Unit Study: Fractions 1

- Numerators
- Denominators
- Improper Fractions
- Mixed Numbers

2013

Fractions for Superpower

At the end of this Unit Study the student will:

1. Understand the structure and function of the parts of a fraction
2. Know vocabulary related to beginning fractions
3. Understand how fractions and whole numbers work together
4. Understand and work with mixed numbers and improper fractions
5. Show concept skills with practice, hands-on manipulation, and a skills test.

VTAlsup

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By VTAlsup

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Fractions For Superpower

You know all about **whole numbers** but you've probably guessed by now that sometimes you just need part of a whole for a complete answer to a math puzzle. You learned a little about this when you started having remainders in your division **quotients,** or when you wondered how many pieces of birthday cake you could get. Mom cut it into 12 pieces, and you have 2 brothers.

Right now, your puzzle might look something like this.

There is 1 cake. There are 12 pieces in the cake. I have 2 brothers, and there is mom, dad, and me. That is five people all together and we all like cake. How can we divide it evenly?

$$\frac{12}{5} = 12 \div 5 = 2\frac{2}{5}\ pieces\ of\ cake\ for\ each\ person. That's\ almost\ 2\ and\ \frac{1}{2}\ pieces\ each.$$

Does this look hard? You'll be amazed at how truly easy it is. Once you learn the steps, you will feel that superpower building!

When you have journeyed through this unit, you will be able to put this puzzle together using an **equation.** Along the way, you will gather bits of superpower in the form of helpful information. Knowing how to use fractions in an equation is a real SUPERPOWER!

We will begin by:

- Learning all about **numerators** and **denominators**
- Learning about **mixed numbers**
- Learning about **improper fractions**

It's very important to study any words in **bold print.** If you click on the word that is in bold print, you will see its definition! These words will build your math vocabulary and help you understand future puzzles and tests. Remember, most people look at math as a series of *problems*. But, we know they are really just unsolved puzzles!

Soon you will be saying, "Fractions? No problem!"

NUMERATORS AND DENOMINATORS

When you look at a fraction, you see a top number, a bottom number, and a line separating them. Let's consider the fraction $\frac{9}{10}$ (pronounced nine tenths, or 9 over 10). The **denominator,** (the bottom number), shows how many total pieces make up the **whole**. The **numerator,** (the top number), shows how many pieces of the whole you are working with.

The line between the two numbers means "**divided by**".

NOTE: When the numerator and the denominator are the same, the fraction *always* equals 1.

You have a whole pizza for lunch. It is cut into 10 slices. Those 10 slices make up the **whole ($\frac{10}{10}$)** pizza. While you step away for a drink, your friends eat 9 slices of your pizza. They ate $\frac{9}{10}$ of your pizza! You only have $\frac{1}{10}$ left for lunch. Oops – did you just subtract a fraction?

$$\frac{10}{10} - \frac{9}{10} = \frac{1}{10}$$

Notice that when the denominators are the same, you simply subtract the **numerators** and keep the same **denominator**. Adding two fractions with the same denominator works the same way. Add the numerators, keep the same denominators.

Checking your work is just as simple as checking answers in the addition or subtraction of whole numbers. Add the answer (**difference**) to the **subtrahend** (the part you subtracted) to get your **minuend** (the fraction you started with). This will tell you if your answer is correct.

$$\frac{1}{10} + \frac{9}{10} = \frac{10}{10}$$

Okay, let's do some **practice puzzles** for fractions that have the same denominator. Work the puzzles out in your notebook. Show each step even though with your superpower it's tempting to just solve the puzzle in your head and write down the answer. Check you work as you go by adding your sums or differences to your subtrahends or addends.

$\frac{7}{14} + \frac{3}{14} = ?$ $\frac{18}{100} - \frac{8}{100} = ?$ $\frac{64}{79} - \frac{27}{79} = ?$ $\frac{25}{42} - \frac{25}{42} = ?$ $\frac{3}{4} - \frac{2}{4} = ?$

Write all of the following fractions that are equal to 1.

$\frac{1}{2}$ $\frac{1}{1}$ $\frac{46}{46}$ $\frac{110}{1}$ $\frac{25}{100}$ $\frac{1000}{1000}$ $\frac{4}{4}$ $\frac{8}{16}$

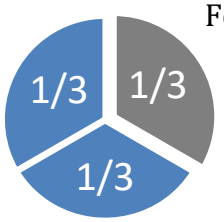
HANDS-ON ACTIVITY 1

You will need:

- Scissors
- Colored construction paper
- Can of vegtables (medium or large)
- Ruler
- Pencil

Use the can of vegtables to trace 3 circles on the construction paper with your pencil. Use your pencil and ruler to draw lines across the circles to represent equal pieces. Draw one circle into fourths, one into sixths, and one into eighths. Use a different color of paper for each circle.

On the circle with 4 parts, shade 1 of the parts with your pencil. On the circle with 6 parts, shade 2 of the parts. On the circle with 8 parts, shade as many as you would like and write the corresponding fraction for each circle.



For example this circle is divided into 3 parts. The shaded part (gray area) is one third of the whole. You can also see that the 3 parts together make one whole circle. We express that fraction as $\frac{3}{3}$, or the whole number 1. Remember that if the numerator and the denominator is exactly the same, no matter what the numbers are, the fraction equals 1.

$$\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=\frac{3}{3}\ or\ 1$$

Write the proper fraction inside each part of your circles. For instance, on each part of your circle that you divided into 8 pieces, you will write $\frac{1}{8}$. Then use your scissors to carefully cut out each part of your circles.

Practice taking away parts and write an equation for the puzzles you make. Try to make 10 equations from your circles.

For my circle I am taking away 1 part. So my equation will look like this:

$$\frac{3}{3}-\frac{1}{3}=\frac{2}{3}\ \ then\ check: \frac{2}{3}+\frac{1}{3}=\frac{3}{3}$$

Mixed Numbers and Improper Fractions

Can you see your future? It's as close as tomorrow. And tomorrow you will understand mixed numbers and improper fractions.

A mixed number is a whole number and a fraction put together when you have something whole with another part. Like when your sister eats half your candy bar but you have another one in your pocket. Then you have $1\frac{1}{2}$ candy bars left. This mixed number represents a whole and part of another candy bar together.

A mixed number can also be expressed as an improper fraction. An improper fraction has a larger numerator than denominator. Any time you see a fraction with a larger top number, the fraction is equal to more than 1. Proper fractions always have the smaller number as the numerator.

Consider the following fractions. Write them in your Math notebook. Label each one as a proper or improper fraction.

$$\frac{3}{1} \qquad \frac{6}{10} \qquad \frac{17}{56} \qquad \frac{3}{5} \qquad \frac{5}{3}$$

- The bottom number (denominator) tells how many pieces make the whole.
- The top number (numerator) tells how many pieces of the whole you are using.
- So – if the top number is larger than the whole represented in the denominator, there must be more than one whole!

To find out "how many" an improper fraction represents we must divide the numerator by the denominator.

$$\frac{5}{3} = 5 \div 3 = 1\frac{2}{3} \qquad \frac{12}{5} = 12 \div 5 = 2\frac{2}{5} \qquad \frac{9}{2} = 9 \div 2 = 8\frac{1}{2}$$

The answer to an improper fraction can also be a simple whole number. A whole number has no extra parts, so it doesn't need a fraction.

$$\frac{6}{3} = 6 \div 3 = 2$$

Can you change the following improper fractions into mixed numbers or whole numbers?

Use your Math notebook, and you newly acquired super power knowledge to solve each puzzle.

$$\frac{10}{5} \quad \frac{8}{6} \quad \frac{32}{10} \quad \frac{1000}{100} \quad \frac{9}{8} \quad \frac{144}{12} \quad \frac{82}{9} \quad \frac{7}{1} \quad \frac{55}{5} \quad \frac{100}{50}$$

Another skill you need to master is turning mixed number into improper fractions. You will be impressed at how easy this is!

Consider the mixed number 2 ½. You will need to know how to turn it into a fraction for ~~equations~~ puzzles you will be working on later.

- Multiply the whole number by the denominator.
- Add the numerator to the result.
- This is your new numerator.
- Keep the original denominator.

Following these steps give you:

$$2\frac{1}{2} = 2 \times 2 + 1 = \frac{5}{2}$$

Remember: Whole number (2) × denominator (2) + numerator (1) = 5. The denominator stays the same as in the original fraction.

Try turning these mixed numbers into improper fractions in your Math notebook.

$$1\frac{5}{8} \quad 10\frac{3}{4} \quad 5\frac{7}{10} \quad 3\frac{1}{2} \quad 9\frac{2}{3} \quad 17\frac{6}{9} \quad 2\frac{3}{4}$$

Remember to check your work and fix any errors. If you have made an error, don't worry. Some of the best and strongest super powers come from understanding our errors!

HANDS-ON ACTIVITY 2

We use fractions in many ways. One is measurements. For this activity, you will need:

- One cup (8 ounce) measuring cup
- $\frac{1}{2}$ cup measuring cup
- $\frac{1}{3}$ cup measuring cup
- $\frac{1}{4}$ cup measuring cup
- Your Math notebook

This activity should be performed over the sink in case of spills. Write an equation and the results for each of the following parts of this activity.

Fill your $\frac{1}{2}$ cup measuring cup with water, and pour it into your 1 cup vessel. How many half cup fills does it take to fill the 1 whole cup? Empty the cup.

