Predicting Percents

Summary

These activities help students understand equivalencies of fractions.

Main Core Tie

Mathematics Grade 6

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

Group Size

Large Groups

Materials

- *Piece = Part = Portion*
- *Estimating Equivalencies*
- Fractured Line Game
- Fraction cards

Dice

Paper clips

Additional Resources

Books

Piece = Part = Portion, by Scott Gifford; ISBN 1-58246-102-3

The Grizzly Gazette, by Stuart J. Murphy; ISBN 0-06-000026-0

World Cards; ISBN 0-9629962-2-x

Geography Facts, by Dougal Dixon; ISBN 0-88029-925-8

Background for Teachers

The same amount can be represented in multiple ways using fractions, decimals, and percents. Depending on the task at hand, one form may be easier to work with than another, therefore students need to develop fluency converting between the multiple forms. This fluency can be cultivated by identifying relationships between forms throughout our teaching. Teaching these separately and expecting students to make the necessary connections on their own leave a needed learning to chance. Often these concepts are taught independently: fractions as parts of a whole using fraction circles or squares, decimals as parts of a whole number in tenths and hundredths with base ten blocks, and fractions as part of 100 using computation to find the answer. These models should be integrated throughout instruction to foster flexibility between forms. The ability to understand the meaning of a percent as part of a whole and use common percents such as 10 percent, 33 1/3 percent, or 50 percent as benchmarks in interpreting situations they encounter is useful.

Often, textbooks and classroom situations provide problems, numbers are used that compute easily. In real-life contextual problems, things we face daily at the grocers or stores, the calculations do not work out so perfectly. We need to assist our students in developing an ability to find reasonable approximations with fractions, decimals, and percents. Think about how you would figure 33% off $28.95. Your solution may include changing 33% to 1/3 or rounding the dollar amount to either $27 or $30. This skill must be fostered in our classrooms to allow students to reason with numbers.

Intended Learning Outcomes

1. Develop a positive learning attitude toward mathematics.

3. Reason mathematically.
6. Represent mathematical ideas in a variety of ways.

Instructional Procedures

Invitation to Learn

Ask students if they can tell, or model some different ways to show the number 1/2. Have students look around the room and see if they can spot things that would represent or explain what they are thinking. Students may use decimal forms or percents but the majority will find different models or numbers that represent 12. Review real- life examples (students may want to use their journal entry from the previous discussion on 12). At this time, focus on the volume of ideas shared, while observing what the students share and their level understanding. Allow students time to share solutions amongst their groups.

Instructional Procedures

Part 1: Oh, So Close!

Ask the students what they think the word "percent" means. Ask them to record in their journals any other words that have "cent" as a part of the word. They can use dictionaries if they are struggling with this.

Discuss the meaning of the words they come up with. (e.g. century: 100 years, centimeter: 1/100 of a meter, centennial: hundredth anniversary, cent: 1/100 of a dollar.) Some other words may include things that have to do with the center or middle of something. You may want to categorize the words into two groups as we want to focus on the "parts of 100"words.

Have students record in their journal what percent means: Percent- a ratio that compares a number to 100.

Read the book *Piece=Part=Portion*.

On the board list some of the fractions mentioned in the book like 1/2, 1/4, 1/7, 1/12. Ask the students what fractions they think would be easy to change into percent form? Students will probably respond with the familiar fractions like 12 equals 50%. Have someone explain how they know that is true. If it does not come up in the discussion relate the idea of a percent as being part of 100 so how can we find an equivalent fraction form of 12 that is part of 100. 1/2= 50/100 = 50% = .50 or .5) What other fractions are easy to change to hundredths? (fourths, fifths, tenths)

Hand out *Estimating Equivalencies*. Have students identify the fractions that are easily changed and fill in those columns by finding an equivalent fraction with a denominator of 100 and then expressing it is a fraction, decimal, and percent.

Share with students that sometimes finding a close estimation is enough to help us solve a problem.

Start with 1/9. Can you easily get an equivalent fraction with a denominator of 100? (no) How close can you get? (99). Is 99 close to 100? (Yes, very close, just one under)? What would I have to do to change 1/9 into n/99? (multiply by 11/11) What do you get? (11/99) So 1/9 is about 11%. Look in *Piece=Part=Portion* and see how close your percent matches.

