Smaller Than One

Summary

Students will practice converting a fraction into a decimal and a percent.

Main Core Tie

Mathematics Grade 6

Strand: RATIOS AND PROPORTIONAL RELATIONSHIPS (6.RP) Standard 6.RP.3

Materials

For each group:

White paper for books

- Base ten blocks

Copy of shapes for extension

For each student:

Scissors

Glue

Colored pencils/crayons

- *Base 10* worksheet

Background for Teachers

The fifth grade core curriculum has students order and compare *whole numbers*, fractions (including mixed numbers), and decimals using a variety of methods and symbols.
Percent is a ratio comparing a part to a whole using the number 100. The *percent* is the number of hundredths that part is equal to.

Intended Learning Outcomes

1. Demonstrate a positive learning attitude toward mathematics.
2. Become mathematical problem solvers.
3. Reason mathematically.

Instructional Procedures

Invitation to Learn

Provide each student in the class with a card or paper with an assigned number (1-30, or the number of students in the class).
Have the student with 1 and the largest number stand on opposite sides of the room.
Instruct the rest of the class to place themselves in numerical order between the two numbers.
Repeat this process as needed by having the first two students hold 0 and 1. The other students should have numbers dealing with tenths, hundredths, or thousandths.
Repeat the game using fractions.

Instructional Procedures

Using the base ten blocks, show the 100 square. This equals 100/100 = 1/1 = 1.0 = 100%
Transfer information onto the *Base 10* worksheet by coloring all 100 squares.
Using base ten blocks, show 50 out of 100, 1/2 = 0.50 = 50 %.
Transfer information onto *Base Ten* worksheet by coloring 50 of the 100 squares.
Continue making diagrams using:
10/100 = 1/10 = 0.1 = 10%

20/100 = 1/5 = 0.2 = 20%
25/100 = 1/4 = 0.25 = 25%
30/100 = 3/10 = 0.3 = 30%
40/100 = 4/10 = 0.4 = 40%
60/100 = 3/5 = 0.6 = 60%
70/100 = 7/10 = 0.7 = 70%
75/100 = 3/4 = 0.75 = 75%
80/100 = 4/5 = 0.8 = 80%
90/100 = 9/10 = 0.9 = 90%

Review how to convert a fraction into a decimal and then find the percent:

To convert a fraction to a decimal, divide the numerator by the denominator.
To convert a decimal to a fraction, write the place value of the decimal as the denominator. Write the digits of the decimal as the numerator.
To convert a percent into a fraction or a decimal, rewrite the percent as a fraction over 100.
To convert a fraction to a percent, use the following proportion:

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent value}}{100}$$

Construct a book to keep diagrams.

Fold a sheet of 8 1/2" x 11" paper in half, horizontally (paper A).
Measure and mark one inch from each side along the fold.
Cut one inch slits on either side of the mark. Unfold to full original size.
Take a new sheet of paper (paper B).
Fold in half, horizontally.
Measure and mark one inch from each side along the fold.
Cut between the inch marks to create a slit in the paper. Unfold to full size.
Take paper A and roll vertically.
Slide paper A through the slit in paper B.
Unroll paper A carefully and match slits.
Crease book again.
Add as many pages (like paper A) as needed. To complete book for above conversions, use 1 paper A and 3 paper B (on last page write the steps to conversion).

Have students glue in their diagrams, in numerical order, and label each page.
Title the book.
Use book as a quick reference for the remainder of the unit on decimals, percents, and fractions.
As extra credit or an extension, students find:
33 1/3 /100 = 1/3 = 0.3 =33 1/3%
66 2/3/ 100 = 2/3 = 0.6 = 66 2/3 %
15/100 = 3/20 = 0.15 = 15 %
35/100 = 7/20 = 0.35 = 35%
45/100 = 9/20 = 0.45 = 45%
55/100 = 11/20 = 0.55 = 55%
65/100 = 13/20 = 0.65 = 65%
85/100 = 17/20 = 0.85 = 85%
95/100 = 19/20 = 0.95 = 95%

Extensions

Using *Number Cards*, students could play War, Spoons, Memory, Gin, or Go Fish. (The cards equivalent to 1/3, 2/3, 1/8, 3/8, 5/8, and 7/8 are optional. 6/15 and 4/8 are also optional.)

Create "percentage pictures" from geometric shapes.

Give each student two squares, two rectangles, two equilateral triangles and two circles.
Ask students to "using your scissors cut 50% (25%, 75%, etc...) off your square (rectangle, triangle, circle)."
When shapes have been cut use the shapes to create a picture.
Have students create a worksheet to accompany their picture. For example, if there is a picture of a sun one question on the worksheet could be, "What percentage of the circle made the sun?"

Materials

- *Number Cards*
- *Geometric Shapes*

Family Connections

Students take their diagram book home and explain it to a family member.
Students make their own set of game cards and play one of the games with a family member.
Students have a family member complete his/her "percentage picture."
Students create their own answer key and test their family members.

Assessment Plan

Informal assessment includes observation of students, class discussion and discovery.
Formal assessment includes completed diagram book with correct fractions and percents.

Bibliography

Research Basis

Farivar, S. & Webb, N.M. (1994). Helping and Getting Help--Essential Skills for Effective Group Problem Solving. *Arithmetic Teacher*. 41, 521-525.
Using examples drawn from a program of peer learning in middle school mathematics, this paper identifies a set of helping behaviors that best aid learning in collaborative small groups. The paper describes conditions that must be satisfied for helping behavior to be effective and the responsibilities of students seeking help, students giving help, and teachers to make helping productive for learning.
Hatfield, M., Edwards, N., Bitter, G., & Morrow, J. (2000). *Mathematics Methods for Elementary and Middle School Teachers*. New York, NY. John Wiley & Sons Inc.
This resource included the NCTM Principles and Standards for School Mathematics 2000, as well as the newest NAEP data and findings from the TIMSS. The book emphasizes considerations regarding cultural diversity and includes a CD-ROM with vignettes of real classroom situations to help the reader study teaching practices as they occur naturally in the classroom.

Authors

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