

6th Grade - Unit 7

Ratios & Rates

In this unit, students are introduced to ratios and rates and use ratio language and notation to solve real-world problems. Students will explore tape diagrams, double number lines, and ratio tables to develop deep understanding of ratio relationships.

Key Words

Ratio - a pair of nonnegative numbers, $A:B$, where both are not zero, and describes a relationship between the quantities.

Rate - indicates how many units of one quantity there are for every 1 unit of the second quantity.

Unit Rate - the numeric value of the rate, e.g. in the rate 2.5 mph, the unit rate is 2.5.

Equivalent Ratios - ratios that have the same value.

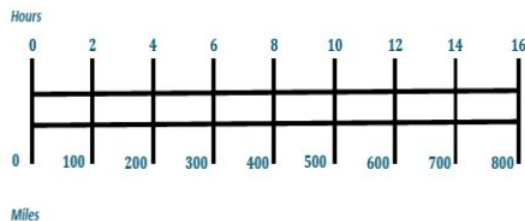
Percent - percent of a quantity is a rate per 100.

Double Number Line Diagrams - a math model that is often used when quantities have different units and is a visual representation for showing multiple equivalent ratios.

Ratio Table - a table listing pairs of numbers that represent equivalent ratios.

Tape Diagrams - drawing that looks like a segment of tape, used to illustrate number relationships. Also known as strip diagrams, bar model, fraction strip, or length model.

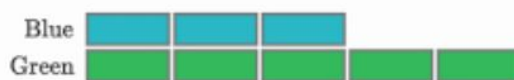
The Double Number Line Diagram



The Ratio Table

Number of Cups of Sugar	Number of Cups of Flour
2	3
4	6
6	9

Tape Diagram



How can I help at home?

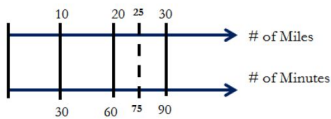
- ★ Ask your child what they learned in school and ask them to show you an example.
- ★ Ask your child to explain the difference between a ratio and a rate.
- ★ Ask your student to explain what the word percent means.
- ★ Look for common unit rates in your daily life such as speed limit signs and unit prices at the grocery store.
- ★ Look for percents when you are out at the store - discounts, tax, tip, etc.
- ★ Have your student try to determine how long it will take to get a destination on a trip given the total number of miles and an average speed in miles per hour.
- ★ Have your student help you determine the tip that should be left at the restaurant (round the total bill to the nearest dollar).

Common Core Standards

- ★ Understand ratio concepts and use ratio reasoning to solve problems.
 - Use ratio language to describe the relationship between two quantities.
 - Use rate language in the context of a ratio relationship.
 - Solve real-world problems using ratio and rate reasoning.

Sample Problems

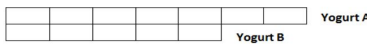
Julie has been biking at a constant speed for 30 minutes during which time she traveled 10 miles. Julie would like to know how long it will take her to run 25 miles, assuming she maintains the same constant speed. Help Julie determine how long the trip will take. Include a table or diagram to support your answer.



Create a double number line using the increments 10 miles and 30 minutes. 25 miles falls half way in between 20 and 30 miles so its equivalent minutes would be half way between 60 and 90 minutes, which is 75 minutes.

It will take Julie 75 minutes to travel 25 miles.

Shane is comparing two brands of Greek yogurt to determine which brand he should buy to sell in his store. When he surveyed his customers he determined the ratio of customers who preferred Yogurt A to the customers who preferred Yogurt B is 7 to 5. This relationship is modeled in the tape diagram.



What fraction of the total number of customers prefer Yogurt A to the number of customers who prefer Yogurt B?

The fraction of the total number of customers who prefer Yogurt A is $\frac{7}{12}$ of the total number of customers who prefer Yogurt B.

Your middle school has 900 students. $\frac{1}{3}$ of the students bring their lunch instead of buying lunch at school. What is the value of the ratio of the number of students who do bring their lunch to the number of students who do not?

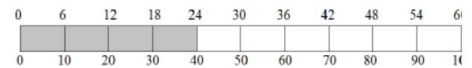


First, I created a tape diagram. In the tape diagram, $\frac{1}{3}$ of the students bring their lunch instead of buying lunch at school. I determined that 300 students bring their lunch, leaving 600 students who buy their lunch. One unit of the tape diagram represents 300, and 2 units of the tape diagram represent 600. This creates a ratio of 1:2. As such, the value of the ratio of the number of students who bring their lunch to the number of students who buy their lunch is $\frac{1}{2}$.

Find 40% of 60 using two different strategies, one of which must include a pictorial model or diagram.

$$40\% \text{ of } 60 \quad 40\% = \frac{40}{100} = \frac{4}{10} = \frac{24}{60} \quad 40\% \text{ of } 60 \text{ is } 24$$

or



The bottom of the tape diagram shows the 100% broken up into sections of 10% for each section. The top portion of the tape diagram shows 60 as the whole. When 60 is divided into 10 equal parts each section of the diagram is 6. The pictorial representation shows 24 is 40% of 60.

Problem to Try at Home

Suppose you want to determine how many pages of homework Megan will complete in 8 hours if she can complete 3 pages in 2 hours, assuming she completes the homework at a constant rate.

You can represent the situation using a double number line diagram to visibly show the ratio relationship of 3 pages for every 2 hours.

Coming Up Next...

Students will utilize their previous experiences with shape composition and decomposition in order to understand and develop formulas for area, volume, and surface area.