7-4: Comparing and Scaling

Unit Goals, Focus Questions, and Mathematical Reflections

Unit Goals

Ratios, Rates, and Percents Understand ratios, rates, and percents

- Use ratios, rates, fractions, differences, and percents to write statements comparing two quantities in a given situation
- Distinguish between and use both part-to-part and part-to-whole ratios in comparisons
- Use percents to express ratios and proportions
- Recognize that a rate is a special ratio that compares two measurements with different units
- Analyze comparison statements made about quantitative data for correctness and quality
- Make judgments about which kind of comparison statements are most informative or best reflect a particular point of view in a specific situation

Proportionality Understand proportionality in tables, graphs, and equations

- Recognize that constant growth in a table, graph, or equation is related to proportional situations
- Write an equation to represent the pattern in a table or graph of proportionally related variables
- Relate the unit rate and constant of proportionality to an equation, graph, or table describing a proportional situation

Reasoning Proportionally Develop and use strategies for solving problems that require proportional reasoning

- Recognize situations in which proportional reasoning is appropriate to solve the problem
- Scale a ratio, rate, percent, or fraction to make a comparison or find an equivalent representation
- Use various strategies to solve for an unknown in a proportion, including scaling, rate tables, percent bars, unit rates, and equivalent ratios
- Set up and solve proportions that arise from real-world applications, such as finding discounts and markups and converting measurement units

7-4 Comparing and Scaling: Focus Questions (FQ) and Mathematical Reflections

Investigation 1 Ways of Comparing: Ratios and Proportions	**Investigation 2** Comparing and Scaling Rates	**Investigation 3** Markups, Markdowns, and Measures: Using Ratios, Percents, and Proportions
Problem 1.1 **Surveying Opinions: Analyzing Comparison Statements** FQ: What do different comparisons of quantities tell you about their relationship? **Problem 1.2** **Mixing Juice: Comparing Ratios** FQ: What strategies do you use to determine which mix is the most orangey? **Problem 1.3** **Time to Concentrate: Scaling Ratios** FQ: When you scale up a recipe and change the units, like from cups to ounces, what are some of the issues you have to deal with? **Problem 1.4** **Keeping Things in Proportion: Scaling to Solve Proportions** FQ: What strategies can you use to find a missing value in a proportion? What is your preferred strategy and why?	**Problem 2.1** **Sharing Pizza: Comparison Strategies** FQ: How can you determine whether two ratios are equivalent or find which of two ratios is more favorable? **Problem 2.2** **Comparing Pizza Prices: Scaling Rates** FQ: How can you use rate tables to find missing values? How are rate tables similar to scaling quantities and solving proportions? **Problem 2.3** **Finding Costs: Unit Rate and Constant of Proportionality** FQ: How can you find a unit rate in a description, an equation, a table, or a graph?	**Problem 3.1** **Commissions, Markups, and Discounts: Proportions With Percents** FQ: How can you use proportions and percent tables to find various percentages of a value when you know a certain percentage of the same value? **Problem 3.2** **Measuring to the Unit: Measurement Conversions** FQ: How can you use unit rates, proportions, equations, and rate tables to scale a variety of units? **Problem 3.3** **Mixing it Up: Connecting Ratios, Rates, Percents, and Proportions** FQ: How can you use scale factors, rate tables, proportions, equations, or graphs to find amounts of a mixture, given the proportions?
Mathematical Reflections 1a. In this Investigation you have used ratios, percents, fractions, and differences to make comparison statements. How have you found these ideas helpful? 1b. Give examples to explain how part-to-part ratios are different from, but related to, part-to-whole ratios. 2. How can you use scaling or equivalent rations 2a. to solve a proportion? Give an example. 2b. To make a decision? Give an example. 3. You learned about scaling in *Stretching and Shrinking*. You learned about proportions and rates in *Comparing and Scaling*. How are the ideas in these two Units the same? How are they different? 4. Describe the connections you have found among unit rates, proportions, and rate tables.	**Mathematical Reflections** 1a. How are tables, graphs, and equations helpful when you work with proportions? 1b. How can you identify a unit rate or constant of proportionality in a table? In a graph? In an equation? 2. How are unit rates useful? 3. How is finding a unit rate similar to solving a proportion?	**Mathematical Reflections** 1. What strategies have you learned for solving proportions? 2. Describe a strategy for converting a rate measured in one pair of units to a rate measured in a different pair of units. For example, how would you convert ounces per cup to pounds per gallon? 3. You learned about scaling in *Stretching and Shrinking*. You learned about proportions and rates in *Comparing and Scaling*. How are the ideas in these two Units the same? How are they different? 4. Describe the connections you have found among unit rates, proportions, and rate tables.