LESSON OVERVIEW

Lesson 2
Understand Unit Rate

CCSS Focus

Domain
Ratios and Proportional Relationships

Cluster
A. Understand ratio concepts and use ratio reasoning to solve problems.

Standard
6.RP.A.2 Understand the concept of a unit rate $\frac{a}{b}$ associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $\frac{3}{4}$ cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."

Additional Standards
6.RP.A.1, 6.RP.A.3a, 6.RP.A.3b, 6.RP.A.3d
(See page B3 for full text.)

Standards for Mathematical Practice (SMP)
2 Reason abstractly and quantitatively.
6 Attend to precision.
7 Look for and make use of structure.

Lesson Objectives

Content Objectives
- Understand the concept of a unit rate.
- Use rate and unit rate language.
- Find rates and unit rate.

Language Objectives
- Articulate an understanding of ratios, rates, and unit rates clearly, using complete sentences and examples.
- Compare ratios, rates, and unit rates using graphic organizers and visual models.
- Discuss sample solutions to real-life rate problems using a combination of everyday and mathematical language.
- Demonstrate understanding of the phrases *for every, for each*, and *per* by using them in speaking and writing.
- Read to clarify the meaning of the terms *ratio, rate*, and *unit rate*.

Prerequisite Skills
- Understand ratio concepts from 6.RP.A.1.
- Simplify fractions.
- Communicate relationships between two quantities using ratio notation.

Lesson Vocabulary
- **ratio** a way to compare two different quantities.
- **rate** an equivalent ratio that compares the first quantity in a ratio to only one of the second quantity.
- **unit rate** the part of the rate that is being compared to 1.

Review the following key terms.
- **equivalent fractions** two or more fractions that have the same value.
- **gram** a metric unit for mass.
- **mass** the amount of matter in an object.
- **unit** one; a singular item or entity.
- **difference** the way in which concepts are not the same.
- **related** connected in some way.

Learning Progression

In Grade 5 students were introduced to fractions as division, and learned to understand division with unit fractions. **Earlier in Grade 6** students were introduced to ratios by using ratio language to compare quantities.

In this lesson students learn about rates and unit rates. They draw on their knowledge of ratios and on their fraction skills to find unit rates from ratios.

In Grades 7 and 8 students will compute unit rates involving complex fractions. They will also reason about proportional relationships and use them to solve real world problems.

Lesson Pacing Guide

Whole Class Instruction

Day 1
45–60 minutes

Toolbox: Interactive Tutorial*
The Concept of Rate

Introduction
- Think It Through Question *10 min*
- Think *15 min*
- Think *15 min*
- Reflect *5 min*

Practice and Problem Solving
Assign pages 11–12.

Day 2
45–60 minutes

Guided Instruction

Think About Finding Unit Rates
- Let's Explore the Idea *20 min*
- Let's Talk About It *15 min*
- Try It Another Way *10 min*

Practice and Problem Solving
Assign pages 13–14.

Day 3
45–60 minutes

Guided Practice

Connect Ideas About Finding Unit Rates
- Identify *10 min*
- Analyze *10 min*
- Compare *5 min*

Practice and Problem Solving
Assign pages 15–16.

Independent Practice

Apply Ideas About Finding Unit Rates
- Put It Together *10 min*
- Intervention, On-Level, or Challenge Activity *10 min*

Toolbox: Lesson Quiz
Lesson 2 Quiz

*We continually update the Interactive Tutorials. Check the Teacher Toolbox for the most up-to-date offerings for this lesson.

Small Group Differentiation

Teacher-Toolbox.com

Reteach
Ready Prerequisite Lessons *45–90 min*

Grade 4
- Lesson 23 Convert Measurements

Grade 5
- Lesson 12 Fractions as Division
- Lesson 17 Understand Division with Unit Fractions

Teacher-led Activities
Tools for Instruction *15–20 min*

Grade 6
- Visualizing Unit Rate

Grade 7
- Fractions, Division, and Unit Rates

Personalized Learning

i-Ready.com

Independent
i-Ready Lessons* *15–20 min*

Grade 6
- The Concept of Rate

ELL English Language Development

Prepare for Day 1: Use with *Reflect*

Academic Vocabulary: *Difference* refers to the way in which concepts are not the same. *Related* means "connected in some way."

