its numerator; its value is less than 1

repeating decimal

a decimal with a block of one or more digits that repeat without end

simplest form a fraction where the greatest common factor of the numerator and the denominator is 1

terminating decimal

a decimal with a finite number of decimal places

Dear Family,

Your child is beginning to study fractions. Some of the basic skills your child will learn in this section are converting between decimals and fractions and writing equivalent fractions.

Decimals are another way to write fractions and mixed numbers. **Mixed numbers** are special fractions that consist of a whole number and a fraction. Your child will use place value concepts to convert between decimals and fractions.

Write each decimal as a fraction or mixed number.**A. 0.17**

0.17 Identify the place value of the digit farthest to the right.

$\frac{17}{100}$ The 7 is in the hundredths place, so use 100 as the denominator.

B. 2.3

2.3 Identify the place value of the digit farthest to the right.

$2\frac{3}{10}$ Write the whole number, 2. The 3 is in the tenths place, so use 10 as the denominator.

When converting from a fraction to a decimal, you may discover that the decimal part will repeat itself. This type of decimal is called a **repeating decimal**. A decimal that has a finite number of decimal places is called a **terminating decimal**.

repeating decimal

0.35 $\overline{35}$

terminating decimal

0.64

To convert from a fraction to a decimal, your child will divide the numerator by the denominator. The quotient will be the decimal.

Change $\frac{3}{5}$ to a decimal.

$\frac{3}{5} = \frac{0.6}{5} = 5\overline{)3.0}$ Divide the numerator by the denominator.
 $\quad \quad \quad - \underline{30}$
 $\quad \quad \quad \quad \quad \quad 0$

$\frac{3}{5} = 0.6$ The quotient is the decimal.

Understanding equivalent fractions will help your child have a better grasp of how fractions are related to each other. To find a fraction equal to another fraction, simply multiply or divide both the numerator and the denominator of the given fraction by the same number.

Write two equivalent fractions for $\frac{3}{8}$.

$$\frac{3 \times 2}{8 \times 2} = \frac{6}{16}$$

Multiply the numerator and the denominator by 2.

$$\frac{3 \times 5}{8 \times 5} = \frac{15}{40}$$

Multiply the numerator and the denominator by 5.

So $\frac{3}{8}$, $\frac{6}{16}$, and $\frac{15}{40}$ are all equivalent fractions.

Ask your child to name two more fractions equivalent to $\frac{3}{8}$.

Fractions with different denominators are called **unlike fractions**. When asked to compare unlike fractions, your child will need to use the least common denominator (LCD) to create equivalent fractions. Once the fractions have common denominators, they are called **like fractions** and your child will be able to order and compare the numerators.

Compare. Write $<$, $>$, or $=$.

$$\frac{2}{3} \square \frac{3}{4}$$

$$\frac{2}{3} = \frac{?}{12}$$

$$\frac{3}{4} = \frac{?}{12}$$

Find a common denominator by multiplying the denominators
 $3 \cdot 4 = 12$.

$$\frac{2 \cdot 4}{3 \cdot 4} = \frac{8}{12}$$

$$\frac{3 \cdot 3}{4 \cdot 3} = \frac{9}{12}$$

Find equivalent fractions with 12 as the denominator.

$$\frac{2}{3} = \frac{8}{12}$$

$$\frac{3}{4} = \frac{9}{12}$$

Compare the like fractions.

$$\frac{8}{12} < \frac{9}{12} \text{ so } \frac{2}{3} < \frac{3}{4}.$$

Your child will continue to learn about fractions in the following sections.

Sincerely,

CHAPTER

Family Letter

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Understanding Fractions

Write each decimal as a fraction or a mixed number.

1. 0.37

2. 0.09

3. 6.11

4. 1.2

Write each fraction or mixed number as a decimal.

5. $3\frac{2}{5}$

6. $\frac{3}{8}$

7. $4\frac{1}{9}$

8. $\frac{7}{12}$

Order the fractions and decimals from least to greatest.

