GETTING READY FOR GRADE 7

GR3.1 Exploring Rates

Engage

ESSENTIAL QUESTION

How do you find a unit rate? To find a unit rate, write the rate with a denominator of 1 unit by dividing both numerator and denominator by the number in the denominator.

Motivate the Lesson

Ask: When one bag contains 4 apples at a certain price and another contains 6 apples at a different price, how can you find which costs less per apple? Begin the Explore Activity to find out.

Explore

EXPLORE ACTIVITY Connect Vocabulary ELL

The meaning and use of the word *per* may not be clear to some students. Explain that *per* means "for each." Discuss some examples that may be familiar to them such as a car might drive 30 miles for each gallon, or a person might walk 4 miles for each hour.

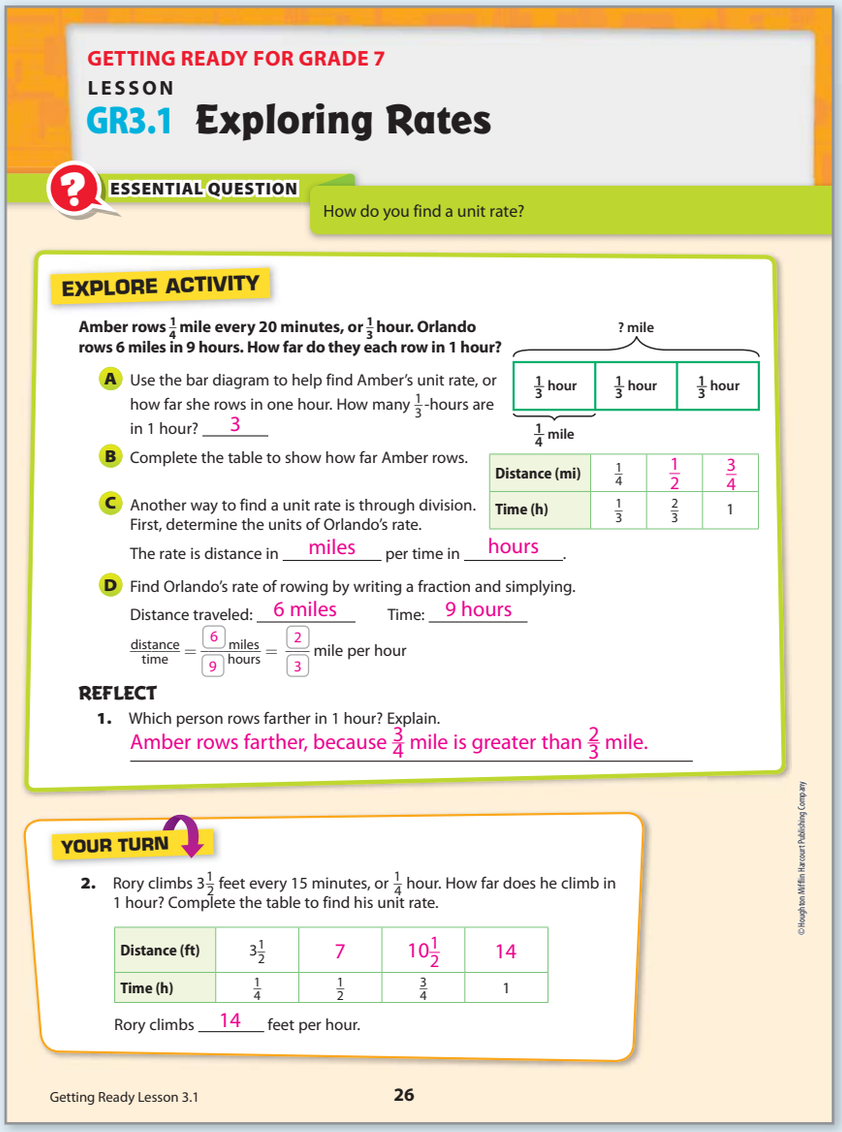
Avoid Common Errors

Some students may be confused by the meaning of the words *ratio, rate,* and *unit rate*. You may wish to quickly define *ratio* as a comparison of any two numbers or quantities. A *rate* is a special kind of ratio that compares quantities measured in different units, such as miles per hour, or words per minute. A *unit rate* is a special kind of rate where the denominator is 1 unit.

Explain

YOUR TURN Avoid Common Errors

In Your Turn Exercise 2, some students may not understand how to convert 15 minutes to $\frac{1}{4}$ hour. Remind them there are 60 minutes in one hour, so 15 minutes is $\frac{15 \text{ minutes}}{60 \text{ minutes}}$ or $\frac{1}{4}$ hour.



GETTING READY FOR GRADE 7
LESSON
GR3.1 Exploring Rates

ESSENTIAL QUESTION
How do you find a unit rate?

EXPLORE ACTIVITY

Amber rows $\frac{1}{4}$ mile every 20 minutes, or $\frac{1}{3}$ hour. Orlando rows 6 miles in 9 hours. How far do they each row in 1 hour?

? mile

$\frac{1}{3}$ hour	$\frac{1}{3}$ hour	$\frac{1}{3}$ hour

$\frac{1}{4}$ mile

A Use the bar diagram to help find Amber's unit rate, or how far she rows in one hour. How many $\frac{1}{3}$-hours are in 1 hour? 3

B Complete the table to show how far Amber rows.

Distance (mi)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Time (h)	$\frac{1}{3}$	$\frac{2}{3}$	1

C Another way to find a unit rate is through division. First, determine the units of Orlando's rate.
The rate is distance in miles per time in hours.