Math Terms: The word *unit* can mean "one"; a *unit rate* is the number in a rate that is compared to 1.

ELP Levels 1–3

Reading/Writing Display and read aloud the Academic Vocabulary and Math Terms; have students repeat. Clarify meanings and contextual usage of the terms. Read ***Reflect*** aloud. Have students revisit the lesson and highlight or underline the meaning of each concept with a different color. Ask student pairs to discuss their responses. Display and read these sentence frames to support students' discussions and written responses:

- A ratio compares any [two quantities].
- A related rate is equivalent to the ratio. The first quantity is compared to [1].
- A unit rate is [the number that is compared to 1].

ELP Levels 2–4

Reading/Writing Display the Academic Vocabulary and Math Terms. Guide students to discuss their meanings.

Have students partner-read ***Reflect***. Encourage them to revisit the lesson and highlight or underline the meaning of each concept with a different color. Use the ***Co-constructed Word Bank*** routine with students to generate vocabulary to use when they respond to ***Reflect***. Be sure to include the terms *compare, quantity, fraction, equivalent,* and *number*.

Ask partners to discuss their thinking before writing responses. Encourage students to include examples in their explanations.

ELP Levels 4–5

Reading/Writing Display the Academic Vocabulary and Math Terms. Support students as they discuss meanings.

Have students read and work independently to respond to ***Reflect*** in complete sentences. Encourage them to use mathematically precise language and to include examples in their explanations. Ask students to share their responses with a partner. Encourage partners to ask questions for clarification and point out parts of the explanation that are clear or unclear. If partners do not agree on their responses, suggest that they re-read ***Think*** or consult with other students.

Prepare for Day 2: Use with *Try It Another Way, Problem 13*

Math Term: *Equivalent fractions* are fractions with the same value, such as $\frac{1}{2}$ and $\frac{20}{40}$ or $\frac{2}{3}$ and $\frac{8}{12}$.

ELP Levels 1–3

Listening/Writing Read aloud ***Try It Another Way*** problem 13. Use the ***Three Reads*** routine to discuss and process the problem. For the second read, ensure students see that there are three questions.

Have students work in small groups to solve the problem. Offer these sentence frames to support students' conversations and writing:

- The ratio is [260 miles] to [4 hours].
- The related rate is [65 miles] per [1 hour].
- The unit rate is [65].

Invite groups to explain their strategies and share their calculations.

ELP Levels 2–4

Listening/Writing Have students partner-read ***Try It Another Way*** problem 13. Use the ***Three Reads*** routine to discuss the problem. For the second read, help students see that there are three questions. Form pairs.

Use the ***Co-constructed Word Bank*** routine to support students' written responses and discussion of solution strategies. Suggest these terms if students do not mention them: *divide, equivalent fraction, rate, unit rate,* and *per.*

Have students solve the problem in their groups. Call on groups to read their responses as part of the class discussion of solution strategies.

ELP Levels 4–5

Listening/Writing Have students read ***Try It Another Way*** problem 13 independently. Answer any questions they may have about the problem.

If appropriate, use the ***Co-constructed Word Bank*** routine to generate vocabulary that students can refer to when writing solutions and explaining solution strategies. Suggest the following terms if students do not mention them: *divide, equivalent fraction, rate, unit rate,* and *per.*

Have students solve the problem in their groups. Call on groups to read their responses as part of the class discussion of solution strategies.

Prepare for Day 3: Use with *Analyze, Problem 15*

Math Terms: The *mass* of an object is how much matter is in the object. A *gram* is a metric unit for mass.

ELP Levels 1–3

Speaking/Writing To help students clarify the questions and the important quantities in ***Analyze*** problem 15, adapt the ***Three Reads*** routine by reading the problem aloud. For the second read, identify "the unit rates described below" or call on students to do so. For the third read, have them draw diagrams to show the relationship between a cracker and a serving. Then ask them to highlight the information in the nutrition label that they need to calculate the unit rates. Have them use the labels in the highlighted information and this frame for their written explanations:

- There are _____ in one serving, so there are _____ in one cracker.

ELP Levels 2–4

Speaking/Writing Use the ***Three Reads*** routine to help students clarify the questions and the important quantities in ***Analyze*** problem 15. For the second read, call on students to identify "the unit rates described below." For the third read, have students ***Turn and Talk*** to identify the quantities given in the problem that they will need to calculate the unit rates.

Ask students to highlight in the nutrition label the units they will need in their written explanations. Offer this sentence frame:

- There are _____ in one serving, so there are _____ in one cracker.

ELP Levels 4–5

Speaking/Writing Use the ***Three Reads*** routine to help students clarify the questions and the important quantities in ***Analyze*** problem 15. For the second read, call on students to identify "the unit rates described below." For the third read, have students ***Turn and Talk*** to identify the quantities given in the problem that they will need to calculate the unit rates. Have students solve the problem independently. Remind them to use appropriate labels for the quantities in their written explanations. Have students read their solutions and explanations to partners. Students may want to revise their responses after the discussion.

Introduction

At A Glance

Students explore comparisons of one quantity to another using ratios and related rates. Then they explore rates and related unit rates. They also review the terms *ratio*, *rate*, and *unit rate*.

Step By Step

- Introduce the Question at the top of the page.
- Discuss how the tape diagram represents the question. Note that the top tape represents cups of nuts and the bottom represents cups of dried fruit.
- Read the information about the ratio, rate, and unit rate as a class. Discuss that while they are all related, each is slightly different from the other two. Have students describe the differences. Be sure they see that the rate is stated in terms of 1 cup instead of 2 cups. The unit rate is like a summarized form of the rate. It includes only a number to describe how many for each 1. The "for each 1" is assumed and not written.
- Read **Think** as a class. Have students explain how the tape diagram shows the comparison. Discuss the meaning of rate and how rate is related to ratio.

SMP TIP Attend to Precision
The terms ratio, rate, and unit rate have very specific meanings in mathematics. As you discuss each one, note that it is important to attend to precision when using the terms. *(SMP 6)*

▶ Hands-On Activity

▶ Mathematical Discourse 1 and 2

Think It Through

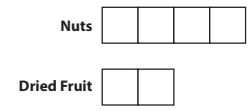
How are ratios, rates, and unit rates related?

Ratios, rates, and **unit rates** are all comparisons. They compare one quantity to another quantity.

A **ratio** compares any two quantities.

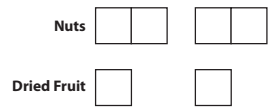
Yolanda uses 4 cups of nuts and 2 cups of dried fruit to make trail mix.

You can use a tape diagram to show this comparison.



The ratio is 4 cups to 2 cups or 4:2. Notice that the quantity of nuts is double the quantity of dried fruit.

Think **Every ratio has a related rate.**



A related **rate** is an equivalent ratio that compares the first quantity in a ratio to only one of the second quantity. In this example, you know that the amount of nuts is double the amount of dried fruit. So, what if you want the same kind of mix but you only have 1 cup of dried fruit? How many cups of nuts would you use?

Think: 4:2 is the same as 2 :1.

The rate is 2 cups of nuts to 1 cup of dried fruit. You can also say the rate is 2 cups of nuts per cup of fruit.

▶ Mathematical Discourse

1 *We use ratios all the time. In sports, we compare goals made to attempts. In school, we compare the number of teachers to students. What are other examples of ratios?*

Responses may include other sports statistics, ratios for mixing ingredients, graduation rates.

2 *In the trail mix problem, how can you use a bar model to find the rate?*

Responses may include that the bar model is a visual way to show the comparison. You see how many rectangles on the top it takes to be the same length as one rectangle on the bottom.

▶ Hands-On Activity

Illustrate the rates 2:1, 3:1, and 4:1.

Materials: sticky dots, drawing paper, crayons or markers

- Discuss the number of wheels on a bicycle, a tricycle, and a car. Write each as a rate of wheels : vehicle.
- Give each student a sheet of sticky dots and drawing paper. On the top of the paper, students should sketch several bicycles using sticky dots for the wheels. Underneath, they should record the ratio and the rate.
  __ wheels : __ bicycles = 2 wheels : 1 bicycle
- Repeat the activity for tricycles and for cars. Under each illustration they should show that the ratio and the rate are equivalent.

Think **Every rate has a related unit rate.**

The **unit rate** is the number in a rate that is being compared to 1. In the previous problem, the unit rate of nuts to fruit is 2. Let's look at another example.

Marco earned $85 for 10 hours of work.

Ratio of dollars to hours: 85 to 10

Rate of dollars to 1 hour: Marco earned $85 in 10 hours, so he earned $85 ÷ 10 in 1 hour. He earned $8.50 for each 1 hour, or $8.50 per 1 hour.

Unit Rate: The part of the rate that is compared to 1 is $8.50.

Marco earned $8.50 for each hour that he worked.

Talking about rates in different ways helps me understand them. I can say "$8.50 for every hour," "$8.50 for each hour," or "$8.50 per hour."

Reflect

1 What is the difference between a ratio and its related rate and unit rate?

Possible answer: A ratio compares any two quantities. A related rate is an equivalent ratio in which the first quantity is compared to 1. The unit rate is the number that is compared to 1 in the rate.

Step By Step

- Read the problem at the top of the page with the class. Point out that it is the problem from **Think** on the facing page.
- Stress the difference between a ratio and a related rate. Challenge students to give examples of ratios and their related rates. (Examples: 10 passengers : 2 vans, 5 passengers : 1 van; 36 seats : 4 rows and 9 seats : 1 row)
- Read **Think** as a class. Use the terms *ratio*, *rate*, and *unit rate* in the context of the problem.
- Note the difference between the ratios in **Think** on this page and those in **Think** on the previous page. On this page the ratio compares two different units, dollars to hours, and on the previous page the ratio compares the same units, cups to cups.
- Have students read and reply to the **Reflect** directive.

English Language Learners

Mathematical Discourse 3–5

English Language Learners

Make a table of ways to talk about a rate. Encourage students to look for these words in problems involving rates. Point out that sometimes we don't say the *1* when we say *for every, for each,* or *per,* e.g., 2 cups of nuts for each cup of fruit. Continue the table using other examples such as 4 legs and 1 table or 25 miles and 1 hour.

2 cups of nuts	**to**	**1** cup of fruit
2 cups of nuts	**for every**	**1** cup of fruit
2 cups of nuts	**for each**	**1** cup of fruit
2 cups of nuts	**per**	**1** cup of fruit

Mathematical Discourse

3 *Explain why the ratio and the rate describing a situation have to be equivalent.*

Students should see that they are equivalent since they describe the same situation. The rate is the ratio simplified so that the denominator is 1.

4 *Suppose a school has 800 students and 40 teachers. What is the ratio of students to teachers, the rate, and the unit rate?*

800 students to 40 teachers; 20 students to 1 teacher; 20

5 *When might it be useful to give the ratio? The rate?*

The ratio shows the size of the school as well. The rate is easier to understand and simpler to use.

Ready Mathematics PRACTICE AND PROBLEM SOLVING

Assign *Practice and Problem Solving* **pages 11–12** after students have completed this section.

Guided Instruction

At A Glance

Students use a double number line to find the rate and unit rate when given a ratio. They work with the double number line to reinforce the concepts of unit rate and rate in the context of the problem on this page. They also use equivalent fractions to find rate and unit rate.

Step By Step

Let's Explore the Idea

- Tell students that they will have time to work individually on the problems on this page and then share their responses in groups. You may choose to work through the first problem together as a class.
- If students are not familiar with a double number line, use the one on this page to explain how the top and bottom lines show the relationship among numbers.

▶ Visual Model

- As students work individually, circulate among them. This is an opportunity to assess student understanding and address student misconceptions. Use the Mathematical Discourse questions to engage student thinking.

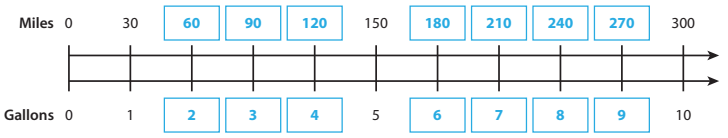
▶ Mathematical Discourse 1–3

- If students do not understand how to label the top number line, ask them to find the number of miles that corresponds to one gallon. Then discuss how they can use the ratio 30:1 to complete the number line.
- Take note of students who are still having difficulty and wait to see if their understanding progresses as they work in their groups during the next part of the lesson.

Think About **Finding Unit Rates**

Let's Explore the Idea **A double number line can be used to find rate and unit rate.**

A car can travel 300 miles on 10 gallons of gas. The ratio is 300 miles to 10 gallons.



2 What do the 300 and 10 in the double number line represent?

300 total miles and 10 total gallons

3 Fill in the remaining numbers on both number lines.

4 Look at the corresponding pairs of numbers on the bottom and top number lines. Write a multiplication sentence to show how 10 gallons and 300 miles are related. How are 5 gallons and 150 miles related? How are 1 gallon and 30 miles related?

10 × 30 = 300, 5 × 30 = 150, 1 × 30 = 30

5 Use words to describe the relationship between the number of miles and each corresponding number of gallons.

Possible answer: The number of miles is 30 times the corresponding number of gallons.

6 What is the rate of miles per gallon for this car?

30 miles for each gallon or 30 miles per 1 gallon

7 What is the unit rate of miles to gallons? 30

▶ Mathematical Discourse

1 *We have used three different visual models for ratios—a bar model, tape diagram, and double number line. What is one way all are alike?*

Responses may include that all show the ratio and can also be used to figure out the rate and unit rate.

2 *How are they different?*

Students may see that the bar model and number line are aligned so it is easy to see the unit rate. The tape diagram is for comparisons of the same unit, so the rectangles are the same size.

3 *Is there one model that helps you see the relationship more clearly? What do you like about it?*

Students' explanations should involve explaining which model helps them see the relationship more clearly.

▶ Visual Model

Use a model to find rate and unit rate.

- Draw an oval or other symbol for a gallon on the board. Have students read **Let's Explore the Idea** and tell you how many gallon symbols you should draw in all.
- Ask how many miles are given in the problem. Say that the car travels the same distance on each gallon. Have students figure out how far the car travels on one gallon.
- Write 30 in each of the gallon symbols.
- Use the visual model to reinforce the relationship shown by the double number line.

Let's Talk About It

Solve the problems below as a group.

8 Look at the model on the previous page. What pattern do you see in the numbers of miles?

Possible answer: The numbers are multiples of 30.

What pattern do you see in the numbers of gallons?

Possible answer: Each number is 1 more than the previous one.

9 Now look at all of the corresponding numbers of miles and gallons. Describe the pattern.

Possible answer: Each number of miles is 30 times the number of gallons.

Each number of gallons is the number of miles divided by 30.

10 Write the ratio given in the problem. 300 miles to 10 gallons

Use division to find the related rate. Explain how you know your answer is correct.

30 miles to 1 gallon; This ratio is the rate because it compares a quantity to 1.

11 Look at your answer to Problem 10. How can you find the related rate for a ratio?

Divide the first quantity in the ratio by the second quantity to find the rate.

Try It Another Way

Work with your group to use equivalent fractions to find the rate and unit rate.

12 A 10-pound box of apples costs $12.50. Write the ratio of cost to number of pounds as a fraction. Then find an equivalent fraction with a denominator of 1. Write the rate and unit rate to describe the cost of the apples.

Possible answer: $\frac{\$12.50}{10 \text{ pounds}}$. Divide both $12.50 and 10 by 10 to get $\frac{\$1.25}{1 \text{ pound}}$.

The rate of cost to weight is $1.25 per 1 pound, and the unit rate is 1.25.

13 A driver traveled 260 miles on the highway for 4 hours, driving at the same speed for the whole trip. Write the ratio of miles to hours. Then use what you know about equivalent fractions to write a related rate and unit rate.

$\frac{260 \text{ miles}}{4 \text{ hours}}$. Divide both 260 and 4 by 4 to get the rate: $\frac{65 \text{ miles}}{1 \text{ hour}}$. The unit rate is 65.

▶ Mathematical Discourse

4 *How can you use the pattern in numbers of miles and gallons to help you write the ratio or the rate?*

Responses should indicate that the pattern tells how many miles can be driven with each gallon of gas, which is the same as the rate.

5 *Will the rate always be a whole number? Explain or give an example.*

Listen for responses that show the rate can be a fraction. For example, the associated rate for 7 miles in 2 hours is $3\frac{1}{2}$ miles for every 1 hour. The rate for 2 cups flour for 18 muffins is $\frac{1}{9}$ cup per muffin.

Step By Step

Let's Talk About It

- Organize students into pairs or groups. You may choose to work through the first **Let's Talk About It** problem together as a class.
- Walk around to each group, listen to, and join in on discussions at different points. Use the Mathematical Discourse questions to help support or extend students' thinking.

▶ Mathematical Discourse 4 and 5

- Note that there is often more than one way to describe a pattern. To make sure a description is valid, have students check to see if it is true for all the numbers on the double number line.

Try It Another Way

- Direct the groups' attention to **Try It Another Way**. Have a volunteer from each group come to the board to explain the group's solutions to problems 12 and 13.

SMP TIP Look for Structure
Students look for and make use of structure as they describe the patterns found on the double number line and in the related ratios. Occasionally ask them to describe the numeric patterns in other diagrams and ratio tables they are working with. *(SMP 7)*

Error Alert Some students may reverse the two quantities. Have students read the problem and tell what it is asking for. Note that the word order is important because it tells what order the numbers should follow. It is sometimes helpful for the student to write the ratio as words before using the numbers in the problem.

Ready Mathematics PRACTICE AND PROBLEM SOLVING

Assign *Practice and Problem Solving* **pages 13–14** after students have completed this section.

Guided Practice

At A Glance

Students demonstrate their understanding of ratios, rates, and unit rates as they talk through three problems. They work with the ratios of two ingredients to change the quantities needed when using a recipe.

Step By Step

Discuss each **Connect** problem as a class using the discussion points outlined below.

Identify

- Have students explain why they would divide to find the rate.
- After students identify the correct rate for each ratio, ask: *How can you use multiplication to check your answers?* [Multiply the rate by the number of pounds in the original ratio.]

Analyze

- Have students read the nutrition facts. Point out that the information is given for 2 crackers.
- Ask: *If you know a quantity for 2 crackers, how do you find the related quantity for 1 cracker?* [divide by 2]

Compare

- The third problem focuses on using the rate to compare two ratios with different second quantities.
- Have students explain why they cannot compare the hourly earnings using the information as given.
- Have students explain why finding the rate is important in this problem.

SMP TIP **Reason Abstractly and Quantitatively** Students reason abstractly and quantitatively as they compare two ratios with different second numbers by finding the related rates. They understand the meaning of the quantities in context and then work abstractly to calculate the related rates. They contextualize the rates they derived to compare the girls' earnings. *(SMP 2)*

Connect Finding Unit Rates

Talk through these problems as a class. Then write your answers below.

14 Identify Write the letter of the rate that matches each ratio.

c	$7.50 : 3 pounds
a	$3.75 to 5 pounds
d	$6.00 : 4 pounds
b	$13.50 to 6 pounds

a. $0.75 for every 1 pound
b. $2.25 for each 1 pound
c. $2.50 for every 1 pound
d. $1.50 per 1 pound

15 Analyze Use the information on this nutrition label to write the unit rates described below. Show your work.

Nutrition Facts
Serving Size: 2 Crackers (14 grams)
Servings Per Container: About 20
Amount Per Serving
Calories 50 Calories From Fat 15

There are 25 calories in 1 cracker.

One cracker has a mass of 7 grams.

There are 7.5 or $7\frac{1}{2}$ fat calories in 1 cracker.

Possible student work: 50 calories to 2 crackers = 25 calories in 1 cracker; 14 grams to 2 crackers = 7 grams for 1 cracker; 15 fat calories to 2 crackers = $7\frac{1}{2}$ fat calories for 1 cracker.

16 Compare Dawn earned $97.50 for 10 hours of work. Amy earned $120 for 12 hours of work. How much did each person earn per hour? How can you use this information to compare their earnings?

Possible answer: If Dawn earned $97.50 for 10 hours of work, she earned $97.50 ÷ 10, or $9.75 per hour. If Amy earned $120 for 12 hours of work, she earned $120 ÷ 12, or $10 per hour. You can compare these rates to find that Amy earns more money per hour than Dawn does.