9. 0.38, $\frac{1}{3}$, $\frac{3}{10}$

10. $\frac{8}{15}$, $\frac{1}{2}$, 0.75

Find two equivalent fractions for each given fraction.

11. $\frac{12}{16}$

12. $\frac{11}{22}$

13. $\frac{5}{9}$

14. $\frac{14}{21}$

Find the missing number that makes the fractions equivalent.

15. $\frac{4}{5} = \frac{?}{20}$

16. $\frac{9}{12} = \frac{3}{?}$

17. $\frac{9}{10} = \frac{36}{?}$

Write each fraction in simplest form.

18. $\frac{6}{18}$

19. $\frac{12}{15}$

20. $\frac{25}{40}$

Compare. Write $<$, $>$, or $=$.

21. $\frac{3}{5} \square \frac{4}{5}$

22. $\frac{11}{15} \square \frac{2}{3}$

23. $\frac{9}{33} \square \frac{3}{11}$

24. Harry needs $3\frac{3}{8}$ feet of wood to make a birdhouse. Write $3\frac{3}{8}$ as an

improper fraction. _____

Answers: 1. $\frac{37}{100}$ 2. $\frac{100}{9}$ 3. 6 $\frac{100}{11}$ 4. $1\frac{10}{2}$ 5. 3.4 6. 0.375 7. $4\frac{11}{8}$ 8. 0.583 9. $\frac{10}{3}$, $\frac{3}{1}$, 0.38 10. $1\frac{2}{8}$, $\frac{2}{1}$, 0.75
Possible Answers for 11–14: 11. $\frac{4}{3}$, $\frac{32}{24}$ 12. $\frac{2}{1}$, $\frac{66}{33}$ 13. $\frac{10}{18}$, $\frac{27}{27}$ 14. $\frac{3}{2}$, $\frac{42}{28}$ 15. 16 16. 4 17. 40 18. $\frac{3}{1}$ 19. $\frac{5}{4}$ 20. $\frac{5}{8}$ 21. $>$ 22. $<$ 23. $=$ 24. $\frac{8}{27}$

CHAPTER

Family Fun

4

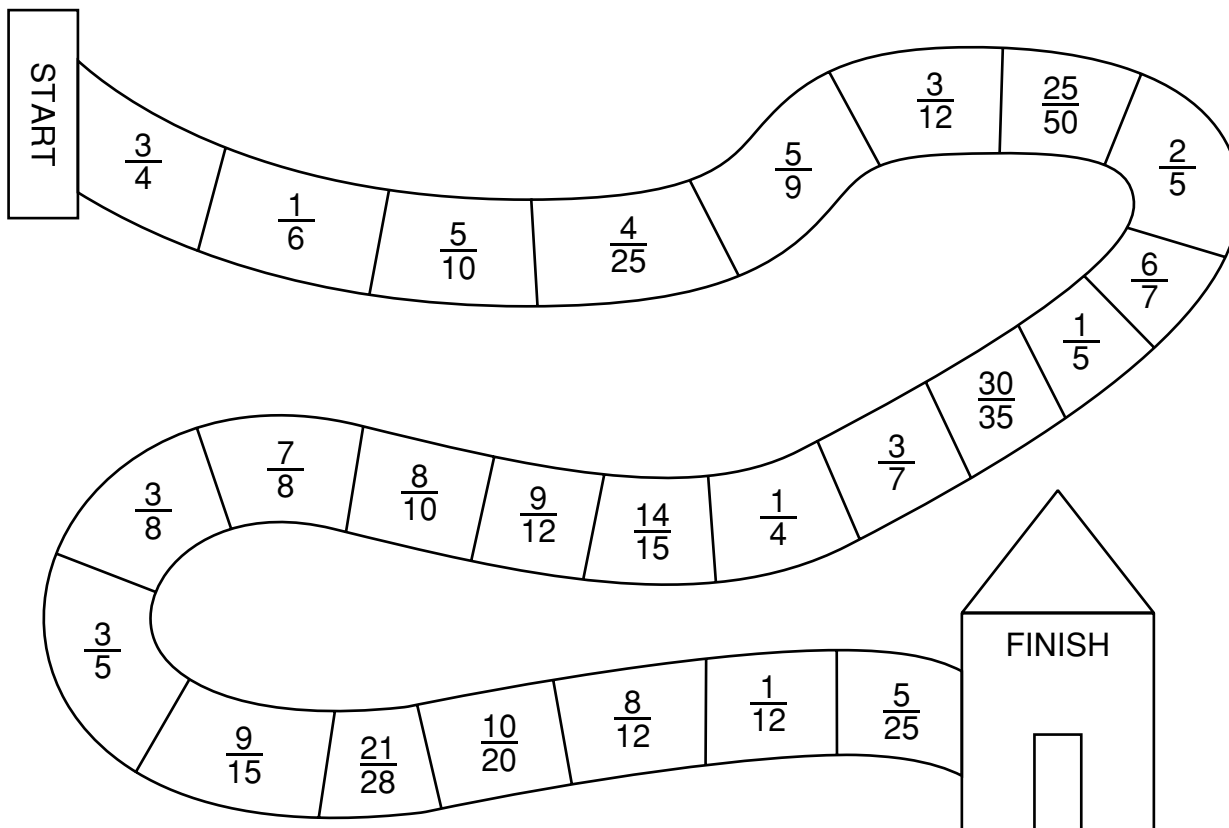
First Team Home Wins!