Repeat the process for 1/6. This time it is hard to determine 6 x n = 100. So we are going to break it down even more. I don't know 6 x n = 100 but 6 x 8 gets me pretty close to half way there (6x8 = 48; 1/6 = 8/48). If I double that I'm pretty close to 100 for my denominator (8/48 x 2/2= 16/96). So 1/6 is pretty close to 16% or .16, it's a little low because I only have 96 instead of 100 for my denominator. Have students figure it out mathematically either paper-pencil or using a calculator. The answer is actually 16.666. Pretty reasonable estimate!

Depending on your students have them complete the worksheet on their own, in groups, or whole class.

Part 2: Fractured Line Game

Give each student the *Fractured Line Game Handout* and a paper clip. Every two students need a set of *Fraction Cards*.
Show the students how to fold the game sheet along the dotted fold line and place the paper clip at 0%.
The first player draws a fraction card, decides what percent the fraction represents, and slides the paper clip on the percent number line to where he thinks the fraction is located.
The second player checks the answer by opening the flap. If the first player is right, he gets a point.
The second player now draws a card, figures out what percent the fraction represents, and moves the paper clip to the correct position. Player one checks the answer.
If the player draws a word card, he must define that word. (Example: Player 1 draws the card "What does percent mean?". He tells player two the definition while player 2 checks. If player one is correct, he earns a point.
Play continues until all of the cards are drawn. The player with the most points wins.

Extensions

Curriculum Extensions/Adaptations/ Integration

Have students glue their *Estimating Equivalencies* in their journal.
Have students create a flag of an imaginary country. They will determine the percent of each section of the flag; writing this as a decimal, fraction, and percent.
Play *Equivalent Fractions Spoons*. Create cards that have 8 different sets of 4 equivalent fractions. Play Spoons with original rules.
Play *Target Percent*. This is similar to *Rolling to One* from the Decimals Activity. Students roll two dice, create a fraction, find its corresponding percent, and write it down. Students may roll again, or stop and take the total at any time. Once they stop, their turn is over. Each round has a winner- the student closest to the target percent. At the end of four rounds, the student with the most wins is the winner.

Family Connections

Look for fractions, decimals, and percents in real world situations.
Have students figure out the percent off of items when shopping. Example video games are 25% off. What fraction is 25%? If the video game is $59.99, how much is 25%? What is the cost of the video game on sale?
Send *Fractured Line* game home to play with parents.

Assessment Plan

Have students answer the following problem: We surveyed the students at a Utah elementary school about what pets they owned. 8/25 of them owned dogs, 0.04 owned snakes, 3/20 owned birds, 19% owned fish, and 0.3 owned cats. List the pets in order from least to greatest and explain your answer.
Have students list in their journals as many everyday examples of fractions, decimals, and percents as possible as why they are important.
Give students several fractions and have them write the percent equivalent, explaining their solution.
Play the *Fractured Line Game* with individual students to check their understanding.

Bibliography

Research Basis

Van de Walle, J. A. (2001). *Elementary and middle school mathematics: Teaching developmentally* (4th ed.). New York: Addison Wesley Longman.

When a student encounters an unfamiliar math problem, students will need some support in developing solutions. This should not occur on test day. Students should encounter these sorts of problems daily and learn to solve them with the support of peers and teachers. "Children rarely give random responses" (Van de Walle, 2001, p. 28). Teachers must understand the mental models that students use to perceive the world and the assumptions they make to support those models.

Youngs, D. (1998). Have you done a good math problem lately? *AIMS*, 13(2), 18-21.

Dr. Dave Youngs brings up an interesting point in the journal article, "Have You Done a Good Math Problem Lately."

Why does is seem so natural to ask someone if they've read a good book lately, but so odd to ask them if they have done a good math problem? Perhaps this is because most of us don't view mathematics as something that anyone would ever voluntarily choose to do, let alone choose to do "for the fun of it." (Youngs, 1998, p. 18)

Some students would laugh at the thought of having fun at math. Yet, through careful selection of materials and methods, students become motivated to solve problems and discuss their findings. Mathematics must become an exciting, interesting part of the day where students are solving intriguing problems and coming up with new and interesting ways to approach the problem. Puzzles should be a part of the daily classroom activities. Solving real-world problems that occurred in the classroom and situations to that engaged students.

Authors

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