

LESSON

6-2

Rates**Practice and Problem Solving: A/B****Find the unit rate.**

1. David drove 135 miles in 3 hours. _____
2. Three medium apples have about 285 calories. _____
3. A 13-ounce package of pistachios costs \$5.99. _____

Use the information in the table to solve Exercises 4–6.

Morgan's favorite spaghetti sauce is available in two sizes: pint and quart. Each size and its price are shown in the table.

| Size | Quantity (oz) | Price (\$) |
|-------|---------------|------------|
| pint | 16 | 3.98 |
| quart | 32 | 5.98 |

4. What is the unit rate to the nearest cent per ounce for each size?
a. pint: _____ b. quart: _____
5. Which size is the better buy? _____
6. A coupon offers \$1.00 off the 16-ounce size. Which size is the better buy then?

Find the unit rate to the nearest cent per ounce. Compare.

7. a. A 24-ounce box of cornflakes costs \$4.59. _____
b. A 36-ounce box of cornflakes costs \$5.79. _____
c. Which is the better buy? _____

Solve.

8. Karyn proofreads 15 pages in 2 hours for \$40.
a. What is her proofreading rate in pages per hour?

- b. How much does she receive on average for a page?

LESSON
6-2**Rates****Practice and Problem Solving: C****Find the unit rate. Compare.**

1. Jason drives 180 miles in 4 hours and Ali drives 90 miles in 1.7 hours.

Jason: _____ Ali: _____

_____ is the faster driver.

2. Five medium apples have about 475 calories. Three medium oranges have about 186 calories.

apple: _____ orange: _____

_____ have fewer calories.

Use the information in the table to solve Exercises 3–5.

Paint is available in 3 sizes. Each size and its price are shown in the table.

| Size | Quantity (oz) | Price (\$) |
|--------|---------------|------------|
| pint | 16 | \$12.29 |
| quart | 32 | \$19.98 |
| gallon | 128 | \$34.99 |

3. What is the unit rate to the nearest cent for each size?

a. pint: _____ b. quart: _____ c. gallon: _____

4. Per ounce, which size paint container costs about twice as much as another size paint container?

5. How much larger is a gallon than a quart? _____

Find the unit costs. Solve.

6. a. A 15-inch link of silver chain costs \$82.99. _____

b. A 15-inch link of gold chain costs \$112.59. _____

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Rates**Practice and Problem Solving: D**

Find the unit rate. The first one is done for you.

- Carrie biked 75 miles in 3 days. **25 mi per day**
- Twenty emails in 5 minutes. _____
- A quart (32-ounce) bottle of milk costs \$1.19. _____

Use the information in the table to solve the problems. The first one is done for you.

Rob's favorite shampoo is available in two sizes: regular and economy. Each size and its price are shown in the table.

| Size | Quantity (oz) | Price (\$) |
|---------|---------------|------------|
| regular | 20 | \$8.00 |
| economy | 40 | \$10.00 |

- What is the unit rate to the nearest cent per ounce for each size?
 - regular: **\$0.40**
 - economy: **\$0.25**
- Which size is the better buy? _____
- A coupon offers \$1.00 off the regular size. Which size is the better buy then?

Find the unit rate. The first one is done for you

- A pound (16 ounces) of cheddar cheese costs \$8.00 **\$0.50 per oz**
 - A half-pound of Swiss cheese costs \$8.00 _____

Solve. The first one is done for you.

- Eric paints 8 rooms in 3 days for \$600.
 - What is his painting rate in dollars per day? **\$200 per day**
 - How much does he receive on average for a room? _____
 - About how many rooms could Eric paint in 6 days? _____

LESSON
6-2

Rates

Reteach

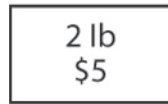
You can divide to find a unit rate or to determine a best buy.

A. Find the unit rate.

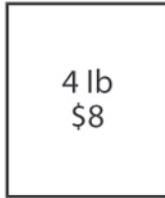
Karin bikes 35 miles in 7 hours.

$$35 \div 7 = 5 \text{ mph}$$

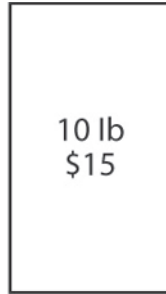
B. Find the best buy.



$$5 \div 2 = \$2.50 \text{ per lb}$$



$$8 \div 4 = \$2.00 \text{ per lb}$$



$$15 \div 10 = \$1.50 \text{ per lb}$$

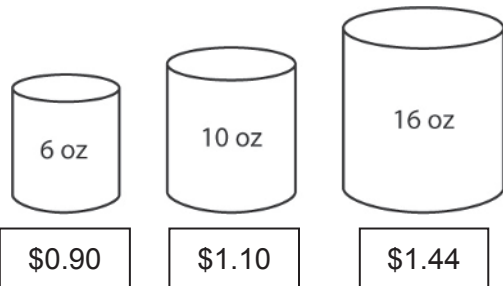
BEST BUY!

