Stretching the Truth

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Grade Levels: 6th

Time allotment: 2-3 class periods plus individual work time

Overview: Students will be given an opportunity to experiment with different percentages to observe the effect on visual materials. Students will see percents as parts of a whole in solutions, as alterations of photographs, and as various models of circles, squares and sets.

Subject Matter: Math (decimals and percents)

Learning objectives:

Students will be able to describe the effect of altering percents in a solution or on visual representations.

Standards;

The objectives will in part meet the Virginia Standards of Learning for math, which can be found at
http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml

6.1 The student will identify representations of a given percent and describe orally and in writing the equivalence relationship between fractions, decimals, and percents.

Media Components:

Video - *Eddie Files* Program #404, "Take a Bite" (Percents) (1999)

Web sites:
http://illuminations.nctm.org/mathlets/fractionpie/ver3.html - an applet that allows the person to alter the parameters of shading and view the resulting percents, decimals and fractions.

http://www.mathgoodies.com/lessons/toc_vol4.shtm - a set of interactive lessons on percents.

http://www.richlandone.org/teachers/connections/grade6/gofigure.htm - "Go Figure! Using Percents in the Real World" An online lesson where students work through exercises online to calculate prices, including sales taxes. A good extension exercise.

http://www.thecoo.edu/~apeter/math_interactive_sites.htm -a listing of interactive web sites, organized by topic.

Overhead and graphics program (PaintShop Pro, Imaging for Windows)

Materials:

For the teacher:

- TV/VCR
- Video - *Eddie Files* #404
- Overhead and graphics program (PaintShop Pro, Imaging for Windows)
- Copies of lab sheet
- Colored water solutions (1 quart each of red, blue and yellow)
- 100 ml containers, marked in increments (4 per each group)

Student Materials:

- Each student should bring one picture (magazine/photo) from home

Prep for teachers:

Teachers will need to:

- Prepare colored water solutions in small jars (baby food jars work well.) Add one tablespoon of food coloring to one quart of tap water. Pour into small jars, three jars for each group.
- Copy lab sheets for each student
- Acquire 100 ml container with markings for each group.
- Scan photographs that students have brought in
- Have VCR available

Introductory Activity: Setting the Stage

Day 1

Colored Water Lab Exercise

Step 1. This activity begins with the teacher showing the students a beaker with 100 ml of red water. The teacher explains that 1 whole beaker is filled and that is the same as 100% or 1.0. The teacher writes the following words on the board in columns: *number*, *percent*, and *fraction*. The teacher continues with the analogy by using 70 ml, 70%, and 70/100. This continues through a demonstration of 60 ml, 50 ml, 30 ml, and 25 ml. Each time the teacher will lead the students to the fraction and the corresponding percent.

Step 2. As a demonstration, the teacher will prepare each of the solutions listed on the lab sheet in the following manner. (See attached lab sheet at the end of the lesson)

Say: "The first solution calls for 50% red. If we use a 100 ml container, how much red liquid should we put in the container?" (Answer – 50 ml) Put 50 ml of red in the graduated cylinder.

Say: "The first solution calls for 25% yellow. If we use the same 100 ml container, how much yellow liquid should we add to the red liquid?" (Answer – 25 ml)

Say: "Since we already have 50 ml in the container, what should the graduated cylinder read after we have add the 25 ml of yellow liquid?" (Answer – 75 ml) Put 25 ml of yellow in the graduated cylinder.

Say: "The first solution also contains 25% blue. If we use the same 100 ml container, how much blue liquid should we add?" (Answer – 25 ml)

Say: "Since we already have 75 ml in the container, what should the graduated cylinder read after we have added the blue liquid? (Answer – 100 ml)

Say: "How many ml does this graduated cylinder measure?" (Answer – 100 ml) "How much liquid do we now have in the container?" (Answer–100 ml)"What percent of this container is filled?"(100%)

Say: "What color would you say the liquid is now? Write your response in the last square on the row."

Repeat this activity with solutions 2 and 3.

Say: "Before starting solution 4, predict what you think the solution is going to look like."

Say: "Let's collect our predictions on a chart." Write the class members' predictions on the chart.

Complete the activity using the fourth set of proportions.

Say: "What was our result? Were any of our predictions close?"

Learning Activities:

Say: "Now we are going to observe how fractions and percents and decimals are related by doing some exercises from a website."

Step 1
Load website
http://illuminations.nctm.org/mathlets/fractionpie/

This particular applet has three versions. Click on the one listed as Version three
Set the denominator to 100.

FOCUS FOR MEDIA INTERACTION – Say: "Watch what happens to the circle when the numerator cursor is moved from zero to one hundred." (Move the cursor slowly to the right, stopping at 100)

Ask: "What happened to the circle when the cursor was moved from zero to one hundred?" (Answer - As the cursor moved to the right, the circle filled until it was completely filled).

Say: "Now observe the change in the fraction as the cursor is moved from zero to one hundred." Move the cursor again. **Ask:** "What happened to the fraction?"(Answer – As the cursor is moved

to the right, the numerator of the fraction increases until it reaches 100)

Say: " Now observe the change in the decimal as the cursor is moved from zero to one hundred." Move the cursor again. **Ask:** "What happened to the decimal?" (Answer – As the cursor is moved to the right, the decimal increases until it reaches 1.00.)

Say: " Now observe the change in the percent as the cursor is moved from zero to one hundred." Move the cursor again. **Ask:** "What happened to the percent?" (Answer – as the cursor is moved to the right, the percent increases until it reaches 100%.)

*Optional activity – (repeat the above activity with the rectangular model and the set model)

Say: " What are the decimal, fraction and percent that represent one whole?" Give answer

Now reset the applet to Version 2 by clicking on Version 2 from the list at the top. Change the denominator to a value of 4 by sliding the blue cursor to the right. Move the top cursor to the right until it is 4 as well.

FOCUS FOR MEDIA INTERACTION – **Say:** "What do you think will happen to the circle when the cursor is moved past one whole?" (Accept answers)

Move the cursor past one whole slowly. **Ask:** "What does happen to the circle when the cursor is moved past one whole?" (Answer – Another circle is added and fills up. This continues until 5 whole circles are filled up.)

Ask: "What happens to the fraction, decimal and the percent when the cursor moves past one whole? Repeat moving the cursor if necessary. (Answer-the fractions become improper, the decimals move above 1.0 and the percents rise towards 500%.)

Say: "Based on what you have seen, describe what 400% would look like?"
(Answer – 4 filled circles)

Step 2. Ask your students for examples of times in their lives when they use percentages. (Students will most likely associate them with money, buying and selling, sales).

Depending on the length of class, this is likely the end of the first day.

Day 2

Have the video, *The Eddie Files, # 404* set and ready to go. **Fast forward** to where Ms. Brooks comes into the store, (approximately 5:50). The segment ends when she leaves the store.