16

Scoring Rubrics

See student facsimile page for possible student answers.

Parts A and B

Points	Expectations
2	The response shows the correct ratio, rate, and unit rate.
1	The response shows either the correct ratio or the correct rate and unit rate, but not all three.
0	Incorrect response, or none given

Apply Finding Unit Rates

17 Put It Together A recipe uses 3 cups of flour and 2 cups of sugar.

Part A Write the ratio of flour to sugar. Then write the related rate and unit rate. Be sure to label your answers.

Possible answer: The ratio of flour to sugar is 3 to 2. The related rate is $\frac{3}{2}$ to 1. The unit rate is $\frac{3}{2}$.

Part B Now write the ratio of sugar to flour. Then write the related rate and unit rate. Be sure to label your answers.

Possible answer: The ratio of sugar to flour is 2 to 3. The related rate is $\frac{2}{3}$ to 1. The unit rate is $\frac{2}{3}$.

Part C Imagine that the recipe is doubled and that 4 cups of sugar are used. Use the unit rate in A to find how much flour is needed. Show your work.

Possible answer: $\frac{3}{2} \times 4 = 6$. If 4 cups of sugar are used, then 6 cups of flour are needed.

Part D Imagine that 6 cups of flour are used to make the recipe. Use the unit rate in B to find how much sugar is needed.

Possible answer: $\frac{2}{3} \times 6 = 4$. If 6 cups of flour are used, then 4 cups of sugar are needed.

Part E Compare your answers to C and D and explain how the two unit rates are related.

Possible answer: Both answers show that to double the recipe, you need 6 cups of flour and 4 cups of sugar. The unit rates include the same quantities, but the quantities are reversed.

Independent Practice

Step By Step

Put It Together

- Direct students to complete the **Put It Together** task on their own.
- Remind students that unit rates can be fractions and that fractional unit rates are found and used the same way as whole number unit rates are used.
- As students work on their own, walk around to assess their progress and understanding, to answer their questions, and to give additional support, if needed.
- Students may represent their related rates or unit rates as decimals. Validate their responses and use the opportunity to discuss that fractions and equivalent decimals represent the same quantity or point on the number line.
- If time permits, have students share the reasoning behind their solutions.

Ready Mathematics PRACTICE AND PROBLEM SOLVING

Assign *Practice and Problem Solving* **pages 15–16** after students have completed this section.

Parts C and D

Points	Expectations
2	Student demonstrates the correct answer by multiplying by the unit rate, making a double number line, or using a table.
1	Student's work shows some evidence of proportional reasoning but is not well developed or contains a minor error.
0	Incorrect response, or none given

Part E

Points	Expectations
2	The response indicates the student understands that the rates show an inverse relationship and some explanation of the relationship is given.
1	The response uses a word such as *reciprocal* but does not explain the relationship in depth.
0	The response does not recognize that the rates show an inverse relationship or no response is given.

Differentiated Instruction

▶ Intervention Activity

Use concrete materials to find and apply a unit rate.

Materials: paper cups, paper clips, paper, pencils

Have students work in groups of 2 or 3. Give each group 4 cups and 24 paper clips. Have students find and record the ratio of paper clips to cups. Then have them place the paper clips into cups so that each cup contains the same number. Have them record the ratio of paper clips to one cup. Then have students find and record the ratio of paper clips to 2 cups and to 3 cups.

Ask students to identify and record the unit rate. Then have them explain how they could use the unit rate to find other ratios with the same unit rate without having to count the clips in the cups.

▶ On-Level Activity

Draw and use a double number line to find a unit price.

Tell students that a package of 12 markers costs $3.00.

Have them draw a double number line with the top line labeled *Cost* and the bottom *Number of Markers*. Ask them how many vertical lines they would need to show all 12 markers. Have them draw the lines and label the bottom number line. Discuss how to find the cost of 1 marker. Emphasize that the cost of 1 marker is called the unit rate. Once students have found the unit rate, have them use it to number the top number line. Have students draw conclusions from the number line and share them with the class.

▶ Challenge Activity

Find and compare unit rates.