D Find Orlando's rate of rowing by writing a fraction and simplifying.
Distance traveled: 6 miles Time: 9 hours
$\frac{\text{distance}}{\text{time}} = \frac{6 \text{ miles}}{9 \text{ hours}} = \frac{2}{3}$ mile per hour

REFLECT

1. Which person rows farther in 1 hour? Explain.
Amber rows farther, because $\frac{3}{4}$ mile is greater than $\frac{2}{3}$ mile.

YOUR TURN

2. Rory climbs $3\frac{1}{2}$ feet every 15 minutes, or $\frac{1}{4}$ hour. How far does he climb in 1 hour? Complete the table to find his unit rate.

Distance (ft)	$3\frac{1}{2}$	7	$10\frac{1}{2}$	14
Time (h)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1

Rory climbs 14 feet per hour.

ADDITIONAL PRACTICE

Find each unit rate.

1. 2 miles every $\frac{1}{2}$ hour 4 miles per hour
2. 4 miles every 6 hours $\frac{2}{3}$ mile per hour
3. $4\frac{1}{2}$ feet every $\frac{1}{3}$ hour $13\frac{1}{2}$ feet per hour
4. 1,000 words in 5 minutes 200 words per minute
5. 7 miles in $\frac{1}{4}$ hour 28 miles per hour
6. $3\frac{1}{2}$ yards in $\frac{1}{3}$ hour $10\frac{1}{2}$ yards per hour
7. 500 gallons in 10 minutes 50 gallons per minute
8. 30 feet in 10 seconds 3 feet per second
9. $3.00 dollars for 5 apples $0.60 per apple
10. $3.75 for 5 used books $0.75 per used book

Guided Practice

Find each unit rate.

1. Joaquin read 2,600 words in 8 minutes.

Identify units: words per minute

Write a fraction: $\frac{2{,}600 \text{ words}}{8 \text{ minutes}}$

Simplify: $\frac{2{,}600 \text{ words}}{8 \text{ minutes}} = \frac{325 \text{ words}}{1 \text{ minute}}$

Joaquin read 325 words per minute.

2. Thanh drove 6 miles in $\frac{1}{5}$ hour.

Distance (mi)	6	12	18	24	30
Time (h)	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	1

Thanh drove 30 miles per hour.

ESSENTIAL QUESTION CHECK-IN

3. Which is better in comparing rates, the rate or the unit rate?

Sample answer: The unit rate because the denominator is the same, which allows you to compare the rates directly.

Independent Practice

Find each unit rate.

4. $2\frac{1}{4}$ yards in $\frac{1}{2}$ hour
$4\frac{1}{2}$ yards per hour

5. $\frac{2}{5}$ m in $\frac{1}{10}$ minute
4 m per minute

6. $\frac{2}{3}$ feet in $\frac{1}{12}$ sec
8 feet per sec

7. $5\frac{1}{2}$ mi in $\frac{1}{4}$ day
22 mi per day

8. A diver descends 50 feet every $\frac{1}{4}$ hour. What is the diver's unit rate?
200 feet per hour

9. You can buy 5 cans of green beans on sale at the Village Market for $3.00. You can buy 10 of the same cans of green beans at Member's Warehouse for $6.70. Which is the better buy? Explain your thinking.
The green beans from the Village Market. Possible answer: The unit price of the green beans from Village Market is $0.60 per can while the unit price from the Member's Warehouse is $0.67 per can. $0.60 is less than $0.67.

Elaborate

Talk About It

Summarize the Lesson

Ask: What is a unit rate and how do you find it? A unit rate is a rate that has 1 unit as the denominator. To write a rate as a unit rate, divide numerator and denominator by the number in the denominator, or use a table to count fractional parts up to 1.

GUIDED PRACTICE

Avoid Common Errors

Exercise 1 Some students may think incorrectly that $\frac{2{,}600}{8}$ means "8 divided by 2,600." Have them practice writing in several different equivalent division forms: $\frac{2600}{8} \rightarrow 8\overline{)2600} \rightarrow 2600 \div 8$ and then ask them to write their own example to show the equivalent forms, including in words.

Evaluate

LESSON QUIZ

Find each unit rate.

1. 5 feet every $\frac{1}{2}$ hour 10 feet per hour

2. $4.50 dollars for 5 grapefruit $0.90 per grapefruit

3. 10 miles every 3 hours $3\frac{1}{3}$ miles per hour

4. 25 feet in 20 seconds 1.25 feet per second

H.O.T. FOCUS ON HIGHER ORDER THINKING

1. **Multiple Representations** In the Explore Activity, Amber's rate is $\frac{1}{4}$ mile every 20 minutes. What is her unit rate per minute? $\frac{1}{80}$ mile per minute. What is her unit rate per hour? $\frac{3}{4}$ mile per hour. Which of these three rates is the fastest? All three are equivalent; they are different ways of writing the same ratio. **DOK 3; MP.3**

2. **Represent Real-World Problems** Kate's dog eats 8 ounces of food every 6 hours. How much food does the dog eat in a 24 hour day? What is its unit rate per hour? 32 ounces per day; $1\frac{1}{3}$ ounces per hour **DOK 2; MP.3**

3. **Represent Real-World Problems** When one bag of 4 apples costs $1.80 and another bag of 6 apples costs $2.10, which is the better buy and what are the different costs per apple? The bag of 6 apples is the better buy; each of these apples costs $0.35 while the 4 apples in the other bag cost $0.45 each. **DOK 3; MP.3**

4. **Look for a Pattern** Use an example to show how could you change a rate of miles per hour to a rate of miles per minute. Sample answer: 45 miles per hour is 45 miles per 60 minutes or $\frac{45 \text{ miles}}{60 \text{ minutes}} = \frac{45 + 15}{60 + 15} = \frac{3}{4}$ for a unit rate of $\frac{3}{4}$ mile per minute. **DOK 3; MP.7**