Step 1

FOCUS FOR MEDIA INTERACTION. While you are fast-forwarding, **say:** "In this episode of *The Eddie Files,* Eddie has taken a picture of his sister Dee messily eating a pizza. Eddie's friend Vincent likes the picture and puts it up on his board at a photo shop. When Eddie puts a copy of the picture on the refrigerator at home, Dee becomes very upset because she feel she looks foolish and makes Eddie promise that he would not show that picture to anyone. Watch this first segment to see what problem Eddie faces." **Play** video until Ms. Brooks leaves Vincent's store. **Ask:**"What problem does Eddie have?"(Answer – Ms. Brooks wants to use his picture of Dee in a citywide advertising campaign.) **Fast forward** to where Eddie and Vincent go to city hall. (Approximately 10:45) The segment ends when Eddie leaves the office. While you are fast-forwarding, **Say:** "Vincent and Eddie go to meet with Ms. Brooks who is going to use his picture in an ad campaign. Don't forget what Eddie has promised Dee." **FOCUS FOR MEDIA INTERACTION. Say:** "After watching this segment, you should be able to state what the photographer must do with Eddie's picture in order to use it in the campaign." **Play** the video until Eddie leaves the office. **Ask:** "What did the photographer say he had to do in order to use the photo in the campaign?" (Blow it up.) "What does this mean? Why do you have to make it larger?" (Develop the idea that the larger version must be in two dimensions.) **Fast-Forward** the video to the segment on the visit to the graphic artist. (Approximately 11:46). The segment ends after cutting back to the story line. **FOCUS FOR MEDIA INTERACTION. Say:** " After watching this segment, be able to describe some of the activities that graphic designers must use to manipulate their work." **Resume** and **Play. Pause** when it cuts back to the story line.

Ask: "What are some of the technical activities that a graphic designer must use to manipulate his/her work?" (Use a percent circle to compute new dimensions, use a color scale to set and alter color in their work.) As you **Fast Forward** the tape to where Vincent is talking to Ms. Brooks on the phone, (approx. 19:17) tell the students that Eddie confessed to Vincent that he had made a promise to Dee not to show her picture to anyone and that he feels he must keep his promise. Therefore, he cannot use the picture of Dee for the ad campaign. Vincent has to call Ms. Brooks and tell her the bad news. **FOCUS FOR MEDIA INTERACTION – Say:** " After watching this last segment, be able to state how both Ms. Brooks and Eddie solved their problem." **Resume** video. **Ask:** "How did both Ms. Brooks and Eddie solve their problem?" (Eddie keeps his promise to Dee and Ms. Brooks uses the picture Eddie made of Vincent instead!)

Culminating Activity

Step 1-

Say: "In the video we saw how a photographer could enlarge or reduce a picture. I am going to demonstrate doing this with a picture I have by using graphic software. In order to do this I need to use percent scales. Watch carefully as I manipulate the size of my picture using percentages."

Using graphic software and an overhead, the teacher will demonstrate how photos are enlarged and reduced by using percent scales. Demonstrate both equal reductions (vertical and horizontal) and unequal reductions.

- Open the picture using the graphic software.
- On the edit menu, change the vertical axis to 150%.
- Click okay.
- Observe the effects on the picture. (discuss with students)
- On the edit menu, change the horizontal axis to 150%.
- Click okay.
- Observe the effects on the picture. (discuss with students)
- Repeat this activity with altering the two axes to 75%, 200%.

Students should be able to see that photographers must use percentages to manipulate the size of pictures.

Step 2-

Students can now be given the opportunity to manipulate their own pictures that they brought from home.

- Students will scan their own photo that they brought from home.
- They will put together, (using Microsoft Office or a comparable program), a portfolio of the same picture at 25%, 50%, 100% and 150%.
- Pictures will be labeled and displayed.
- Students must also include a resizing where only one of the two axes has been altered.

Cross-Curriculum Extensions

Art – Have a graphic artist visit the class and discuss the role of math in the creation of art.

Science – Research the percent of ingredients found in many common materials.

Social Studies – Research the history of the “golden triangle” and its importance in Greek history and culture.

Community Connections

Invite a local banker to speak to the students about the importance of interest rates and their effect on the economy.

Have your students take photos of local buildings, particularly those that might have been built in the neoclassic or Greek style.

Have your students conduct surveys in the community and display their results using percents.

Create the following mixtures using these requirements.

Red	Yellow	Blue	Sample
50%	25%	25%	

Red	Yellow	Blue	Sample
10%	85%	5%	

Red	Yellow	Blue	Sample
50%	5%	45%	

Red	Yellow	Blue	Sample
10%	5%	85%	

Names _____

Full size 100%

25%

50%

only 1 dimension changed (100% X 10%)