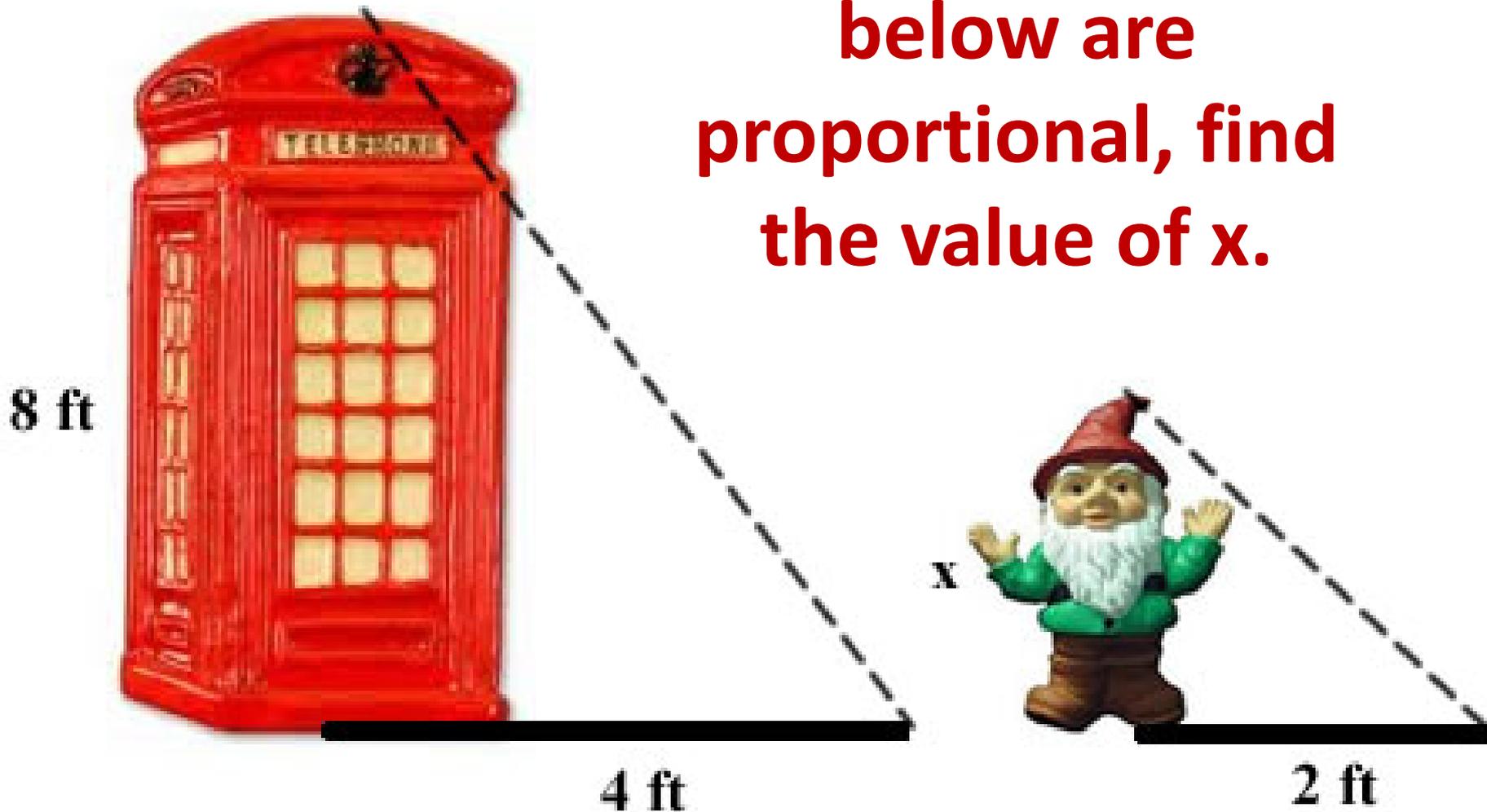


DO NOW 12.3.13

If the two objects below are proportional, find the value of x .



We will compute¹ unit rates.

CALIFORNIA STANDARDS: 7AF4.2 & 7MG1.3

Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

CFU

What are we going to do?

What does *compute* mean?
Compute means _____.

Activate Prior Knowledge

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

Use the ratio table to find the unit rate.

