

Dear Parents,

Thanks for attending our first math workshop! We've selected fractions as the focus because research has shown that if students are not proficient in working with fractions by the time they leave fifth grade, they will struggle with middle school math. Additionally, understanding fractions was found to be *essential* for algebra success. Because of this, the U.S. Department of Education studied effective fraction instruction and in 2010 published five recommendations (which are summarized here):*

1. Build on students' informal understanding of sharing fairly and identifying equivalent proportions of common shapes.
2. Use number lines to help students recognize that fractions are numbers that expand the number system beyond whole numbers.
3. Help students understand why procedures for computations with fractions make sense.
4. Develop students' conceptual understanding of strategies for solving rate, ratios, and proportions before teaching cross-multiplication. (6th grade)
5. Teachers (and parents?) should improve their own understanding of fractions and how to teach them.

In addition, we are now beginning to follow the new national Common Core Curriculum** for mathematics. This curriculum covers the following fraction topics:

3rd grade: developing an understanding of fractions, especially unit fractions (fractions with numerator 1), identifying fractions on a number line, comparing fractions by reasoning about their size

4th grade: developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers

5th grade: using equivalent fractions to add and subtract fractions with different denominators, developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions)

We hope you (and eventually your child) will find this a fun learning experience!

*The full report can be found at <http://ies.ed.gov/ncee/wwc/PracticeGuide.aspx?sid=15>

** The full curriculum can be viewed at <http://www.corestandards.org/the-standards/mathematics>

Everyday Fraction Activities

Apple Fraction Game

Wash Hands

Pass out apples

Parents help cut apples in half

Discuss how 2 halves equal 1 whole

Put halves together

Demonstrate how 4 halves equal 2 wholes

Write corresponding fractions in a piece of paper

Cut the halves into quarters

Discussing how 2 quarters equal 1 half and 4 quarters equal 1 whole

Continue cutting apples and discussing fractions

Let your child put the apples together to make a whole each time

Measure up.

Give your child measuring spoons and measuring cups. Have him pour 1 cup of water into a glass. Then have him guess: How many half-cups will it take to fill another glass the same size? How many quarter cups? How many one-third cups?

Change that recipe!

Ask your child to rewrite the amount of each ingredient to double or halve a recipe.

Got Pizza!

Let *Pizza Night* turn into a delicious, and fraction-filled time of learning with the kids. Have your child figure out how many pieces of pizza each person in the group should have if each one is to have the same number of pieces.

Paper Folding Fraction Game

Start with a blank piece of blank paper. Have student fold it in half, along either direction, and then quickly color one half of it. Then we continue folding and counting the colored sections: $\frac{2}{4}$ $\frac{4}{8}$ $\frac{8}{16}$... but hasn't the amount of the paper we colored stayed the same? Then try thirds, sixths, twelfths.

Candy Fractions - Fraction Paper Game

by <http://hannahmeans.bizland.com> (A New Teacher's Survival Guide)

To make sure that children really understand fractions, I get their attention by bringing out Hershey Bars. First we look at it and determine how many sections it is divided into. We talk about how each section is $\frac{1}{12}$ of the whole bar. Then I pass out rectangles of brown construction paper. They divide the paper as the candy is divided and mark each section as $\frac{1}{12}$.

Then I break the candy bar in half. We talk about all the different ways that we could divide the candy bar in halves. The children cut their paper candy bars in two. Then we talk about what is in each half. We cut one of the halves in half and I write on the board all the statements that the children can make about their "candy bars" i.e.: "There are six twelfths in each half," "there are two halves in a whole," "there are three twelfths in a fourth," etc.

After the children are familiar with the basics of Hershey Bar fractions, I introduce M & M fractions. I get a regular size bag of peanut M & M's. I open them and we try to divide them evenly. (If I am lucky, and there are an odd number of candies in the bag, I correct the problem by eating one.) Then I give the children a sheet of paper with a bag drawn on it. They draw the correct number of M & M's in the bag with colored crayons. We divide the M&M's into two piles. They cut their picture of the M&M's in two. Then we follow the same procedure that we did with the Hershey Bar fractions.

Of course, if you have a small class or are home-schooling, you can use the actual candy bars and M & M bags instead of the paper counterparts. In any case, after the children have learned the concepts, I usually break up the candy bars (I keep a few extras so that everyone will get a piece) and give everyone a taste.

Egg Carton Fractions

Take an egg carton made for one dozen (12) eggs. Use the egg carton as a tool to teach and model fractions. The size of an egg carton does not change. The child should demonstrate to you what simple fractions are by putting eggs into the carton. You could use marbles, buttons or other things to place in the egg carton if you do not want to use eggs.

