

## **Ratio Tables and Unit Rates**

**STRAND:** Patterns, Functions and Algebra

**STRAND CONCEPT:** Proportional and Additive Relationships; Slope; Linear Functions

**SOL:** 6.12a,b

### **Remediation Plan Summary**

Students determine whether a proportional relationship exists between two quantities. Students will also represent proportional relationships in practical situations, determine unit rates, and determine missing values in a ratio table.

### ***Common Errors and Misconceptions***

Students may have difficulty understanding the equivalent relationship between fractions. Students sometimes confuse multiplication and division when determining the constant of proportionality.

### ***Materials***

- Linking cubes
- Chart paper (optional)
- Determining Proportional Relationships and Unit Rates activity sheet (attached)
- Creating a Table of Ratios and Determining the Existence of Proportional Relationships activity sheet (attached)

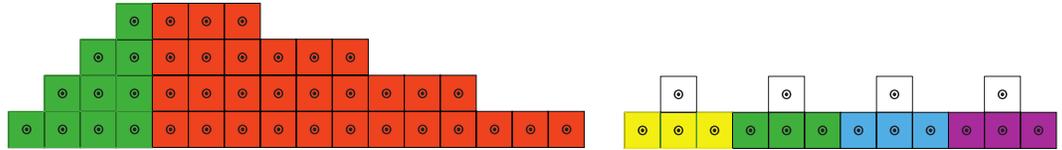
### ***Introductory Activity***

Write the term *ratio* on the board. Ask students to discuss with a shoulder partner anything they remember about ratios, and then ask individual students to share out as a whole class. Make sure that students understand that a ratio is a comparison of any two quantities and that it is used to represent a relationship within a quantity and between quantities. Students must first understand the concept of ratios in order to recognize and determine the existence of equivalent ratios. Equivalent ratios arise by multiplying each value in a ratio by the same constant value. For example, the ratio of 6:3 would be equivalent to the ratio 18:9, since each value in the first ratio could be multiplied by 2 to obtain the second ratio.

### ***Plan for Instruction***

- Share with students that a proportional relationship consists of two quantities where there exists a constant number (constant of proportionality) such that each measure in the first quantity multiplied by this constant gives the corresponding measure in the second quantity. Provide students with additional examples that will allow them to identify the constant of proportionality.

- Use the Determining Proportional Relationships and Unit Rates activity sheet as a means of practical application and discovery of the following concepts:
  1. Understanding the difference between a multiplicative relationships and additive relationships.
  2. Understanding that a rate is a ratio that involves different units and how they relate to each other. A unit rate describes how many units of the first quantity of a ratio correspond to one unit of the second quantity.
  3. An example of using the linking cubes to demonstrate the relationship 1:3 and unit rates:



- Use the Creating a Table of Ratios and Determining the Existence of Proportional Relationships activity sheet to help students understand that a ratio table is a table of values representing a proportional relationship that includes pairs of values that represent equivalent rates or ratios. A constant exists that can be multiplied by the measure of one quantity to get the measure of the other quantity for every ratio pair. The same proportional relationship exists between each pair of quantities in a ratio table.

***Pulling It All Together (Reflection)***

Have students complete the following exit ticket:

- Joseph worked 5 days a week, and 6 hours each day. This week he earned \$337.50. What was his hourly rate of pay? Is there a proportional relationship between hours worked and his pay?

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

### Determining Proportional Relationships and Unit Rates

Ella is going to an amusement park to enjoy some rides with her friends. Ella’s amusement park charges \$5 per ride and no entrance fee. Isabelle is going to a different amusement park that charges an entrance fee of \$20 plus \$1 per ride. The tables below represent the cost per number of rides ridden for Ella and Isabelle.

**ELLA**

No. of rides	Cost
1	\$5
2	\$10
3	\$15
4	\$20

**ISABELLE**

No. of rides	Cost
1	\$21
2	\$22
3	\$23
4	\$24

1. What is a ratio?
2. Do the tables represent the same relationship?
3. Use the linking cubes to model the ratio of cost to number rides ridden for Ella. What do you notice with Ella’s growing pattern?
4. What is the cost for one ride in Ella’s table?
5. Build Ella’s unit rate with linking cubes. Show how the unit rate model is repeated within all the other ratio models that you have built for Ella’s table.
6. The ratio of  $\frac{\text{cost}}{1 \text{ ride}}$  is known as \_\_\_\_\_
7. Using any two of the  $\frac{\text{cost}}{\text{number of rides}}$  ratios within Ella’s table, determine whether they are equivalent.
8. Use the linking cubes to model the ratio of cost to number of rides ridden for Isabelle. What do you notice with Isabelle’s growing pattern?
9. Using any two of the  $\frac{\text{total cost}}{\text{number of rides}}$  ratios within Isabelle’s table, determine whether they are equivalent.
10. Based on the tables above, who has the better bargain? Explain your thinking.
11. After eight rides, who would spend the most money? Explain your thinking based on the unit rate developed in question 6.

## Creating a Table of Ratios and Determining the Existence of Proportional Relationships

Jennifer would like to buy a dress that costs \$40. Because she has not saved any money, Jennifer's parents are willing to pay her for chores completed around the house. They agree to pay Jasmine \$4 for every two chores she completes but will also pay her for completing single chores.

Complete the ratio table below to show how many chores Jasmine would have to do in order to save enough money to buy the game.

X chores	1	2	4		9			20
Y money earned		\$4		\$12		\$26	\$34	

1. Does the situation above represent a proportional relationship? Use ratios from the table to explain your thinking.
2. What is the unit rate of cost per chore for Jennifer's situation?
3. Create a double-number line to demonstrate the given relationship.
4. How could you change Jennifer's situation to represent a non-proportional relationship between money earned and chores completed?

