Solving Percent Problems With Proportions

Summary

Students will use proportion equations to solve percent problems.

Main Core Tie

Mathematics Grade 6

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

Additional Core Ties

Mathematics Grade 7

Strand: RATIOS AND PROPORTIONAL RELATIONSHIPS (7.RP) Standard 7.RP.3

Materials

Foldables: Percent Estimator
Calculators
Percent Estimator manipulative (made from card stock) for each pair, Percent Estimator Template for Smart Pal, Smart Pals, markers and cleaning cloths
Several Sales Ads
Book "If The World Were A Village" (David Smith)

- Percent Concentration Game
on Transparency
Worksheets: Percent Estimator, If The World Were A Village, The Bargain Store, Just Put It On My Credit Card, Payday Loans

Background for Teachers

Enduring Understanding (Big Ideas):
Proportions can be used to solve a variety of problems.
Essential Questions:
Why is a percent ratio based on 100?
How can a proportion be used to solve a problem involving percent?
Skill Focus:
Set up and solve proportion equations for percent problems
Vocabulary Focus:
Ratio, proportion, percent
Ways to Gain/Maintain Attention (Primacy): stories, graphic organizer, shopping simulation

Instructional Procedures

Starter:
Order these from least to greatest: 45%, 4.5%, 450%, 4/5
Amee takes her resting heart rate and counts 8 beats in 6 seconds. Use a proportion to find the number of beats in one minute. Then write this as a rate beats/minute.

Lesson Segment 1: Why is a percent ratio based on 100? How can a proportion be used to solve a problem involving percent?
Do Stand-Up If, where the students stand for a statement if they believe it is true. Ask a few students to justify their choice to stand or not.
Percent means a part out of 100.
If we say 50% of our class prefers chocolate ice cream, this means 50 of us prefer chocolate ice

cream.

50% of our class would be about 18 people.

Q. So if 50% means 50 out of every 100, how can we know how many that is out of 36 (or whatever number of students is in the class)?

Do "Vizualizing Percents In Our World" with the students, shading in the appropriate percent as they visualize the fraction of the whole given in each problem.

To help students visualize the percent of a number, give student pairs a Percent Estimator Foldable and Smart Pal with Percent Estimator Practice worksheet. The Percent Estimators come four to a page. Copy them on card stock and slit the 0% line on each bar to allow a slider strip to be moved up and down the fraction and the percent bars. Cut 1 ½ " strips from a different color card stock to use as slider bars. They should be inserted in the slit on each bar, so there are 2 sliders per Estimator. Students work together to slide a covered card stock bar on the % side and on the part to total number side to see the ratios. They should also shade the Smart Pal and Practice worksheet for both % and part to total. Using the bar, they should try to determine about what number out of the total number given represents the percent given. After estimating using the Percent Estimator, have the students set up a proportion using part/total = %/100 as the ratios, and have them find the exact number.

25% of 20

40% of 30

10% of 50

75% of 10

Ask students to describe what 150% of a number would look like, 200%, etc.

Q. What if we knew the part to total ratio, but didn't know what percent that would be. How could we find a percent? Repeat the visualization with the Percent Estimator, worksheet, and Smart Pals. This time have them estimate what the part to total ratio bar would look like and slide the bar up the % side to estimate the percent. Use:

30/40 is what %?

12/48 is what %?

10/25 is what %

1/12 is what %?

Lesson Segment 2: How can proportions be used to solve percent problems?

Read parts of the book, "If The World Were A Village" by David Smith. Use the attached worksheet to find out how many people that would be in the classroom if the class were typical of the world.

Lesson Segment 3: How can proportions be used to solve tax and interest problems?

Use appropriate text problems involving tax and interest to practice setting up proportions to solve. Students will need to determine what the part represents, and what the total represents in the first ratio if you use:

If you are finding the total cost after tax is being paid, it is helpful for students to consider the part as original price plus tax, the total as original price, and the percent as 100% plus the tax percent. To help with this have students model purchasing something and ask questions such as:

Q. What is the tax?

Q. Is tax added or subtracted for the item price?

Q. Will the total cost including tax be more or less than 100% of the original price?

The attached Shopping Spree Worksheet helps students connect to their world. Give groups several sales ads to look through to spend their "$1000" limit.

Lesson Segment 4: How can proportions be used to solve percent increase and decrease problems?

Your text will also have plenty of practice problems for increase and decrease that can be used. Again it is useful for students to consider whether the question wants them to find more than 100% of the original (increase) or less than 100% of the original (decrease). Helping students determine

Q. What is the increase or decrease?
Q. Will the result be more or less than 100% of the original?
The attached "The Bargain Store" worksheet can be used as a role model. Students often mistakenly think taking additional percent off can eventually result in paying nothing. This worksheet investigates the idea of accumulated percent decrease.
Lesson Segment 4: Practice Game
Play Percent Concentration (attached)

Assessment Plan

observation, performance task, journal

Bibliography

This lesson plan created by Linda Bolin.

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