

Do Now 12.2.13

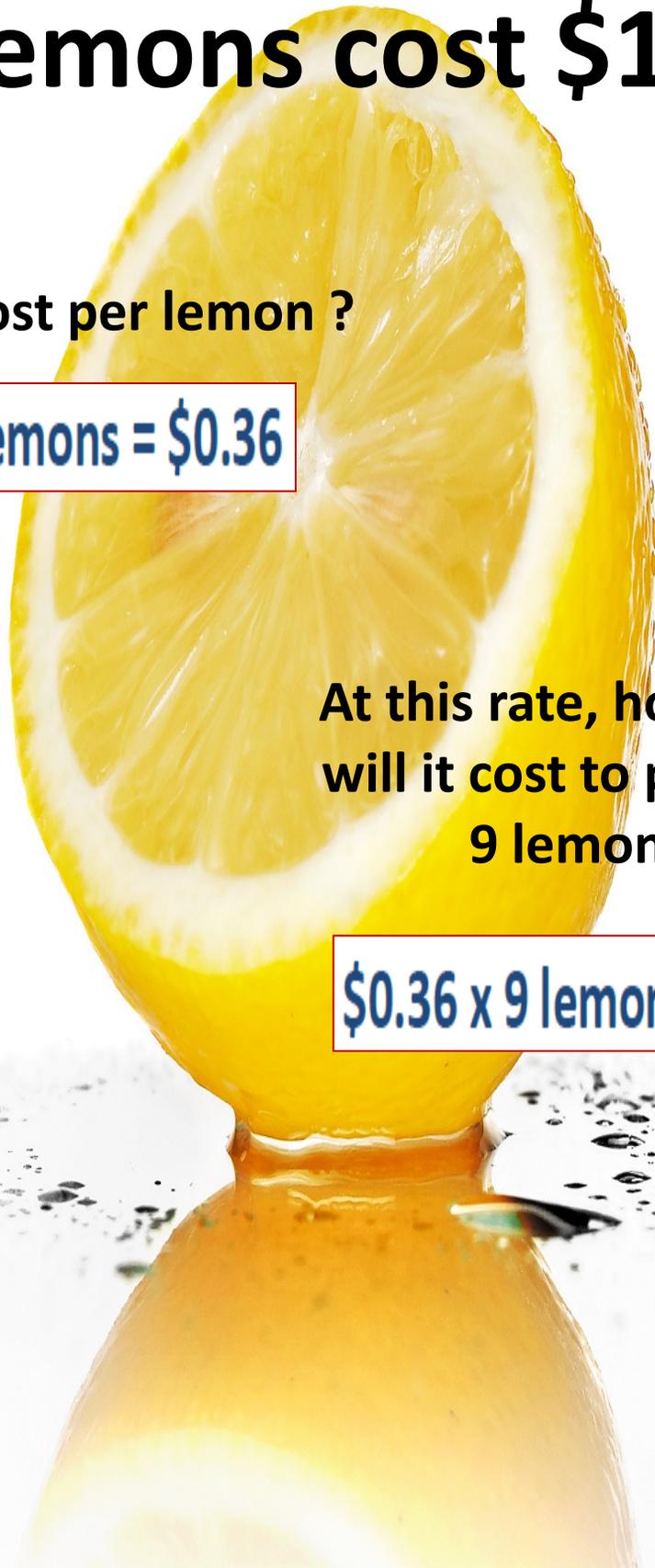
Five lemons cost \$1.80

What is the cost per lemon ?

$$\$1.80 / 5 \text{ lemons} = \$0.36$$

At this rate, how much will it cost to purchase 9 lemons?

$$\$0.36 \times 9 \text{ lemons} = \$3.24$$



Learning Objective

We will calculate₁ unit rates.

CFU

What are we going to do?

What does *calculate* mean?

Calculate means _____.

Activate Prior Knowledge

A **ratio** shows the relationship between one quantity and another quantity.

Write the ratio in ***a:b*** form and $\frac{a}{b}$ form.

1. There were 12 buckets of water balloons and 8 kids. Write the ratio of **buckets** to **kids**.
2. Darla bought 8 granola bars for \$4. Write the ratio of **granola bars** to **dollars**.



Standard
7AF4.2 Solve
multistep problems

involving rate, average speed, distance, and time or a direct variation.

