

Nothing Compares to You!

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Christiansburg Middle School, Christiansburg, VA

Grade Level: 6-8

Time Allotment: Three 45-minute class periods

Overview: This lesson has been designed to serve a remediation purpose for middle school students. The purpose of the lesson is to review the concept of a fraction and make comparisons between fractions. The lesson has been created with the understanding that the students have minor background knowledge of what a fraction represents and how a fraction is written. Students will be engaged in hands-on and interactive web activities that reinforce the concept of equivalent fractions while building and strengthening their background knowledge.

Subject Matter: Math

Learning Objectives:

The students will be able to:

- write the equivalent relationships among fractions
- compare the numerical value of fractions using concrete materials, drawings and pictures
- apply knowledge of equivalent fractions to real life applications

Standards:

This lesson addresses the Virginia SOL's which can be found at:

<http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml>

4.2 (b) – The student will represent equivalent fractions

4.3 – The student will compare the numerical value of fractions (with like and unlike denominators) having denominators of 12 or less, using concrete materials

6.1 – The student will ... describe orally and in writing the equivalence relationships among fractions, ...

6.4 – The student will compare ... ,fractions, ..., using concrete materials, drawing or pictures, and mathematical symbols.

Media Components:

Video:

Mathematical Eye: Fractions and Percentages, "Finding Fractions of a Whole"

Video found at www.unitedstreaming.com

Website:

"Fraction Pie" (from NCTM Illuminations)

<http://illuminations.nctm.org/mathlets/fractionpie/index.html>

"Fraction Pie" is a NCTM interactive math applets where the user is able to manipulate the pieces of a circle. The activity allows the user to divide the circle into 1-100 pieces and then create a shaded portion. The applet follows by showing the fraction shaded, the equivalent percent and decimal.

Materials:

Introductory Activity:

For each group of 4 students

- 1 whole [paper] pizza with one of the following numbers written on the back (4, 8, 12, 16). Numbers may be repeated for additional groups.
- Scissors
- Tape

Learning Activities:

- Computer with TV output
- Web connection
- Computer with Word or word processing program for each student or pair of students
- Printer accessibility

Culminating Activity:

For each pair of students

- Five 3"x18" strips of construction paper (each a different color)
- Scissors
- Envelope
- Pencil

Prep for Teachers:

- Prior to teaching this lesson either:
 - bookmark the Websites used in the lesson on each computer in the classroom or lab
 - or
 - put Web address on your www.portaportal.com site. Make sure you have allowed guest access and that you can pull the site up in the lab
- Prior to teaching this lesson, make sure the Shockwave plug-in is loaded onto each computer. This is available free at www.macromedia.com.
- Connect your classroom computer to a television or LCD projector.
- Check that each computer has a word processing program and printer capability.
- Students should have prior knowledge of screen capturing and pasting into a word processing document.
- Prepare the hands-on element of the lesson by:

- Preparing the [paper] pie for each group of students (see attached sample)
- Cutting the strips of paper needed for the culminating activity
- When using media, provide students with a **FOCUS FOR MEDIA INTERACTION**, a specific task to complete and/or information to identify during or after viewing of video segments, Web sites, or other multimedia elements.

Introductory Activity:

Step 1: Divide students into groups of 4 students. Distribute a [paper] pizza to each group of 4 students.

Step 2: Give the students specific instructions as follows:

Say, "You are going to divide your paper pizza into equal pieces to share within your group. Look on the back of your pizza to see how many pieces you will need to divide your pizza into." Make sure each group understands what they're looking at.

Step 3: **Say** "Using only folding and cutting, divide your pizza into equal-sized pieces. You may only have the number of pieces written on the back of your pizza. Once you have divided and cut your pieces out, give each group member an equal amount of pizza. Write the fraction of pizza you have on the back of your piece." Give students a few minutes to complete this activity.

Step 4: **Say** "With your pizza slices, go around the room to find another student with the same amount of pizza you have, but with a different number of pieces. For example, if you have 2 pieces, you need to find someone else with more or less than 2 pieces but with the same amount of pizza. Form a new group with no less than 4 people." (Each of you should have the same amount of pizza but different number of pieces). "Discuss with your new group the fraction of pizza you have."

Step 5: **Say** "Now that new groups are formed, tape the pieces to a poster to form a whole pizza. On the poster write the different fractions of pizza that make up the whole."

Make comparisons with each group and check as a whole class that all parts are equal. Once every group has finished, discuss how the equal parts of the pizza are related.

Learning Activities:

Step 1: **Say**: "Now that we have reviewed fractions, we are going to review how to divide things into equal pieces. The video clip we are about to watch will show us a group of students attempting to divide a cake into a specified number of pieces." **Provide a Focus for Media** by saying, "In this first clip I want you to look for what tool the students used to divide the rectangular cake."

Play the first 23 seconds of the video and **pause**. (Pause when the narrator says, "...Good!" and the students have divided the rectangular cake.)

Ask: "How did the students divide the rectangular cake?" (They used ropes to create three equal pieces.)

Ask: "How do you think the group will divide the round cake to show three equal parts?" (Students will provide their own explanation. An example may be that they will place the ropes where they will have three equal parts.)

Step 2: Provide a **Focus for Media Interaction** by saying, "After this clip, I want you to be able to tell me how the group divided the round cake into three equal pieces."

Play the video until the time reaches 30 seconds and **pause**. (Pause when the students show they have divided the cake into three pieces lengthwise.)

Provide a **Focus for Media Interaction** and **Ask:** "Is this fair how the students divided the cake? How could it be an equal amount?" Accept all reasonable answers from students.

Play the video until the time reaches 45 seconds and **pause**. (Pause when the students show they have divided the cake into three pieces from the center.)

Step 3: **Ask:** "Why is this in thirds and the other one is not?" (Because the pieces are equal from the center instead of across.)

Step 4: **Say:** "I want you to watch the students try to divide the cake into six pieces. How might the group attempt to do this?" (They might divide the thirds in half; they might start over with more rope, etc. Accept all reasonable answers.) Provide a **Focus for Media Interaction** by saying "Watch the students divide the cake. I want you to be able to show me how they divided the cake into six pieces."

Play the video until the students begin to cut the cake. **Pause** when the video reaches 1:13. (Just as the students divide the cake with the rope into 6 equal parts, before they cut.)

Step 5: **Ask:** "How did the group divide the cake? How did it compare with dividing into three pieces?" (If necessary, allow students to illustrate or discuss how the group divided the cake. Accept all reasonable answers) Provide a **Focus for Media Interaction** by saying "In this next clip you will watch as the students label each piece of cake. I want you to be able to tell me how each piece was labeled."

Play the video until the students create $\frac{1}{3}$ piece of the cake. **Stop** when the video reaches 1:43. (Pause when the video shows the group put two pieces together and the narrator says the amount of cake is $\frac{1}{3}$)

Ask: "How did the students label each piece of cake?" (They said each piece was a sixth.)

Ask: "When they took 2 of the pieces, what did they call this part of the cake?" (They called this part of the cake $\frac{1}{3}$.)

Step 7: Discuss reasons why this part of the cake may be considered $\frac{1}{3}$ instead of $\frac{2}{6}$. Ask students to think of other examples where they may create equivalent fractions. An example might be a pizza cut into 6 pieces and they take 4 or the pizza could be cut into 12 pieces where they take 8. As

part of class discussion, think of other scenarios where equivalent fractions may be used.

Learning Activities continued (computer lab):

In the computer lab, the students should be on the Fraction Pie website

<http://illuminations.nctm.org/mathlets/fractionpie/index.html>

Step 1: **Say:** "At this website you will be looking at many different fractions and your goal is to find fractions that are equivalent or equal. Begin by clicking on Version 3 of the pie. There are a few ways you can do this. If you look on the screen you will see the fraction, the percent and the decimal equivalents. You need to use the two sliders on the left to create different fractions of the pie. The top slider is the part shaded, which will be the numerator of the fraction. The bottom slider is the number of pieces the whole pie is cut into, which will be the denominator of the fraction. As you move the sliders, the fractions will change. You need to pay attention to the percent and decimal values to find equal fractions. For example, the screen shows you $\frac{1}{4}$, meaning the pie is cut into 4 pieces and 1 of them is shaded. The percent is 25% and the decimal is 0.25. If you slide the top slider to 2 and the bottom slider to 8, notice the fraction changed but the percent and decimal remained the same. This means that $\frac{1}{4}$ and $\frac{2}{8}$ are equivalent fractions. Try to find another equivalent fraction."

Allow the students to manipulate the sliders and take student answers. Some possible answers may be $\frac{3}{12}$, $\frac{5}{20}$, $\frac{6}{24}$, $\frac{25}{100}$, etc.

Step 2: **Say:** "Now I need you to open up the word processing program on the computer." Make sure each student has this program on their screen.

Say: "You will use this program to show me the equivalent fractions you found. Minimize the word processing program and go back to your fraction pie."

Step 3: **Say:** "Now you will create some other equivalent fraction sets of your own. Other than $\frac{1}{4}$, choose a fraction to work with. You may choose $\frac{1}{3}$, $\frac{4}{5}$, $\frac{7}{9}$, etc. It's up to you. For that fraction, you need to find at least two other equivalent fractions. For each equivalent fraction you find, you will need to paste it into your word processing document. For your first fraction, say $\frac{1}{4}$, press the 'Alt' and 'Print Screen' buttons at the same time. This will copy what you see on the screen. Go back to your word processing document and press 'Ctrl' and 'V' which will paste your screen into the document. Do this same thing for each of your equivalent fractions. You need to have three equivalent fractions per set."

At this point, allow the students to begin manipulating their sliders. Once they begin finding fractions, be readily available for questions and help to paste into their word processing document. After monitoring their progress for a while and letting them explore, give instructions on saving their document. This will be different depending on school and building. Some schools have accounts for each student, some may need the students to save to a disk, and some may have teacher accounts for saving data. Whatever method of saving work, it's

not advisable to print due to the volume of pages this may create. The teacher may grade directly from a saved file or even from the screen when the student has finished.

Culminating Activity:

Fraction Kit

- Step 1: Give each student 5 strips of paper (3" x 18") each a different color, and a pair of scissors. Give the following instructions to the group of students.
- Strip 1: Fold the first strip in half and cut into two pieces. Label each of the pieces as $\frac{1}{2}$
- Strip 2: Fold the next strip in half and then fold each half in half again. Cut the four pieces and label each $\frac{1}{4}$.
- Strip 3: Fold the third strip in half three times and cut the eight pieces. Label each piece $\frac{1}{8}$.
- Strip 4: Fold the next strip in half four times and cut the sixteen pieces. Label each piece $\frac{1}{16}$
- Strip 5: Remains whole, label with 1.

Step 2: At this point, each student has 31 strips of paper. Tell the students they now have a puzzle to put together. Hand out the Fraction Kit Worksheet and have them complete the questions. After they have completed the activity, discuss the answers as a class. Be sure to point out all of the different combinations of fractions that were used to create the same whole.

Cross-Curricular Extensions:

Language Arts:

Students can use their fraction knowledge and vocabulary to create a story. Example title may be "A Day of My Life With Fractions" where they create characters and a story line around the use of fractions in daily life.

Keep a journal log of fraction use throughout the day/week or other specified length of time.

Community Connections:

- Invite a professional chef or cafeteria worker to discuss the use of fractions in their profession.
- Invite a carpenter or contractor to discuss fraction applications.

Name: _____

Fraction Kit Worksheet

Directions: Using some of the 31 strips of paper you have, create a strip that equals the length given. Do not use the given length as your answer.

Example:

$$\frac{1}{4} = \boxed{} \boxed{}$$

You can use (2) $\frac{1}{8}$ strips to make $\frac{1}{4}$.

1. $\frac{1}{2}$

2. $\frac{1}{8}$

3. $\frac{8}{16}$

4. $\frac{3}{4}$

5. $\frac{2}{8}$

6. $\frac{4}{16}$

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

8. $\frac{2}{4}$

9. Write a fraction equivalent to $\frac{3}{8}$.

10. Write a fraction equivalent to $\frac{10}{16}$.

Paper Pizza

Example: Print pizza out and cut around the edges of the pizza. Some classes might prefer a bigger pizza. This example may be enlarged, copied on to different paper or redesigned.

