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Unit 3, Lesson 7: Equivalent Ratios Have the Same Unit Rates

Let's revisit equivalent ratios.

7.1: Which One Doesn't Belong: Comparing Speeds

Which one doesn't belong? Be prepared to explain your reasoning.

A. 5 miles in 15 minutes

C. 20 miles per hour

B. 3 minutes per mile

D. 32 kilometers per hour

7.2: Price of Burritos

1. Two burritos cost \$14.00. Complete the table to show the cost for 4, 5, and 10 burritos at that rate. Next, find the cost for a single burrito in each case.

number of burritos	cost in dollars	unit price (dollars per burrito)
2	14.00	
4		
5		
10		
b		

2. What do you notice about the values in this table?

3. Noah bought b burritos and paid c dollars. Lin bought twice as many burritos as Noah and paid twice the cost he did. How much did Lin pay per burrito?

	number of burritos	cost in dollars	unit price (dollars per burrito)
Noah	b	c	$\frac{c}{b}$
Lin	$2 \cdot b$	$2 \cdot c$	

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4. Explain why, if you can buy b burritos for c dollars, or buy $2 \cdot b$ burritos for $2 \cdot c$ dollars, the cost per item is the same in either case.

7.3: Making Bracelets

1. Complete the table. Then, explain the strategy you used to do so.

time in hours	number of bracelets	speed (bracelets per hour)
2		6
5		6
7		6
	66	6
	100	6



2. Here is a partially filled table from an earlier activity. Use the same strategy you used for the bracelet problem to complete this table.

number of burritos	cost in dollars	unit price (dollars per burrito)
	14.00	7.00
	28.00	7.00
5		7.00
10		7.00

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3. Next, compare your results with those in the first table in the previous activity. Do they match? Explain why or why not.

7.4: How Much Applesauce?

It takes 4 pounds of apples to make 6 cups of applesauce.

1. At this rate, how much applesauce can you make with:

a. 7 pounds of apples?

b. 10 pounds of apples?

2. How many pounds of apples would you need to make:

a. 9 cups of applesauce?

b. 20 cups of applesauce?

pounds of apples	cups of applesauce
4	6
7	
10	
	9
	20

Are you ready for more?

- Jada eats 2 scoops of ice cream in 5 minutes. Noah eats 3 scoops of ice cream in 5 minutes. How long does it take them to eat 1 scoop of ice cream working together (if they continue eating ice cream at the same rate they do individually)?
- The garden hose at Andre's house can fill a 5-gallon bucket in 2 minutes. The hose at his next-door neighbor's house can fill a 10-gallon bucket in 8 minutes. If they use both their garden hoses at the same time, and the hoses continue working at the same rate they did when filling a bucket, how long will it take to fill a 750-gallon pool?

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Lesson 7 Summary

The table shows different amounts of apples selling at the same rate, which means all of the ratios in the table are equivalent. In each case, we can find the *unit price* in dollars per pound by dividing the price by the number of pounds.

apples (pounds)	price (dollars)	unit price (dollars per pound)
4	10	$10 \div 4 = 2.50$
8	20	$20 \div 8 = 2.50$
20	50	$50 \div 20 = 2.50$

The unit price is always the same. Whether we buy 10 pounds of apples for 4 dollars or 20 pounds of apples for 8 dollars, the apples cost 2.50 dollars per pound.

We can also find the number of pounds of apples we can buy per dollar by dividing the number of pounds by the price.

apples (pounds)	price (dollars)	pounds per dollar
4	10	$4 \div 10 = 0.4$
8	20	$8 \div 20 = 0.4$
20	50	$20 \div 50 = 0.4$

The number of pounds we can buy for a dollar is the same as well! Whether we buy 10 pounds of apples for 4 dollars or 20 pounds of apples for 8 dollars, we are getting 0.4 pounds per dollar.

This is true in all contexts: when two ratios are equivalent, the two unit rates will always be equal.

quantity x	quantity y	unit rate 1	unit rate 2
a	b	$\frac{a}{b}$	$\frac{b}{a}$
$s \cdot a$	$s \cdot b$	$\frac{s \cdot a}{s \cdot b} = \frac{a}{b}$	$\frac{s \cdot b}{s \cdot a} = \frac{b}{a}$

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1. A car travels 55 miles per hour for 2 hours. Complete the table.

time (hours)	distance (miles)	miles per hour
1	55	55
$\frac{1}{2}$		
$1\frac{1}{2}$		
	110	

2. The table shows the amounts of onions and tomatoes in different-sized batches of a salsa recipe.

Elena notices that if she takes the number in the tomatoes column and divides it by the corresponding number in the onions column, she always gets the same result.

What is the meaning of the number that Elena has calculated?

onions (ounces)	tomatoes (ounces)
2	16
4	32
6	48

3. A restaurant is offering 2 specials: 10 burritos for \$12, or 6 burritos for \$7.50. Noah needs 60 burritos for his party. Should he buy 6 orders of the 10-burrito special or 10 orders of the 6-burrito special? Explain your reasoning.

4. Complete the table so that the cost per banana remains the same.

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number of bananas	cost in dollars	unit price (dollars per banana)
4		0.50
6		0.50
7		0.50
10		0.50
	10.00	0.50
	16.50	0.50

5. Two planes travel at a constant speed. Plane A travels 2,800 miles in 5 hours. Plane B travels 3,885 miles in 7 hours. Which plane is faster? Explain your reasoning.

(from Unit 3, Lesson 5)

6. A car has 15 gallons of gas in its tank. The car travels 35 miles per gallon of gas. It uses $\frac{1}{35}$ of a gallon of gas to go 1 mile.

a. How far can the car travel with 15 gallons?
Show your reasoning.

b. How much gas does the car use to go 100 miles? Show your reasoning.

(from Unit 3, Lesson 6)

7. A box of cereal weighs 600 grams. How much is this weight in pounds? Explain or show your

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reasoning. (Note: 1 kilogram = 2.2 pounds)

(from Unit 3, Lesson 4)