Materials: index cards

On the board write,

For 6 fruit baskets, Ben used 24 oranges, 6 grapefruit, 18 apples, and 3 pounds of cherries.

For 8 fruit baskets, Bill used 24 oranges, 8 grapefruit, 32 apples, and 6 pounds of cherries.

For each type of basket, have students find the unit rate for each type of fruit. Have students compare the contents of the two types of basket.

Give students an index card. On the front, the students will state the number of baskets and the amount of each type of fruit used for all the baskets. On the back, the students will list the unit rate for each type of fruit they listed on the front. Students exchange cards and find the unit rates. They check their answers with the information on the back of the card. Encourage students to create their own similar problems using different numbers of baskets and contents, and exchange cards.

Teacher Notes

LESSON QUIZ

Lesson 2
Understand Unit Rate

Teacher-Toolbox.com

Overview

Assign the Lesson 2 Quiz and have students work independently to complete it.

Use the results of the quiz to assess students' understanding of the content of the lesson and to identify areas for reteaching. See the Lesson Pacing Guide at the beginning of the lesson for suggested instructional resources.

Context and Vocabulary

Before students begin this quiz, discuss the contexts of problems 1, 2, and 4. If needed, explain that *organic peaches* are a type of fruit. Clarify the meanings of *episodes, golf tees,* and *corresponding*.

Tested Skills

Assesses 6.RP.A.2

Problems on this assessment form require students to be able to use rates to solve real-world and mathematical problems by finding unit rates and finding missing values in a double number line. Students will also need to be familiar with understanding ratio concepts and simplifying fractions.

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Lesson 2 Quiz

Solve the problems.

1 Patrick paid $4.00 for 5 organic peaches. How much did he pay per peach?

A $2.00 per peach

B $1.25 per peach

C $0.80 per peach

D $0.20 per peach

2 Zoe watched 6 episodes of her favorite online video series in 1.5 hours. She spent the same amount of time watching each episode. What is the unit rate of hours to episodes?

Show your work.

Answer: _____

3 Deena drove 585 miles in 9 hours. Kristen drove 605 miles in 11 hours. Who drove at a faster rate?

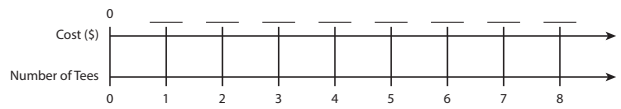
Fill in the blanks to compare the rates of speed for Deena and Kristen.

_____'s rate is _____ miles per hour faster than _____'s rate.

Lesson 2 Quiz continued

4 Tariq is comparing the prices of various packages of golf tees at a sporting goods store. He finds a package of 8 golf tees that costs $2.00.

Complete the double number line to find the relationship between the number of golf tees in Tariq's package and each corresponding cost.



5 Jacob bought 7 T-shirts for $32.90. Kyle bought 12 T-shirts for $60.00.

Part A

Kyle says that he paid less per T-shirt than Jacob. Is Kyle correct?

Explain your answer.

_____

_____

_____

Part B

Brendan found a store online where he can buy a package of 8 T-shirts. These T-shirts sell at the same rate as the T-shirts Jacob bought. How much does Brendan pay for the package of 8 T-shirts?

Show your work.

Answer: $ _____

Common Misconceptions and Errors

Errors may result if students:

- use the incorrect ratio to find the unit rate.
- multiply by the unit rate incorrectly.
- do not use multiplication to verify that their answers are correct.

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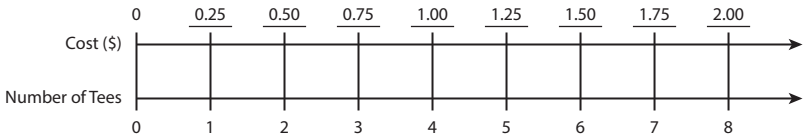
Lesson 2 Quiz Answer Key

1. C
DOK 1

2. 0.25
DOK 1

3. Deena
10
Kristen
DOK 2

4.



DOK 2

5. ***Part A:***
Kyle is not correct. Possible explanation: Jacob paid $4.70 per T-shirt, and Kyle paid $5.00 per T-shirt. Kyle paid $0.30 more per T-shirt than Jacob.
DOK 3

Part B:
$37.60
DOK 2