- Vanessa ran 4 miles this morning in 32 minutes.
 Find her average time, in minutes, for every 1 mile.

miles	4	
minutes	32	

- Edgar downloaded a 10-megabyte video in 5 seconds.
 What was the downloading rate in megabytes per second?

megabytes	10	
seconds	5	

Unit Rates

Quantity A	a	$\frac{a}{b}$	1
Quantity B	b	1	$\frac{b}{a}$

Make Connection

Students, you already learned how to calculate unit rates. Now, we will compute unit rates with fraction quantities.

Vocabulary

¹ calculate

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

- The **multiplicative inverse** of the **unit quantity** can be used to find a unit rate.

Unit Rates

Aubrey's cereal has $\frac{1}{2}$ of a cup of granola for every $\frac{3}{4}$ of a cup of oats.

Unit Rates			
Quantity A	a	$\frac{a}{b}$	1
Quantity B	b	1	$\frac{b}{a}$

CFU

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

A 6½ pounds for \$10

B $\frac{2}{3}$ of a mile per lap

C each container holds $\frac{5}{8}$ of a gallon

In your own words, what is a unit rate. A unit rate is _____.

Cups Granola	$\frac{1}{2}$	$\frac{1}{2} \cdot \frac{2}{1} = \mathbf{1}$	$\frac{1}{2} \cdot \frac{4}{3} = \frac{2}{3}$
Cups Oats	$\frac{3}{4}$	$\frac{3}{4} \cdot \frac{2}{1} = \frac{3}{2}$	$\frac{3}{4} \cdot \frac{4}{3} = \mathbf{1}$

$1\frac{1}{2}$ cups of oats for each **cup of granola**

$\frac{2}{3}$ of a cup of granola for each **cup of oats**

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

- The **multiplicative inverse** of the **unit quantity** can be used to find a unit rate.

Compute unit rates.

- 1 Create an equivalent ratio table using the given units and quantities.
- 2 Identify the **unit quantity**. (write 1)
- 3 Determine₂ the **multiplicative inverse** which produces 1.
- 4 Apply the multiplicative inverse to the other quantity.
- 5 Interpret₃ the unit rate.

CFU

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

1. In preparation for a hurricane, Ryan paid \$24 for two-thirds of a ton of sand to make protective sand bags. If sand is priced at a flat rate, find the cost per ton of the sand.

dollars	24	
tons	$\frac{2}{3}$	

2. Madeline looked at her workout app during her bike ride. It measured that she had biked $\frac{3}{4}$ of a mile and burned 54 calories. On average, how many calories will she burn each mile?

miles	$\frac{3}{4}$	
calories	54	

Unit Rates

Quantity A	a	$\frac{a}{b}$	1
Quantity B	b	1	$\frac{b}{a}$

Vocabulary

² figure out
³ explain

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

- The **multiplicative inverse** of the **unit quantity** can be used to find a unit rate.

Compute unit rates.

- 1 Create an equivalent ratio table using the given units and quantities.
- 2 Identify the **unit quantity**. (write 1)
- 3 Determine the **multiplicative inverse** which produces 1.
- 4 Apply the multiplicative inverse to the other quantity.
- 5 Interpret the unit rate.

CFU

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

3. Every $\frac{1}{2}$ cup of coconut flakes costs \$0.20. How many cups of coconut flakes can you get for \$1?

cups	$\frac{1}{2}$	
dollars	$\frac{2}{10}$	

4. If Howard hikes $\frac{2}{3}$ mile in each $\frac{1}{3}$ hour, compute the unit rate of miles hiked per hour.

miles	$\frac{2}{3}$	
hour	$\frac{1}{3}$	

Unit Rates

Quantity A	a	$\frac{a}{b}$	1
Quantity B	b	1	$\frac{b}{a}$

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.

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?

5. Sean is comparing the prices of macadamia nuts at the store. One bag costs \$5 per pound. Another bag cost \$4 for $\frac{2}{3}$ of a pound. Which option gives Sean a better price?

dollars	4	
pounds	$\frac{2}{3}$	

6. Charles runs a mile in 9 minutes. Jessica can run $\frac{3}{8}$ of a mile in 3 minutes. Who runs a faster mile?

miles	$\frac{3}{8}$	
minutes	3	

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

- The **multiplicative inverse** of the **unit quantity** can be used to find a unit rate.

1 *Computing unit rates will help you understand mixtures with fractional measures.*

A salad dressing company makes a dressing with a mixture of **1/2 of a cup of vinegar for every 1 cup of oil**. Using this unit rate, they can make 3-cup, 6-cup, 9-cup and 12-cup bottles.