Divide to find each unit rate. Show your work.

1. Jack shells 315 peanuts in 15 minutes. _____
2. Sharmila received 81 texts in 9 minutes. _____
3. Karim read 56 pages in 2 hours. _____

Find the best buy. Show your work.

4.



5.

| Bread | Weight (oz) | Cost (\$) |
|-------------|-------------|-----------|
| Whole wheat | 16 | 2.24 |
| Pita | 20 | 3.60 |
| 7-grain | 16 | 2.56 |

LESSON
6-2

Rates

Reading Strategies: Read a Table

A table organizes data in rows and columns.

Column headings tell you what data is below.

The title tells you what the whole table is about.

Columns are read up and down.

Rice Prices at Grandee Supermarket

| Bag Size | Quantity (lb) | Bag Price (\$) | Unit Price (\$) |
|-------------|---------------|----------------|-----------------|
| mini | 1 | 1.50 | 1.50 per lb |
| small | 2 | 3.40 | 1.70 per lb |
| medium | 5 | 7.00 | 1.40 per lb |
| large | 10 | 12.50 | |
| extra large | 25 | 26.25 | |

Rows are read back and forth.

Find the unit price to the nearest cent per pound. Answer the questions.

1. What is the unit price of the large bag? _____
2. What is the unit price of the extra large bag? _____
3. Which size bag has the highest unit price? _____
4. Which size bag is the best buy? _____
5. How do you know? _____

This table shows the hours three carpenters worked, the number of chairs each made, and how much money each made.

| Carpenter | Time worked (h) | Chairs made | Money earned (\$) |
|-----------|-----------------|-------------|-------------------|
| Dan | 38 | 7 | 459.80 |
| Flora | 35 | 6 | 903.00 |
| Chandra | 32 | 5 | 680.00 |

6. Which carpenter makes the most money per hour? _____
7. Which makes the least money per hour? _____
8. Based on labor costs alone, which carpenter makes the most expensive chairs? _____

LESSON
6-2

Rates

Success for English Learners

Problem 1

Mr. Jackson corrects 56 tests in 3 hours. About how many tests does he correct per hour?

Find the unit rate.
Divide 56 by 3.

$56 \div 3 = 18.7$

Mr. Jackson corrects about 19 tests per hour.

Problem 2

Find the best buy for different size boxes of breakfast bars.

| Size | Weight (oz) | Cost (\$) |
|--------|-------------|-----------|
| small | 8 | 5.99 |
| medium | 16 | 8.99 |
| large | 32 | 18.99 |

Divide the cost by the number of ounces.

Small $\$5.99 \div 8 \approx \0.75 per oz

Medium $\$8.99 \div 16 \approx \0.56 per oz

Large $\$18.99 \div 32 \approx \0.59 per oz

To the nearest cent per ounce

Compare. $0.56 < 0.59 < 0.75$.

The unit cost of the medium box of breakfast bars is lowest, so the medium size is the best buy.

- How would you find the number of miles per hour Mrs. Rodriguez drives if you know she drives 300 miles in 5.2 hours?

- Is the best buy always the largest size? Explain.

- Should you always buy the largest size? Explain.

- Write your own "best buy" problem.

LESSON

6-3

Using Ratios and Rates to Solve Problems**Practice and Problem Solving: A/B****Solve using ratios.**

1. Mark is using the ratio of 3 tablespoons of sugar to 2 tablespoons of milk in a recipe. Complete the table to show equivalent ratios if Mark decides to increase the recipe.

| | | | | | |
|-------|---|---|---|----|----|
| sugar | 3 | 6 | | 18 | |
| milk | 2 | | 8 | | 20 |

2. Mark's ratio is 3 tablespoons sugar to 2 tablespoons milk. Sharri is using 4 tablespoons of sugar to 3 tablespoons of milk. Eve is using 9 tablespoons of sugar to 6 tablespoons of milk. Which girl's ratio is equivalent to Mark's? _____
3. A school cafeteria makes cheese sauce for macaroni using 15 cups of Swiss cheese and 17 cups of cheddar cheese. Perry tries to make the sauce for a family party using 5 cups of Swiss and 7 cups of cheddar.

Is Perry using the correct ratio? Explain. _____

4. The chess club members bought 6 tickets to a tournament for \$15. How much would they have paid if all 9 members wanted to go?

