Fractions, Decimals, and Percents with Number Lines

STRAND: Number and Number Sense

STRAND CONCEPT: Rational Number Equivalencies

SOL 6.2a

Remediation Plan Summary

Students will create a fraction number line and use it to find equivalent fractions, decimals, and percents. Students will make connections among different representations (fractions, decimals, and percents) for the same amount.

Common Misconceptions

- Students may not realize that a percent is out of 100 and may not convert a fraction or decimal accordingly.
- Students may not see that 0.5 and 0.50 are equivalent values because they don't realize the zero is just a placeholder.

Materials

- Coins
- Rolls of adding machine tape
- One pre-cut meter strip of adding machine tape for each student
- Colored pencils or markers
- 100 similar objects packaged for each small group
- "Table of 100 Things" handout for each small group

Introductory Activity

Show students different coins. Have them write and tell you what the decimal equivalent is for each coin, for example a nickel is 0.05 and a dime is 0.1 or 0.10. Then ask students to tell you what the fractional amount of a dollar each coin would be, for example a nickel is $\dfrac{5}{100}$ and a quarter is $\dfrac{25}{100}$. Make sure to include a half-dollar and dollar coin if possible. To extend this activity have a group of coins and have 5 students each select a coin. As a class, add up the coins and have students find the decimal and fractional amount of a dollar for that total.

Plan for Instruction

1. Part 1: After a brief discussion about a meter, distribute a pre-cut meter strip of tape to each student. Have the students place their strip horizontally on the desk or table in front of them.
2. Have the students write "0" on the left end of the strip and "1" on the right end of the strip. Discuss briefly that the strip now represents one unit. Model the labeling as you go.

3. Have the students fold the right end of their strip over to the left end and crease. Have them open their strip and observe that the crease makes it appear to be divided into two equal parts. Have the students write "$\frac{0}{2}$" under the 0 on the left end, "$\frac{1}{2}$" on the crease, and "$\frac{2}{2}$" under the 1 on the right end. Model this as you go. After this step, discuss briefly with the students that they now have two ways to write the quantity zero — 0 and $\frac{0}{2}$ — and two ways to write the quantity one — 1 and $\frac{2}{2}$.

4. Have students fold the strip in half again and then fold it a second time and crease. Have them open their strip and observe that it appears to be divided into four equal parts.

5. Have the students write "$\frac{0}{4}$" under the 0 and $\frac{0}{2}$, "$\frac{1}{4}$" at the first crease, "$\frac{2}{4}$" under the $\frac{1}{2}$, "$\frac{3}{4}$" at the third crease, and "$\frac{4}{4}$" under the 1 and $\frac{2}{2}$. After this step, discuss briefly with the students that they now have three ways to write the quantity zero — 0, $\frac{0}{2}$, and $\frac{0}{4}$. Point out that they now have two ways to express the quantity one-half $\frac{1}{2}$ and $\frac{2}{4}$ and three ways to express the quantity one — 1, $\frac{2}{2}$, and $\frac{4}{4}$.

6. If you wish, the same procedure can be done for eighths. Have the students fold their strip in half, in half again, and in half a third time. The strip will now look like it has been divided into eight parts. Have them follow the same procedure for labeling. After labeling, point out equivalent fractions.

7. Folding into thirds is a bit tricky. Have the students think of the strip as a belt and lap the two ends toward the each other, adjusting until the folded lengths are of equal length. Model this folding for them. Have them crease and then label the three parts as they have done before. Be sure to point out that no thirds line up with halves, fourths, or eighths.

8. Have the students turn their strip over to the blank side, making sure that the 0 end is still to the left and the 1 end is to the right. Have them label the left end 0 and the right end 100. *Now is the time to discuss the fact that one meter is equivalent to 100 centimeters and that is why 100 was chosen for the label.*

9. Have the students fold their strip into two parts, open it, and label the parts. Have them write "$\frac{0}{100}$" under the 0 on the left end, "$\frac{50}{100}$" on the crease, and "$\frac{100}{100}$" under the 100 on the right end. To the side of each label, have them write the decimal represented: 0, .5, and 1. Remind them that percent literally means "out of a hundred" so that writing the percent from the fraction for each is easy. Directly under each label, have the students write the equivalent percent: 0%, 50%, and 100%.

10. Now have students start the association with the first side of the strip: zero is zero as a fraction, decimal or percent. One-half can be expressed many ways: $\frac{1}{2}$ or $\frac{50}{100}$ or .5 or 50%.

11. Continue this process until the students have completed the percent and decimal equivalencies for all of the fractions on the first side of the strip. Explain to the students that they have now completed a fraction number line on one side of their meter strip and a decimal and percent equivalency line on the other side.

12. Part 2: Organize the students into small groups, and give each group 100 similar objects, e.g. colored beads, an assortment of buttons, colored marshmallows, M & Ms, small screws and nuts, tricolor dry pasta noodles, a collection of different coins, or different colored marbles. You might wish to place more than 100 objects on the table and ask the students to count out the 100 and store the rest.

13. Give each group a copy of the handout "Who Has 100 Things?." Ask each group to sort their 100 objects into at least three groups and then complete the chart and answer the question on the recording sheet. For example, one collection of 100 beads might consist of 25 red beads, 60 green beads, and 15 blue beads and should be recorded as follows:

	Title of Each Group	Number of Items in Group	Fraction	Decimal	Percent
Group #1	Red Beads	25	$\frac{25}{100}$	.25	25%
Group #2	Green Beads	60	$\frac{60}{100}$	.60	60%
Group #3	Blue Beads	15	$\frac{15}{100}$	.15	15%
TOTAL:		100	$\frac{100}{100}$	1.00	100%

14. Have each group present their data to the class on a transparency of the handout "Who Has 100 Things? Recording Sheet."

15. As students work, circulate and watch carefully as they follow instructions. Answer any questions, and clarify any procedures that may be problematic.

Pulling It All Together (Reflection)

Exit Slip: You scored 85% on your last quiz. Write the equivalent fraction and decimal for this grade. Explain how you determined your answers.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Who Has 100 Things? Recording Sheet

1.   Sort your 100 objects into at least three groups.
2.   Fill in the chart, and answer the question.

	Title of Each Group	Number of Items in Group	Fraction	Decimal	Percent
Group #1					
Group #2					
Group #3					
Group #4					
Group #5					
Group #6					
Group #7					
TOTAL:					

3.   How can you find the percent in group #2 without counting?