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Module 7 Ratio, Proportion, and Percent
Lesson 4 Ratios, Rates, and Proportional Reasoning

Challenge Problems

7.4

Set 1

- 1 Explain how you know that a ratio is written in simplest form. Give an example of a ratio in simplest form.
- 2 A pizza is cut into eight slices. A slice costs \$1.65. Explain why you need to use multiplication instead of division to find the unit cost of a whole pizza.
- 3 Explain the difference between a ratio and a rate.

Set 2

- 1 Marcus earned \$275 in 15 hours. Cheryl earned \$412.50 in 22.5 hours. Show how you can use a proportion to decide whether Marcus and Cheryl earned the same hourly wage.

Possible Answers

Set 1

1. A ratio is written in simplest form when there are no common factors in the two numbers. The ratio 5 to 9 is in simplest form because no number divides evenly into both five and nine.
2. The rate is \$1.65 per eighth of a pizza. To find the unit cost of one pizza, which is a unit rate, multiply both the numerator and denominator by eight so that the denominator becomes one. The unit cost is \$13.20.

$$\frac{\$}{\text{pizzas}} = \frac{1.65}{\frac{1}{8}}$$
$$\frac{\$}{\text{pizza}} = \frac{1.65 \times 8}{\frac{1}{8} \times 8} = \frac{13.20}{1}$$

3. A ratio compares two numbers, for example, 2 : 3 or 5 to 10. A rate is a ratio that compares two quantities that have different units, for example, \$5 to 3 bagels, or $\frac{6 \text{ miles}}{5 \text{ min}}$. Every rate is a ratio, yet not every ratio is a rate.

Set 2

1. If you write a proportion and the cross-products are equal, then the ratios are equal. Since the ratios represent the hourly wages, you can tell whether Marcus and Cheryl earned the same hourly wage.

$$\frac{\$ \rightarrow}{\text{hours} \rightarrow} \frac{275}{15} = \frac{412.50}{22.5}$$
$$275 \times 22.5 \stackrel{?}{=} 15 \times 412.50$$
$$6,187.50 = 6,187.50$$

The ratios are equal. Marcus and Cheryl earned the same hourly wage.