Materials

- 1 number cube
- 2 markers (coins, paper clips, etc)

Directions

- Roll the number cube to see which team goes first. The lowest roll goes first. Each team takes turns.
- Team 1 rolls the cube and moves that many places on the game board.
- Team 1 then has to name a fraction equivalent to the fraction in the space where they landed.
- Team 2 checks to make sure the two fractions are equivalent. If Team 1 is correct, they may stay on that space. If Team 1 is incorrect, they must roll the number cube and move back the number of spaces it shows.
- The first team to reach the finish line wins!



What We Are Learning

Introduction to Fraction Operations

Dear Family,

In this section, your child will use the concepts and skills from previous sections to add and subtract like fractions and mixed numbers. Once the sum or difference has been calculated, your child will need to remember to write the answer in simplest form.

Add. Write your answer in simplest form.

$$\frac{2}{9} + \frac{4}{9}$$

$$\frac{2}{9} + \frac{4}{9} = \frac{6}{9} \quad \text{Add the numerators. Keep the same denominator.}$$

$$= \frac{2}{3} \quad \text{Write your answer in simplest form.}$$

Remember, when the numerator equals the denominator, the fraction is equal to 1. For instance: $\frac{10}{10}$ and $\frac{5}{5}$ both equal 1.

Subtract. Write your answer in simplest form.

$$1 - \frac{5}{8}$$

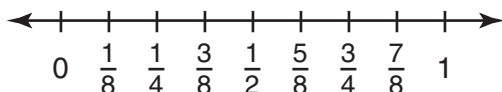
$$\frac{8}{8} - \frac{5}{8}$$

To get a common denominator, rewrite 1 as a fraction with the denominator of 8.

$$\frac{8}{8} - \frac{5}{8} = \frac{3}{8} \quad \text{Subtract the numerators. Keep the denominator the same.}$$

Your child will also learn to evaluate expressions by substituting a given value into an expression and then performing the indicated operation, addition or subtraction. This skill will help prepare your child for the more complex fraction applications that will appear in the upcoming chapters, as well as other math courses.

When fractions have different denominators, you can use estimation to find sums and differences. Rounding fractions to 0, $\frac{1}{2}$, or 1, can help you figure out what numbers to add or subtract. Looking at the number line will help you decide what number the fraction should be rounded to.



$\frac{1}{8}$ should be rounded to 0 because it is closest to 0. $\frac{3}{8}$ rounds to $\frac{1}{2}$ and $\frac{3}{4}$ rounds to 1 because they are closest to 1. You can then use these rounded fractions to add and subtract.

