Solving Practical Problems Using Proportional Reasoning II

STRAND: Computation and Estimation

STRAND CONCEPT: Practical Applications-Rational Numbers and Proportional Reasoning

SOL 7.3, 8.4

Remediation Plan Summary

Students apply proportions to solve practical problems.

Common Misconceptions

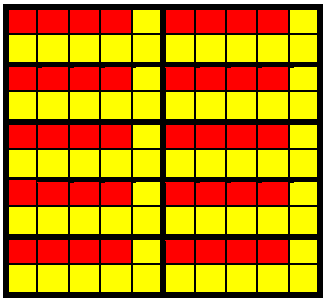
- Students may mix up the whole and the part when trying to write the proportion for the word problem.
- Students may incorrectly reverse the numerator and denominator in the ratios used to solve proportions. Encourage students to label the units.

Materials

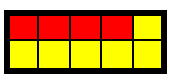
- Copies of the attached worksheet
- Graph or grid paper
- Colored pencils
- Color tiles or construction paper squares (red and yellow)
- Scientific calculators

Introductory Activity

Give each student a set of four red and six yellow color tiles or paper squares. Ask students to state the ratio of red tiles to all the tiles in the set ($\frac{4}{10}$) and the ratio of yellow tiles to the whole set. ($\frac{6}{10}$) Ask: "If the ratio stays the same, how many red tiles would be in a set of 100 tiles?" Remind students that the numerator of the ratio represents the *part* of the set and the denominator represents the *whole* set. When setting up a proportion, the second ratio must have the same type of numerator and the same type of denominator. For this problem, $\frac{4}{10} = \frac{n}{100}$. Using cross-multiplication, $10n = 400$, so $n = 40$.



Distribute a sheet of grid paper to each student, and help students use it to see this relationship by outlining 10 squares and shading four out of the 10 to represent the original ratio, as shown below.



Then, have students outline 100 squares and shade four out of each set of 10, as shown at right. Encourage students to continue to use grid pictures to helps them visualize various ratios or create a ratio table to further explore the relationship of red and yellow tiles.

Red tiles	4				
Yellow tiles	6				

Plan for Instruction

1. Distribute the "Applications of Proportions" worksheet, and remind students that the most important aspect of solving proportions is setting them up correctly. Care must be used in determining what unit of measure will be placed in the numerator and what unit of measure will be placed in the denominator of the first ratio. Once that is done, the second ratio in the proportion must be set up with like units of measure in the numerator and denominator. Students should be encouraged to set up ratio tables to help them develop the proportional relationships and assist them in correctly setting up a proportion. Have students model and solve questions 1-4 on their own. Discuss strategies that students used as a class.
2. Have students work with a partner on questions 5-15. Check to see whether students set up the proportions correctly with like units placed in the same positions in the ratios while groups are working. Assign partners specific problems to present and explain for the class.
3. Have other students share how they set up the proportions and try to show as many of the possible ways for setting up the first ratio and then for setting up the proportion. Students may be surprised to learn that there are many ways to arrive at the "right" answer.

Pulling It All Together

Exit Ticket: Have students create a word problem that can be solved using a proportion and solve it. Use these problems as a warm up activity for tomorrow's lesson. Students can trade problems and solve. The original author of the problem will check the other student's work.

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

Virginia Department of Education 2018

Name:

Applying Proportional Reasoning

For problems 1-4 below, create a ratio table to represent the relationship. Next set up a proportion and solve it showing your work.

1. In one inch, there are 2.54 centimeters. If a tree branch is 14 inches long, how many centimeters long is the branch?

2. A recipe calls for 4 cups of flour to 6 tablespoons of shortening. How many tablespoons of shortening are needed for 6 cups of flour?

3. A tree casts a shadow of 15 meters, while a 2-meter post nearby casts a shadow of 3 meters. How tall is the tree?

4. If a scale distance of 3.5 inches on a map represents an actual distance of 175 kilometers, what actual distance does a scale distance of 5.7 inches represent?

For problems 5-12, use proportional reasoning to solve the problem. You may use ratio tables, manipulatives or proportions to solve the problems.

5. The girls' soccer team scored 60 points in 10 games. If this trend were to continue, what would be the points scored in 15 games?

6. A train travels 90 miles in 1.5 hours. How many miles will the train go in 6 hours if it continues to travel at the same rate of speed?

7. If 3 tickets to a certain show cost $13.20, what would 7 tickets cost?

8. A 40-acre farm yields 600 bushels of wheat. At the same rate, how much wheat would a 75-acre farm yield?

9. A workman received $110 for working 20 hours. At the same rate of pay, how many hours must he work to earn $187?

10. In a certain school, there are 4 girls for every 5 boys. If there are 560 girls in the school, how many boys attend the school?

11. To make concrete, a person mixes 1 bag of cement to 4 bags of sand. How many bags of cement should be used with 100 bags of sand?

12. Shawna weighs 120 pounds. If one pound is approximately .45 kilograms, how many kilograms does Shawna weigh?

Solve each of the following proportions and explain how you solved it. You may use graph paper, ratio tables, algebra tiles or other manipulatives to help you solve.

13. $\frac{n}{15} = \frac{4}{5}$

Explanation:

14. $\frac{12}{21} = \frac{y}{14}$

Explanation:

15. $\frac{16}{x} = \frac{2}{7}$

Explanation: