LESSON 7: Ratios and Proportion

Weekly Focus: Ratio and Proportion
Weekly Skill: word problems

Lesson Summary: In the warm up, students will solve a work-related word problem with fractions. In Activity 1, they will fill in the blanks of sentences to practice vocabulary. In Activity 2, they will practice using proportions to solve word problems. In Activity 3, they will do problems in the workbook. In Activity 4, they compare the costs of 3 common consumer products. There are an exit ticket and an extra word problem at the end. Estimated time for the lesson is two hours.

Materials Needed for Lesson 7:

- Video (length 10:23) on using proportions to solve word problems. The video is required for teachers and recommended for students.
- *Mathematical Reasoning Test Preparation for the 2014 GED Test* Student Book pages 10 and 11
- *Mathematical Reasoning Test Preparation for the 2014 GED Test* Workbook pages 18 to 21
- Application activity (link embedded in the lesson plan)
- Exit ticket (attached)

- Teacher Note: If students complete the word problems in the book quickly, have them solve them on the board while other students are still working.

Objectives: Students will be able to:

- Review vocabulary related to ratios and proportions
- Practice proportion and ratio word problems in the book
- Use real-life information to compare the costs of products

ACES Skills Addressed: N, CT, LS, SM
CCRS Mathematical Practices Addressed: Model with Math, Look for and make use of structure
Levels of Knowing Math Addressed: Intuitive, Pictorial, and Abstract

Notes:
You can add more examples if you feel students need them before they work. Any ideas that concretely relates to their lives make good examples.

For more practice as a class, feel free to choose some of the easier problems from the worksheets to do together. The "easier" problems are not necessarily at the beginning of each worksheet. Also, you may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice.

The GED Math test is 115 minutes long and includes approximately 46 questions. The questions have a focus on quantitative problem solving (45%) and algebraic problem solving (55%).

Students must be able to understand math concepts and apply them to new situations, use logical reasoning to explain their answers, evaluate and further the reasoning of others, represent real world problems algebraically and visually, and manipulate and solve algebraic expressions.

This computer-based test includes questions that may be multiple-choice, fill-in-the-blank, choose from a drop-down menu, or drag-and-drop the response from one place to another.

The purpose of the GED test is to provide students with the skills necessary to either further their education or be ready for the demands of today's careers.

Lesson 7 Warm-up: Solve the work problem	**Time: 10-15 Minutes**

Write/Project on the board: You just got a new job in sales. When you were hired, your boss asked you to divide your time the following ways: ½ of your work day on the sales floor, ¼ doing paperwork, 1/10 making sales calls, and the rest is up to you.

Basic Questions:

- If you work 8 hours, how much time is spent on the sales floor? (1/2 x 8 = 4 hours)
- How much time doing paperwork? (1/4 x 8 = 2 hours)
- How much time is left to sales calls and other tasks? (2 hours)

Extension Questions:

- How many minutes is 1/10 of the 8-hour day? (1/10 x 480 minutes =48 minutes. Students may solve this out different ways. Did anyone use decimals?)
- How much time is left in your day to do other tasks? (8 hours – 6:48 = 1:12)
- What fraction of the day is it? (Since ½ + ¼ + 1/10 = 17/20, then 3/20 is left)
- Can you check your fraction is correct by solving for minutes? (yes, 3/20 x 480/1 minutes in a day = 72 minutes = 1:12)

Lesson 7 Activity 1: Vocabulary in Sentences	**Time: 5 Minutes**

This activity can be projected on the board and done as a whole class. Have students volunteer to write answers.

Answers:

1. ratio
2. numerator, denominator
3. proportion
4. unit rate

Lesson 7: Activity 1

Use the correct term to fill in the blanks of the sentences below:

Numerator Unit Rate Proportion Ratio Denominator

1. A _____ compares two numbers. The second or bottom number does not necessarily represent a whole.
2. The _____ of a fraction represents the part while the _____ represents the whole.
3. A _____ is used to compare two ratios that are written as equals.
4. A _____ is a ratio with a denominator of 1.

   An example is $50\ \frac{miles}{hour}$.

Lesson 7 Activity 2: Ratios and Proportions Practice	Time: 20-25 Minutes

1) Example A: Write the ratio of men to women in class today. (First, write it as $\frac{x}{y}$.) Point out that although this is written in the same format as a fraction, it isn't a true fraction. Why not? Because the denominator isn't the total number of students. Explain that a ratio can also be written as x:y or as x to y.

2) Example B: Chang wants to buy 4 T-shirts. They are priced at 3 T-shirts for $18. How much will he pay for 4 shirts? Ask the students if they can do it first. This can be solved two ways. One way is with unit rate. If it costs $18 for 3, then $\frac{\$18}{3} = \frac{\$6}{1}$ so 4 shirts cost $24. The other way is to set up a proportion. $\frac{\$18}{3} = \frac{\$x}{4}$. When setting up proportions, it is important to use the same terms as the numerators ($ in this example) and the same as the denominators (shirts). The proportion can be solved with cross multiplication 18 times 4 = 3x, so x = $24.

3) Do problems in **student book** pages 10-11. Circulate to help. Review any questions that students found challenging. Choose a few problems to have students volunteer to do on the board and explain if they want.

Lesson 7 Activity 3: Workbook Problems	Time: 20-25 Minutes

Do the problems in the **workbook pages 18-21**. Have students volunteer to do some of the challenging problems on the board. If you prefer, you can do the next activity first as it will generate more conversation and then start on the workbook problems with the rest as homework.

Lesson 7 Activity 4 Application: Cola v. Milk v. Gas	Time: 20-25 Minutes

Work with students to do the **activity** that compares the cost of cola, gas, and milk. Please download the activity directly from yummymath.com. The solution can be accessed if you are a member.

Lesson 7 Exit Ticket (attached below)	Time: 5 Minutes

Write a proportion and solve: At a rate of $15 per dozen, how much will 30 roses cost?

Students may use a unit rate $15/12 roses = $1.25 each x 30 roses =$37.50.
They may set up a proportion of $15/12 = $x/30 and cross-multiply. If there is time, have them solve it both ways.

Lesson 7 Extra Problem	Time: 5-10 Minutes

Write on the board: Josh picked 8 quarts of strawberries and paid $10.00 for them.

Basic Question:

- How much did he pay per quart? *($1.25) Students may use decimals, unit rates, or proportions to solve the problem. Ask them and discuss all the valid ways they came up with the answer.*

Extension Questions:

- How many ounces did he pick? *(1 quart is 32 oz. so 8 x 32 =256 ounces)*
- If he had bought them at the store, they would have cost 2 ¼ times more. How much would they have cost? *($22.50) Discuss the various ways to solve the problem. Did they use whole numbers (double the $10.00 and then add a quarter of it $2.50)? Did they use decimals (10 x 2.25)? Did they use fractions (2 ½ x 10)?*

Exit Ticket

Write a proportion and solve: At a rate of $15 per dozen, how much will 30 roses cost?

How did you solve the problem?

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