Standard 7MG1.3
Use measures expressed as rates (e.g. speed, density) and measures expressed as products (e.g. person-days) to solve problems;

Make Connection

Students, you already know that the relationship between quantities is called a ratio. Now, we will use the ratio to calculate the unit rate.

Vocabulary

¹ find the answer mathematically

MAIN IDEA

- Express ratios as fractions in simplest form and determine unit rates.

A **unit rate** shows the relationship between a **quantity** and **one unit** of another quantity.

- An **equivalent₂ ratio table** can be used to organize the information.
- Two unit rates can be found given one ratio.

		Unit Rates	
1 st quantity	a	$\frac{a}{b}$	1
2 nd quantity	b	1	$\frac{b}{a}$

Darla bought 8 granola bars for \$4.

Unit Rates

granola bars	8	2	1
dollars	4	1	0.50

Diagram showing equivalent ratios and unit rates:

- From 8 granola bars to 2 granola bars: $\div 4$
- From 2 granola bars to 1 granola bar: $\div 2$
- From 4 dollars to 1 dollar: $\div 4$
- From 1 dollar to 0.50 dollars: $\div 2$
- From 8 granola bars to 1 granola bar: $\div 8$
- From 4 dollars to 0.50 dollars: $\div 8$

2 granola bars per 1 dollar

\$0.50 per granola bar

CFU

Which of the following are unit rates? How do you know?

- A 45 tree logs on 5 trucks
- B 4.5 pounds in every 1 box
- C \$1:3ft
- D 32 miles per hour
- E 7cm:\$2

In your own words, what is the difference between a **ratio** and a **unit rate**?

Vocabulary

- ² equal value
- ³ for every 1

A **unit rate** shows the relationship between a **quantity** and one unit of **another quantity**.

- An **equivalent ratio table** can be used to organize the information.
- Two unit rates can be found given one ratio.

Calculate unit rates.

- 1 Create an equivalent ratio table using the given units and quantities.
- 2 Identify the **unit quantity**. (write 1)
- 3 Determine⁴ the division or multiplication which produces 1.
- 4 Apply the operation to the other quantity.
- 5 Interpret⁵ the unit rate.

Unit Rates			
1 st quantity	a	$\frac{a}{b}$	1
2 nd quantity	b	1	$\frac{b}{a}$

1. Dean bought 2 pounds(lbs) of bananas from A-Market for \$4 to make a banana smoothie after his bike ride.

Calculate both unit rates:

cost(\$) per pound(lb)

pounds(lbs) per \$

2. Dean just finished his bike ride. His smartphone biking app says he traveled 5 miles in 20 minutes.

Calculate both unit rates:

minutes per mile

miles per minute

CFU

- 2 How did I/you identify which would be the unit quantity?
- 4 How did I/you determine the related quantity.

Vocabulary

⁴ figure out

⁵ explain

A **unit rate** shows the relationship between a **quantity** and one unit of **another quantity**.

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Strategy: Reducing down to a unit rate.

Mario and Tracy are training to run a marathon (about 26.2 miles).

3. Mario ran 12 miles in one hour and 18 minutes (78 minutes). Find Mario's minute-per-mile running rate.

4. Tracy ran 14 miles in one hour and 38 minutes (98 minutes). Find Tracy's minute-per-mile running rate.



Application

Who runs a faster mile? How do you know?

CFU

- 2 How did I/you identify which would be the unit quantity?
- 4 How did I/you determine the related quantity.

Solving Math Problems

- 1 Determine what the question is asking.**
- 2 Determine the math concept required.**
- 3 Determine relevant information.**
- 4 Solve the problem, then interpret the answer.**
- 5 Check the reasonableness of your answer.**

5. James bought 12 pounds of almonds for \$54. Amina bought her almonds for \$4.25 per pound. Who got a better deal? How do you know?
6. Almaz bought a new car. Her new car gets 32 miles per gallon. Her old car could go 324 miles on a single tank of 12 gallons. Which car gets better gas mileage? How do you know?

**Application**

Why is the better deal in question 5 lower but the better mileage in question 6 higher?

CFU

- 1 How did I/you determine what the question is asking?
- 2 How did I/you determine the math concept required?
- 3 How did I/you determine the relevant information?
- 4 How did I/you solve and interpret the problem?
- 5 How did I/you check the reasonableness of the answer?

A **unit rate** shows the relationship between a **quantity** and one unit of **another quantity**.

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1 *Calculating unit rates helps people make smart comparisons.*

A manufacturing warehouse has two boxing machines. Yesterday, the old machine produced 512 boxes of items in 5 hours and the new machine produced 700 boxes of items in 8 hours. The new machine made more boxes yesterday, but the old machine made more boxes per hour.

New Machine: **87.5** boxes per hour

Old Machine: **102.4** boxes per hour

2 *Calculating unit rates will help you do well on tests.*

Sample Test Question:

17. Evelyn bought 42 t-shirts for her students. If she wants to calculate the cost per shirt, what other information does she need?

CFU

Does anyone else have another reason why it is relevant to calculate unit rates? (Pair-Share) Why is it relevant to calculate unit rates? You may give one of my reasons or one of your own. Which reason is more relevant to you? Why?

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Unit Rates			
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Skill Closure

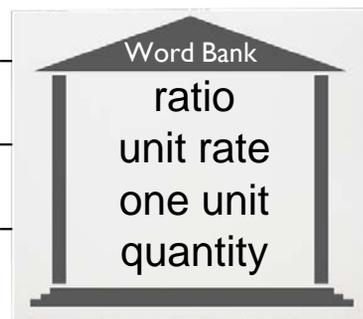
Calculate unit rates.

- 1 Create an equivalent ratio table using the given units and quantities.
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- 4 Apply the operation to the other quantity.
- 5 Interpret the unit rate.

1. The school rented 6 vans to transport students to the local zoo. There will be enough seats for 54 students. Find the unit rate of students per van.

Access Common Core

Describe how you found the unit rate in the question above.



Summary Closure

What did you learn today about calculating unit rates? (Pair-Share)

Use words from the word bank.

Day 1 _____

Day 2 _____

A **unit rate** shows the relationship between a **quantity** and one unit of **another quantity**.

- An **equivalent ratio table** can be used to organize the information.
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Calculate unit rates.

- 1 Create an equivalent ratio table using the given units and quantities.
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Unit Rates			
1 st quantity	a	$\frac{a}{b}$	1
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1. 10 pounds of pork meat is on sale for \$8.

Calculate both unit rates:

cost(\$) per pound(lb)

pounds(lbs) per \$

2. Lisa is looking for a summer job. Her friend, Harrison, told her about being a camp counselor. He said he worked for 4 weeks and made \$2240. If Lisa became a camp counselor, how much money would she make per week? How much money would she make per day?

3. A large pond has 14 geese and 84 ducks. How many ducks are there for every goose?
Hint: Consider reducing down to a unit rate.

4. The Curry family drove 360 miles on 12 gallons. Find the unit rate of miles per gallon (mpg) of the Curry family's car.
Hint: Consider reducing down to a unit rate.

1. Juanita left her secret recipe for apple pie on her desk. Maria peeked over and saw “10 apples” and “4 cups of sugar” in the recipe before looking away. Find both unit rates of *apples per cup of sugar* and *cups of sugar per apple*.

2. A middle school has 330 students and 15 teachers on staff. What is the unit rate of students per teacher?

Access Common Core

If Maria wants to bake apple pies using 15 apples, which unit rate above could she use to find out how many cups of sugar she should use?

Explain why you chose this unit rate.

How many cups of sugar will she need?

1. Valerie is a softball star that set a record for homeruns in a season (48) and homeruns in a game (4). If Valerie went up to bat 240 times this season, find her attempts per homerun.
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2. Geoffrey bought 15 marbles for 75 cents. Find the unit rate of *marbles per quarter*. Find the unit rate of *marbles per nickel*.

Access Common Core

Describe how you found the unit rate "*marbles per quarter*" in problem #2 above.

1. Relationship specialists say that when talking to a friend, you should not talk too much more than your friend if you want to have a happy friendship. During a 22-minute phone call, Lucy talked for 18 minutes and Richard talked for 4 minutes. For every 1 minute Richard talked, how many minutes did Lucy talk?

2. Salvador ordered a metal pipe for the farm. The pipe was 5 yards long and cost \$90. Find the cost per yard, cost per foot, and cost per inch.

Access Common Core

Write a word problem with the stated unit rate answer.
Hint: Fill in the table first, then write your word problem.

1. _____

Students		6
Teams		1

2. _____

Muffins		1
\$		3