Find the sum.

$$\frac{2}{12} + \frac{15}{16}$$

$$\frac{2}{12} \text{ rounds to } 0. \quad \frac{15}{16} \text{ rounds to } 1.$$

$$0 + 1 = 1$$

$$\frac{2}{12} + \frac{15}{16} \text{ is about equal to } 1.$$

Find the difference.

$$\frac{18}{20} - \frac{4}{10}$$

$$\frac{18}{20} \text{ rounds to } 1. \quad \frac{4}{10} \text{ rounds to } \frac{1}{2}.$$

$$1 - \frac{1}{2} = \frac{1}{2}$$

$$\frac{18}{20} - \frac{4}{10} \text{ is about equal to } \frac{1}{2}.$$

Adding and subtracting fractions is an important skill that will be useful to your child in future chapters. Provide problems for your child to practice on to strengthen his or her skills.

Sincerely,

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Family Letter

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Introduction to Fraction Operations

Write each sum or difference in simplest form.

$$\begin{array}{r} 1. \quad \frac{5}{17} \\ + \frac{10}{17} \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad \frac{7}{10} \\ - \frac{5}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 1 \\ - \frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 8\frac{5}{8} \\ - 4\frac{2}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad \frac{36}{45} \\ + \frac{4}{45} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad \frac{8}{24} \\ + \frac{9}{24} \\ + \frac{7}{24} \\ \hline \end{array}$$

Evaluate $\frac{15}{22} - x$ for each value of x . Write your answers in simplest form.

$$7. \quad x = \frac{5}{22}$$

$$8. \quad x = \frac{7}{22}$$

$$9. \quad x = \frac{13}{22}$$

Estimate each sum or difference by rounding to 0, $\frac{1}{2}$, or 1.

$$\begin{array}{r} 10. \quad \frac{3}{4} \\ + \frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad \frac{7}{11} \\ - \frac{2}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad \frac{4}{15} \\ + \frac{7}{20} \\ \hline \end{array}$$

Answers: 1. $\frac{15}{17}$ 2. $\frac{2}{10}$ 3. $\frac{1}{4}$ 4. $4\frac{3}{8}$ 5. $\frac{9}{8}$ 6. $1\frac{1}{7}$ 7. $\frac{11}{5}$ 8. $\frac{11}{4}$ 9. $\frac{11}{1}$ 10. $1\frac{11}{10}$ 11. $0\frac{1}{12}$ 12. $\frac{1}{2}$

CHAPTER

4

Family Fun

Three in a Row

Materials

- Deck of cards
- 2 different colored pencils

Directions

- Play with a partner and take turns.
- At the beginning of each turn, each player draws 2 cards. The card with the lesser value is the numerator and the card with the greater value is the denominator. The face cards are wild and can be given any value.
- If your fraction is the answer to one of the problems in the box, then color that square. If both players have the same fraction, the player who finds the match first will be awarded that square.
Hint: Do not forget about simplest form.
- The first player who colors three squares in a row is the winner.
- Create your own game if you wish in the space provided.

$\frac{5}{9} + \frac{1}{9}$	$\frac{3}{10} + \frac{2}{10}$	$\frac{6}{8} - \frac{4}{8}$
$\frac{14}{14} - \frac{8}{14}$	1	$\frac{1}{5} + \frac{3}{5}$
$\frac{8}{9} - \frac{1}{9}$	$\frac{2}{9} + \frac{3}{9}$	$\frac{12}{16} - \frac{10}{16}$

Answers: $\frac{6}{9}$ or $\frac{3}{3}$; $\frac{10}{5}$ or $\frac{2}{1}$; $\frac{8}{2}$ or $\frac{4}{1}$; $\frac{14}{6}$ or $\frac{7}{3}$; 1; $\frac{5}{4}$; $\frac{9}{7}$; $\frac{9}{5}$; $\frac{16}{2}$ or $\frac{8}{1}$