Discovering Rates, Percentages, and Proportional Data

Family Guide | Grade 6 | Unit 4

> **Your student is exploring how rates and percentages are specific ratios that help compare numbers or measures by their relative values.**

Key Math Ideas

In this unit, students explore two specialized forms of ratios: rates and percentages. Building on their work with equivalent ratios, they learn to compare quantities to either one unit (rate) or one hundred units (percentages). Students strengthen their variable understanding by identifying independent and dependent variables, recognizing that the dependent variable "depends on" what happens to the independent variable.

My mom's recipe makes 4 loaves of bread, but today we are going to make only 1 loaf.
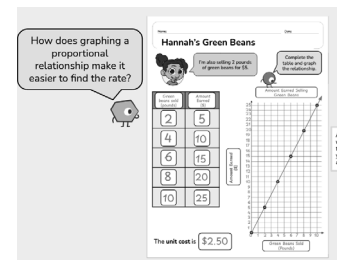
How much water will Arman need to make 1 loaf?

Barbari (loaves)	Water (cups)
4	3
1	

Students expand their understanding to represent proportional relationships with algebraic equations in the form $y = rx$, identifying r as the constant rate connecting independent (x) and dependent (y) variables. Students to use the equations to find equivalent ratios or solve problems involving rates and percentages. Finally, students apply proportional reasoning to analyze real-world data and consider how proportional thinking often provides more meaningful insights than simple comparisons of totals when analyzing data.

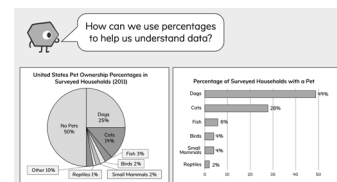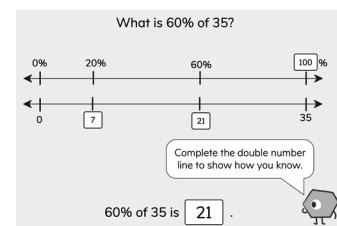→ **In the first half of the unit, your student will learn to**

- model and explain rates as the amount per one unit;
- use double number lines, tables, and calculators to find and use rates to solve problems;
- graph proportional relationships and determine rates;
- identify dependent and independent variables and use them to label tables and graph;
- use double number lines, tables, and calculators to find unknown percentages, parts, and wholes;
- use tables, graphs, rates, and percentages to compare two ratios.

How does graphing a proportional relationship make it easier to find the rate?

The rate can be found at (1, 2.5) on the graph.

→ **In the second half of the unit, your student will learn to**

- describe how, in a proportional relationship, the dependent variable (y) can be found by multiplying the rate (r) and independent variable (x) and show with equations in the form of $y = rx$;
- find equivalent ratios using equations in the form of $y = rx$;
- analyze different strategies and models for solving problems involving ratios and consider advantages and disadvantages;
- use proportional reasoning to compare data sets shown in bar graphs, pie charts, and other visual models.

What is 60% of 35?

Complete the double number line to show how you know.

60% of 35 is 21 .

How can we use percentages to help us understand data?

Helpful Hint

While working with rates and percentages, support your students by using consistent language and focusing on understanding before shortcuts. While working with rates, use language such as "for each" or "per" while making real world connections (25 miles per gallon means the car can drive 25 miles for each gallon of gas in the car).

Tips for Supporting Your Student at Home

Questions to Ask Your Student

→ **In the first half of the unit:**

- How can you find the rate using a table or double number line?
- How can you find the unit cost?
- How can we use a graph to compare proportional relationships?
- How can you find the part, whole or percentage in a situation?
- How can percentages help you to make comparisons??

→ **In the second half of the unit:**

- What equation can you write to describe the proportional relationship? Why?
- What strategy can you use to find an equivalent ratio? Why did you choose that strategy?
- How can we use ratios to help us understand data?

If...	Try...
your student uses the numbers in a percentage problem as multiplication facts, such as solving the problem "____% of 24 is 6" as 4% by using 6 × 4 = 24 instead of recognizing percentages as a ratio to 100 . . .	having students focus on the meaning of the percentage in the problem. For example, if the answer was 100%, it would be all of the 24. 10% would be one-tenth of the 24, which is 2.4. In this way, students would see that the answer of 4% does not make sense.

Student Strengths Spotlight

I ask my classmates to clarify their reasoning, and then I explain why I agree or disagree.	Students engage in discussions about different ways of finding equivalent ratios, which provides opportunities to better understand each other's reasoning and expand their own understanding.
I determine what tools and strategies might help me solve this problem.	Students decide whether to use tables, double numbers lines or graphs to find and use rates and percentages.
I consider how precise I need to be when solving problems.	Labeling units, such as cups per recipe or cost, and identifying dependent and independent variables are important parts of students' work in this unit.
I choose representations to help me solve problems and to record and share my thinking.	I choose representations to help me solve problems and to record and share my thinking.

Try This Together!

- **Rates Around Us!** Take opportunities to notice and discuss rates, such as unit cost or speed, in daily life. For example, at the store, if a pack of 4 cucumbers costs $5, what is the cost of 1 cucumber in that pack? Or, if 5 cups of flour are needed for 4 pies, how much flour is needed for 1 pie?

- **Percentages Around Us!** Take opportunities to notice and discuss percentages in daily life. For example, if there are 12 kids on the soccer team and 3 of them wear black cleats, what percentage of the soccer team wears black cleats? Or, if you have a budget of $50 for a party and want 20% of the budget to be for snacks, how much money can you spend on snacks according to the budget?

- **Data Scavenger Hunt.** Find examples in the real world that show proportional relationships, with a straight line that passes through the origin (0, 0). They may find them in books, magazines, or in the news. Ask your student to share what they learn from the information shown in the graph, including how to find the rate.