Fill your $\frac{1}{3}$ cup measure with water, and pour into the one cup measuring cup. How many times do you have to fill the $\frac{1}{3}$ cup to fill the one cup to capacity? Empty the cup.

Fill your $\frac{1}{4}$ cup measure with water, and determine how many make a whole cup. Empty the cup.

Clean up any spills and put your measuring cups away.

VOCABULARY FOR THIS UNIT STUDY

Addend – A number that you are adding to another number. When checking subtraction the addend added to the subtrahend must be the second addend. For example $5 - 3 = 2$. 5 and 3 are both addends, but your subtraction answer (the difference)must be added to the second addend, 3, to check your work. $2 + 3 = 5$.

Denominator - The bottom number in a fraction; below the line in a fraction.

Difference – The answer in a subtraction problem.

Equation – A number statement that organizes and shows the relationship between two or more numbers.

Fraction – A numerical format that shows part or parts of a whole.

Improper Fraction – A fraction that shows or implies more than 1. It can be broken down into a mixed number or more than 1 whole.

Minuend – The number that comes first in subtraction, the subtrahend is subtracted from it. In $9 - 3 = 6$, 9 is the minuend, 3 is the subtrahend, and 6 is the difference.

Mixed Number – A number that contains both a whole number and a fraction. For example: $2\frac{1}{2}$ apples

Numerator – The bottom number of a fraction.

Proper Fraction – A fraction that represents a piece or pieces of a whole. The smaller number is always the top number of a proper fraction.

Quotient – The answer you get when you divide two numbers.

Subtrahend – The number being subtracted, or taken away, from the Minuend to find the Difference.

Whole Number – A number that represents all of something, with no parts missing, left out, or fractionalized.

SOLUTIONS TO PRACTICE PUZZLES

Pg 4

$\frac{7}{14} + \frac{3}{14} = \frac{10}{14}$ $\frac{18}{100} - \frac{8}{100} = \frac{10}{100}$ $\frac{64}{79} - \frac{27}{79} = \frac{37}{79}$

$\frac{25}{42} - \frac{25}{42} = \frac{0}{42}$ $\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$

Fractions in the list that are equal to 1:

$\frac{1}{1} = 1$ $\frac{46}{46} = 1$ $\frac{1000}{1000} = 1$ $\frac{4}{4} = 1$

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$\frac{3}{1}$ Improper Fraction $\frac{6}{10}$ Proper Fraction $\frac{17}{56}$ Proper Fraction

$\frac{3}{5}$ Proper Fraction $\frac{5}{3}$ Improper Fraction

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Change to mixed or whole numbers.

$\frac{10}{5} = 2$ $\frac{8}{6} = 1\frac{2}{3}$ $\frac{32}{10} = 3\frac{2}{10}$ $\frac{1000}{100} = 10$ $\frac{9}{8} = 1\frac{1}{8}$

$\frac{144}{12} = 12$ $\frac{82}{9} = 9\frac{1}{9}$ $\frac{7}{1} = 7$ $\frac{55}{5} = 11$ $\frac{100}{50} = 2$

SOLUTIONS TO PRACTICE PUZZLES 2

Change Mixed Numbers to Improper Fractions: Pg 7

$1\frac{5}{8} = \frac{13}{8}$ $10\frac{3}{4} = \frac{43}{4}$ $5\frac{7}{10} = \frac{57}{10}$ $3\frac{1}{2} = \frac{7}{2}$

$9\frac{2}{3} = \frac{29}{3}$ $17\frac{6}{9} = \frac{159}{9}$ $2\frac{3}{4} = \frac{11}{4}$

Pg 8 Measurement fractions

It takes 2 of the half ($\frac{1}{2}$) cups to fill 1 cup because $\frac{1}{2} + \frac{1}{2} = \frac{2}{2}$ *or* 1

It takes 3 of the one-third ($\frac{1}{3}$) cups to fill 1 cup because $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$ *or* 1

It takes 4 of the one-fourth ($\frac{1}{4}$) cups to fill 1 cup because $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4}$ *or* 1

I hope this Unit Study has helped you feel more secure about learning fractions. They can make math fun, and turn on the **SUPER POWER** qualities you already have hidden inside you!

THANK YOU for purchasing this Unit Study. I put it together using my experience as a Homeschool Teacher that has lasted for more than 10 years. I have taught my children, grandchildren, and will soon be teaching great-grandchildren.

I have also worked as a substitute teacher at local schools.

My educational background is strong in Biology, Zoology, and Earth Science, with a healthy dose of Statistics and Research. I am a Retired R.N., a freelance writer, and an advocate for stay-at-home moms, home schooling, and honest ways to make money from home.

This is my first in a Unit Study series that will initially cover all things pre-algebra.

Feel free to send comments, criticisms, or questions to valsup940@yahoo.com I would love to hear from you.

Sincerely, Vivian