Cups Vinegar	$\frac{1}{2}$				
Cups Oil	1				

(1.5 cups)

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

Sample Test Question:

9. Abraham needed 250mg of ibuprofen to relieve a fever. He took 2 tablets. How many milligrams of ibuprofen are in each tablet?

CFU

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

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

- The **multiplicative inverse** of the **unit quantity** can be used to find a unit rate.

Skill Closure

Compute unit rates.

- 1 Create an equivalent ratio table using the given units and quantities.
- 2 Identify the **unit quantity**. (write 1)
- 3 Determine the **multiplicative inverse** which produces 1.
- 4 Apply the multiplicative inverse to the other quantity.
- 5 Interpret the unit rate.

Unit Rates

Quantity A	a	$\frac{a}{b}$	1
Quantity B	b	1	$\frac{b}{a}$

1. Filet Mignon (Premium Steak) costs \$5 for every $\frac{1}{4}$ pound
Find the cost per pound for the premium steak.

dollars	5	
pound	$\frac{1}{4}$	

Access Common Core

Explain how you used the ratio table to find the unit rate in the problem above.

Summary Closure

What did you learn today about computing unit rates? (Pair-Share)
Use words from the word bank.

Word Bank

unit rates
unit quantities
multiplicative
inverse
one unit

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

- The **multiplicative inverse** of the **unit quantity** can be used to find a unit rate.

Compute unit rates.

- 1 Create an equivalent ratio table using the given units and quantities.
- 2 Identify the **unit quantity**. (write 1)
- 3 Determine the **multiplicative inverse** which produces 1.
- 4 Apply the multiplicative inverse to the other quantity.
- 5 Interpret the unit rate.

Quantity A	a	$\frac{a}{b}$	1
Quantity B	b	1	$\frac{b}{a}$

1. The nutrition facts on the side of a popcorn box recommend a serving size of $\frac{1}{3}$ cup, unpopped. This serving size yields 150 calories. Find the amount of calories in one cup of unpopped popcorn.

cups	$\frac{1}{3}$	
calories	150	

2. Meredith evenly spread fertilizer on her lawn. It took $1\frac{1}{2}$ bags of lawn fertilizer to cover her 100 ft² lawn. At this rate, find the area of lawn one bag can fertilize.

bags	$1\frac{1}{2}$	
square feet	100	

3. Jessie's flowers are the best in town. She attributes this to her homemade fertilizer. If Jessie uses $\frac{1}{2}$ cup of cottonseed meal for every $\frac{1}{4}$ cup of phosphate, how much cottonseed would Jessie use per cup of phosphate?

cottonseed	$\frac{1}{2}$	
phosphate	$\frac{1}{4}$	

4. A printer is printing hundreds of copies of a popular new book. The printer produces $\frac{2}{3}$ of a book every $\frac{1}{4}$ hour. Find the rate of books printed per hour.

books	$\frac{2}{3}$	
hours	$\frac{1}{4}$	

Periodic Review I

1. Ricardo's doctor recommended that he take 450 milligrams (mg) of acetaminophen every 6 hours for common illnesses. If Ricardo's mom gave him $1\frac{1}{2}$ tablets for the first dose, how many milligrams of acetaminophen are in each tablet?

2. Crystal runs 7 miles in $\frac{1}{4}$ of an hour. Find her speed in miles per hour.

Access Common Core

Describe the process you used to solve the problems above.

Periodic Review 2

1. A one-tenth ounce gold coin is worth \$156.
What is the value of one ounce of gold?

2. \$1.25 buys $\frac{1}{2}$ of a cup of dark chocolate chips. How much would 1 cup of dark chocolate chips cost?

Access Common Core

Not all situations yield proportional relationships.

“If **1 person can paint a house in 3 hours**, then 2 people can paint the same house in 6 hours.”
Explain why this statement may not be true.

“If **Luke is 2 years old and Erin is 1 year old**, then when Luke is 6, Erin will be 3 years old.”
Explain why this statement may not be true.

Periodic Review 3

1. A photo 6 inches tall by 4 inches long. How tall would the photo be if it was proportionally increased to be 12 inches long?

2. A carnival ride spins 3 times every $\frac{1}{4}$ minute. Find the number of spins per minute.

Access Common Core

1. If the photo in Problem # 1 is increased to be 48 inches long, how tall will the photo be?

2. If the carnival ride in Problem # 2 is 2 minutes long, how many times will the ride spin?

Explain how you used your previous answers to solve these problems.