5. The Khan's car averages 22 miles per gallon of gas. Predict how far they can travel on 5 gallons of gas. _____
6. Cafe A offers 2 free bottled waters or juices for every 20 purchased. Cafe B offers 3 free bottled waters or juices for every 25 purchased.
- What is Cafe A's ratio of free drinks to purchased drinks?

 - What is Cafe B's ratio of free drinks to purchased drinks?

 - If you purchased 50 drinks at each café, how many free drinks would you get?

LESSON
6-3

Using Ratios and Rates to Solve Problems

Practice and Problem Solving: C

Solve using ratios.

1. A water molecule is formed from two hydrogen atoms and one oxygen atom. Fill in the table for 2, 5, 10 and 20 water molecules.

| | | | | |
|-----------------------|--|--|--|--|
| water molecule | | | | |
| hydrogen atoms | | | | |
| oxygen atoms | | | | |

2. Hydrogen peroxide molecules have two hydrogen atoms and two oxygen atoms.

How would a table for this compound differ? _____

3. Ammonia molecules have three hydrogen (H) atoms and one nitrogen (N) atom. How many of each atom are in five molecules of ammonia?

4. Tickets to a science exposition cost \$5.75 each for students and \$7.00 for adults. How many students and adults went if the ticket charge was

\$42.75? _____

5. The bus to the exposition averaged 18 miles to a gallon of gas. How far away was the exposition if they used 8 gallons of gas for the round trip?

6. Flyaway airline program offers 5 points for every mile flown, plus a bonus of 20 points for every trip over 500 miles. My Sky airline program offers 7 points for every mile flown plus a bonus of 30 points for each trip. Which program gives more points for this itinerary?

| | | |
|---------------|---------------|-----------------|
| Trip A 600 mi | Trip D 825 mi | Trip G 1,000 mi |
| Trip B 450 mi | Trip E 300 mi | Trip H 545 mi |
| Trip C 710 mi | Trip F 300 mi | |

7. An appliance store sells lamps at \$95.00 for two. A department store sells similar lamps at five for \$250.00. Which store sells at a better

rate? How much better? _____

LESSON

6-3

Using Ratios and Rates to Solve Problems**Practice and Problem Solving: D**

Solve using ratios. The first one is done for you.

1. Pam is making fruit punch for a party using the ratio of 2 cups of club soda to 5 cups of juice. Complete the table to show equivalent ratios for increasing numbers of guests.

| | | | | | |
|-----------|---|----|---|----|----|
| club soda | 2 | 4 | 8 | 10 | |
| juice | 5 | 10 | | | 50 |

2. Pam's ratio is 2 cups club soda to 5 cups juice. Barry is making punch with 3 cups club soda to 8 cups juice. Erin is also making punch with 4 cups of club soda to 10 cups of juice. Whose ratio is the same as Pam's?

3. A restaurant makes vegetable soup using 22 cups of mixed vegetables and 15 cups of stock. Henri tries to make this at home with 5 cups of mixed vegetables and 10 cups of stock. Is Henri using the correct ratio? Explain.

4. Barbara bought 5 amusement park tickets at a cost of \$30. If she bought 7 tickets, how much would it cost?

5. Tony bikes 7 miles in one hour. Predict how far he would bike in 4 hours.

6. A sports store sells bicycle baskets at \$40.00 for two. Another sports store sells bicycle baskets at \$110 for five. Which store sells the baskets at the better rate?

7. Gobbler Stuffing mix has 3 cups of cubed bread and 1 cup of dried vegetables. Perfect Poultry mix has 5 cups of cubed bread to 2 cups of dried vegetables. Which mix has the greater vegetable to bread ratio?

LESSON
6-3**Using Ratios and Rates to Solve Problems****Reteach**

You can write a ratio and make a list of equivalent ratios to compare ratios.

Find out who uses more detergent.

Terri's recipe for soap bubble liquid uses 1 cup of dishwashing detergent to 4 cups of water.

Torri's recipe for soap bubble liquid uses 1 cup of dishwashing detergent to 12 cups of water (plus some glycerin drops).

Terri's ratio of detergent to water: 1 to 4 or $\frac{1}{4}$

Torri's ratio of detergent to water: 1 to 12 or $\frac{1}{12}$

List of fractions equivalent to $\frac{1}{4}$: $\frac{1}{4}$, $\frac{2}{8}$, $\frac{3}{12}$, $\frac{4}{16}$, $\frac{5}{20}$...

List of fractions equivalent to $\frac{1}{12}$: $\frac{1}{12}$, $\frac{2}{24}$, $\frac{3}{36}$, $\frac{4}{48}$, $\frac{5}{60}$...

You can compare $\frac{3}{12}$ to $\frac{1}{12}$, $\frac{3}{12} > \frac{1}{12}$.