Ask your child to show you the fraction $\frac{4}{12}$ by filling some of the egg carton. The child will understand that you place the amount out of 12 into the carton. On a piece of paper have them fill in the numerator as they fill in the amount you ask for. The denominator is 12 and can be written in also. As you ask for different fractions, they will notice that the denominator doesn't change. They may begin to understand that a denominator is the stable amount, the container which doesn't change, represented by the egg carton. They then will understand that part of it is being filled. This part is the numerator and will be written on the top of a fraction.

Equivalent Fraction Activities

Continue to ask to be shown different amounts such as $\frac{2}{12}$, $\frac{3}{12}$ or $\frac{6}{12}$. When the child has demonstrated and written these amounts on paper, then ask them if they can show you $\frac{1}{2}$ of the egg carton. See if they know how to fill $\frac{1}{2}$ of it. Ask them how many eggs this is. So if $\frac{1}{2}$ of the carton is the same as $\frac{6}{12}$, you can then begin to help them see what an equivalent fraction is.

You can have them demonstrate $\frac{1}{3}$ easily in the same way. Draw a black line to divide the carton into thirds to help visualize $\frac{1}{3}$ of a carton. You can cut the carton apart to physically show the thirds are the same size, and the same as filling 4 places out of 12.

You can also have them demonstrate $\frac{2}{3}$ by filling in two of the 3 parts of the egg carton. They can count the eggs to see that 8 out of 12 places are filled. They will then see that $\frac{2}{3}$ is equivalent to $\frac{8}{12}$.

Have them demonstrate $\frac{3}{4}$ or $\frac{2}{4}$ in the same fashion. The carton can be cut apart into quarters to help them visualize the 4 parts of the original 12 places in the carton.

Fun Fractions Using More Than One Egg Carton

Improper Fractions

Ask the child to fill more than 12 places in the carton. Ask if it is possible. When they find that they cannot, they will understand that such a fraction is impossible to demonstrate and therefore is called an improper fraction.

To show how to place 14 eggs into a carton, and write a proper fraction, use 2 egg cartons. Have them fill 1 carton and then place the extra 2 eggs into another carton. Show them that the fraction 14 out of 12 is written as 1 and $\frac{2}{12}$. When 1 carton is filled, the whole number 1 is used. The denominator still remains as 12 to show how part of the other carton is filled.

Modeling Other Fractions

Once your child understands the egg carton example, you may then use egg cartons of different sizes (30) for modeling other fractions. Once the idea is established that the denominator is the container, they will understand that the numerator shows how much is partly filling the container.

Use other containers to represent the denominator. Use a 1 cup measuring cup to show how you need to fill the cup 4 times with a $\frac{1}{4}$ cup measuring cup. Repeat with the 1 cup measuring cup filling it 3 times with the $\frac{1}{3}$ measuring cup.

Then ask them to demonstrate how to fill the cup to represent $\frac{2}{3}$ of a cup. Ask them if it can be filled 4 times with a $\frac{1}{3}$ measuring cup. What proper fraction would they write to represent $\frac{4}{3}$?

Fraction Action

In introducing children to the concept of *fractions*—numbers that aren't whole numbers (such as $1/2$, $1/3$ and $1/4$)—it's often a good idea to use objects that they can see and touch.

What You Need

- Large clear container (holding at least 2 cups)
- Masking tape
- Marker
- Measuring cups ($1/2$, $1/3$ or $1/4$ cup measure)
- Unpopped popcorn

What to Do

- Invite your child to help you make popcorn for the family. Begin by having her put a piece of masking tape from top to bottom on one side of the large container.
- For younger children, use a $1/2$ cup measure. For older children, use a $1/3$ or $1/4$ cup measure. Choose the unit of measure and fill the measuring cup with popcorn. Give the cup to your child and ask her questions such as the following:
 - How many whole cups do you think the container will hold?
 - How many $1/2$ cups (or $1/3$ cups or $1/4$ cups) do you think it will hold?
- Let your child pour the measured popcorn into the clear container. Have her continue to pour the same amount into the container until it is full. As she pours each equal amount, have her mark the level on the container by drawing a line on the tape. Then have her write the fraction, corresponding to the unit of measure on the line. After the container is full, have your child count up the total number of cup increments ($1/2$, $1/3$ or $1/4$) and compare it to her estimate from above.
- As you measure out the popcorn to pop, ask your child to answer questions such as the following:
 - How many $1/2$ cups equal a cup? Two cups?
 - How many $1/4$ cups equal $1/2$ cup? A whole cup?
- Pop the corn and enjoy!