Terri uses much more detergent.

Use the list to compare the ratios. Circle ratios with the same denominator and compare.

1. $\frac{2}{3}$ and $\frac{3}{4}$

2. $\frac{4}{5}$ and $\frac{3}{7}$

3. Jack's recipe for oatmeal uses 3 cups of oats to 5 cups of water. Evan's recipe uses 4 cups of oats to 6 cups of water. Thicker oatmeal has a greater ratio of oats to water. Compare the ratios of oats to water to see who makes the thicker oatmeal. Show your work.

LESSON
6-3

Using Ratios and Rates to Solve Problems

Reading Strategies: Identify Relationships

To identify a relationship between different units, you can use a table to find a rate. You know that a salad has 6 cups of mixed vegetables.

The Greens Salad Bar provides 3 cups of greens to 2 cups of mixed fresh vegetables.

The Veggie Salad Bar provides 3 cups of mixed fresh vegetables to 2 cups of greens.

The tables below show rates for each salad bar.

| | | | | | |
|-----------------------|---|---|---|----|----|
| Greens (cups) | 3 | 6 | 9 | 12 | 15 |
| Veggies (cups) | 2 | 4 | 6 | 8 | 10 |

Greens Salad Bar

| | | | | | |
|-----------------------|---|---|---|----|----|
| Greens (cups) | 2 | 4 | 6 | 8 | 10 |
| Veggies (cups) | 3 | 6 | 9 | 12 | 15 |

Veggie Salad Bar

1. At which salad bar would you get more vegetables in your salad?

2. Marge really likes lettuce and spinach. To which salad bar should she go?

3. Rich bought salad for a tailgate party. He had 18 cups of greens and 12 cups of veggies. At which salad bar did he buy the salad?

4. You know that a salad has 10 cups of mixed vegetables. Can you tell which salad bar it came from? Explain.

5. You have 20 cups of veggies in a salad for a large picnic.

- a. How many cups of greens do you have if you bought it at Greens

Salad Bar? _____

- b. How many cups of greens do you have if you bought it at Veggie

Salad Bar? _____

LESSON
6-3

Using Ratios and Rates to Solve Problems

Success for English Learners

Problem 1

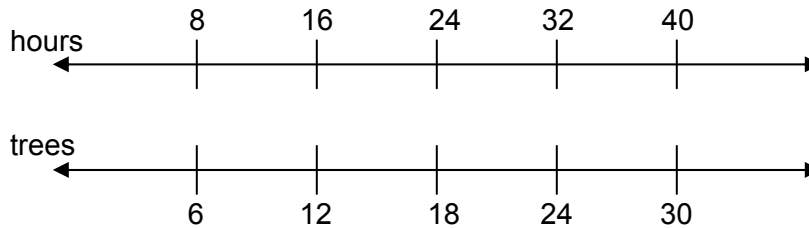
Mrs. O'Hara frames 5 pictures in 3 hours. Use a table to predict how many pictures she will frame in her workweek of 30 hours.

| | | | | | | | |
|------------------------|---|----|----|----|----|-----|----|
| pictures framed | 5 | 10 | 15 | 20 | 25 | ... | 50 |
| hours | 3 | 6 | 9 | 12 | 15 | ... | 30 |

Mrs. O'Hara probably frames about 50 pictures in her workweek.

Problem 2

Mr. Suarez plants 6 large trees in 8 hours. Use a double number line to predict how many large trees he will plant in his workweek of 40 hours.



Mr. Suarez will plant 30 large trees in 40 hours.

You can use a table or a double number line. Predict how many sit ups each person can do in 12 seconds.

1. Janet does 3 sit ups in 2 seconds. _____
2. Paulo does 5 sit ups in 6 seconds. _____
3. Shah does 3 sit ups in 4 seconds. _____
4. Which method do you prefer to predict: table or a number line?
Explain.

Representing Ratios and Rates**Challenge**

Arabella, Bettina, Chandra, and Divya are runners on the track team. The distance and time for each runner are shown in the table below.

| Runner | Distance | Time |
|----------|-------------|------------------------|
| Arabella | 7,229 feet | 561 seconds |
| Bettina | 3,425 yards | 13 minutes, 12 seconds |
| Chandra | 8,214 feet | 0.195 hours |
| Divya | 1.62 miles | 732 seconds |

1. Find the rate for each runner in miles per hour.

2. Which runner ran the fastest? Which runner ran the slowest?

3. Why is it helpful to convert the rates above, as in Exercise 1, when comparing the runners?

4. Suppose each runner ran at the rate given in the table above for 3.1 miles. How much time will elapse between the first place finisher and the last place finisher? Show your work.