Children may reasonably want to say, for example, that $1/4$ cup plus $1/4$ cup makes $2/4$ cups. Letting them work with measuring cups or other measuring devices can let them see that $2/4$ is the same as $1/2$.

Fraction Websites

Games

<http://www.aaamath.com/fra.html> This site has lessons as well as games and activities.

http://www.bbc.co.uk/schools/ks2bitesize/maths/number/fractions_basic/play.shtml This site also has lessons. It also has games with verbal directions and sounds (British English).

<http://www.infoplease.com/math/knowledgebox/fractioncafe.html> My students love these activities! The many lessons range from sharing fairly to adding unlike denominators.

<http://www.kidsolr.com/math/fractions.html> This has some fun activities to help students understand fraction concepts.

<http://www.visualfractions.com/Games.htm> This is bookmarked to the games page. My students *love* the Where's Grampy game. It helps to learn fractions on a number line.

<http://www.mrnussbaum.com/tonyfraction.htm> This is bookmarked to a fraction game/activity, but this site also has many other fun math activities.

<http://www.onlinemathlearning.com/fraction-games.html> This site has many games and activities for many aspects of fraction instruction. While I have not checked all of them, many are very good.

<http://classroom.jc-schools.net/basic/math-fract.html> Again, I have not checked all of these, but there are many fun resources.

<http://coolmath.com/> This site has many math games and lessons.

Tutorials

http://www.helpingwithmath.com/by_subject/fractions/fractions.htm This site will demonstrate the fraction basics

<http://www.khanacademy.org/> This site has great tutorial videos on many subjects!

www.mathplayground.com/ This site has good lessons as well as games.

Fraction Flashcard Activities

Many activities can be done with flashcards. Here is a site with some very nice ones: <http://www.math-salamanders.com/support-files/fractions-mixed-answers.pdf>

Fraction Feud

Skills: Comparing fractions

Materials: 1 deck of "Fraction Feud" Cards

Number of Players: Two or more

Ages: 8+

Playing the Game

The object of the game is to win the most "battles" and to have the most cards at the end of the game!

1. Shuffle the Fraction Feud cards and deal them out so that each player has the same number of cards. Each player must keep their cards in a pile face down, and players cannot look at their cards.
2. Each player turns their top card face up and puts it on the table. Players compare their fractions. The player with the greatest fraction takes all of the cards in play and adds them to the bottom of their pile (face down).
3. Play continues in this manner, with each player placing their next card in play and so on.
4. If there is a tie and the two highest fractions in play are equivalent (equal), then there is a feud! The tied cards stay on the table and both players place the next card from their pile face-down and then another face-up. The new face-up fractions are compared, and the winner takes all of the cards in play (including those that are face down). If the new fractions are equivalent, then the feud continues in the same manner. The feud goes on as long as the cards in play continue to be equal. As soon as they are different, the player with the greater fraction wins all the cards in the feud.

Fraction Concentration

Materials:

- Fraction Cards

Directions:

1. Cut out the Fraction Cards.
2. Shuffle the Fraction Cards and put them face down in rows.

3. Players take turns turning over 2 cards trying to make a match.
4. If the cards match in any way (ex: picture-picture, picture-symbol, or symbol-symbol), the player keeps both cards and takes another turn.
5. If the cards do not match, the player must tell how they are different and turn them back over.
6. Continue until all the cards are matched.
7. The player with the most cards is the winner.

Questions to ask your child while playing:

- How many parts are in the whole or set?
- How many parts are shaded?

More Activities with Fraction Flashcards

Fraction Laundry

Hang a clothesline against a wall. This will serve as a number line. Have your child hang the fraction cards on the line in order from least to greatest, using clothespins. Equivalent fractions can be hung underneath each other.

This is a great activity to practice fractions on a number line.

Fraction Go Fish

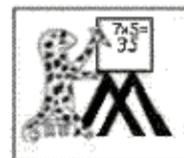
This can be played like the normal go fish game except you can use fraction flash cards. Pairs can be made by matching the fraction to the picture or even making pairs with equivalent fractions.

Fraction Strips (on following page)

Fraction strips can be used as a tool to learn fractions. The strips can be cut out and folded (very carefully!) to use to compare sizes of fractions. They can also be used to find equivalent fractions.

Name

Date



FRACTION STRIPS UP TO TWELTHS

1 WHOLE

$\frac{1}{2}$

$\frac{1}{2}$

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$\frac{1}{12}$



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