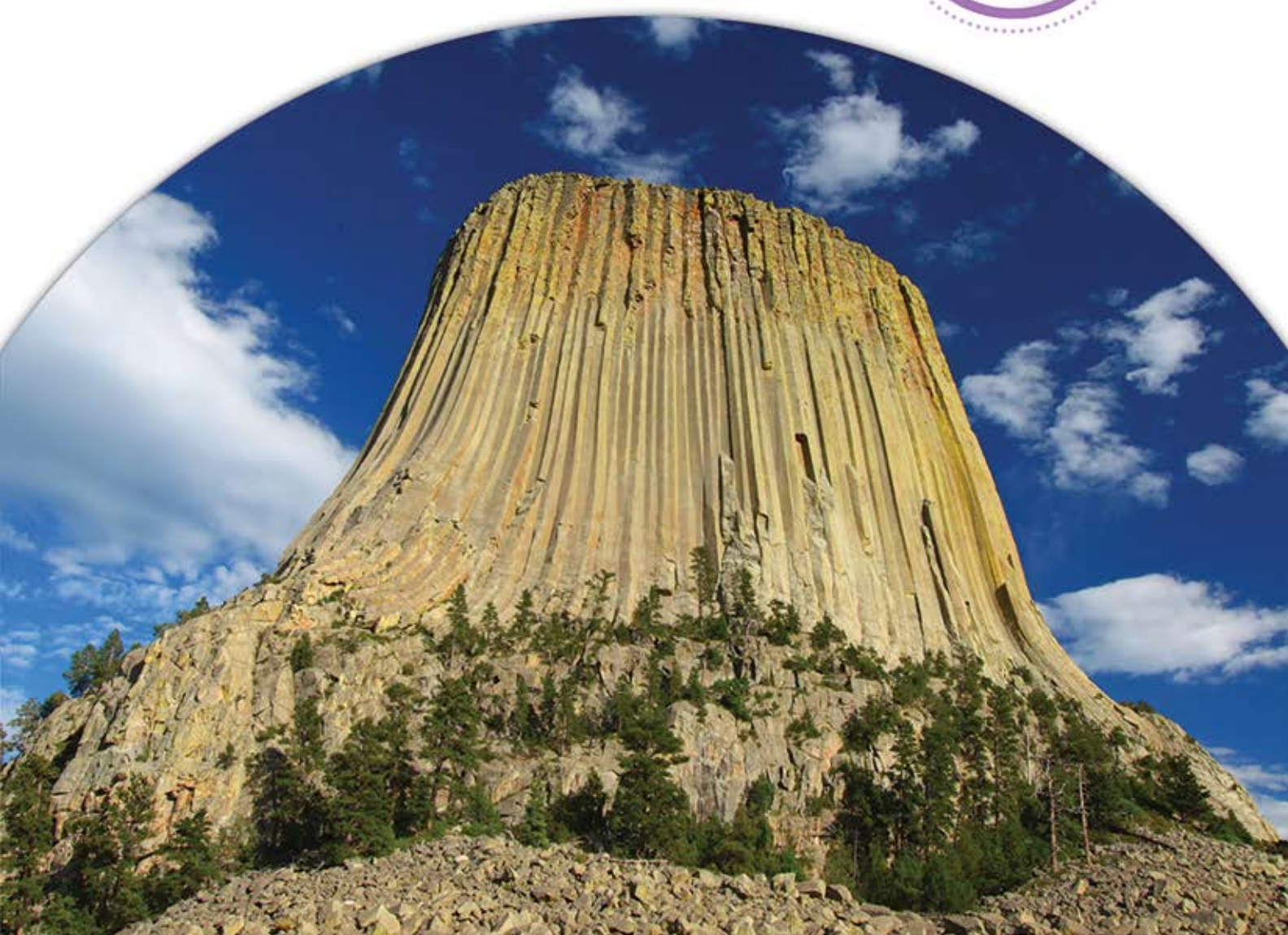


Revised Edition

Performance Coach[™] Mathematics



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Understanding Ratios

1 GETTING THE IDEA

A **ratio** is a comparison of two numbers or quantities. You can write ratios to compare the number of hearts and stars shown below.



Ratios can compare one part to another part. This is called a *part-to-part ratio*. There are 6 stars and 9 hearts. The ratio of stars to hearts is 6 to 9, and the ratio of hearts to stars is 9 to 6.

Ratios can also compare a part to the whole. These are called *part-to-whole* or *whole-to-part ratios*. There is a total of 15 shapes. The ratio of stars, one part of the whole picture, to shapes can be expressed as 6 to 15. The ratio of shapes to stars can be expressed as 15 to 6. The ratio of hearts to shapes is 9 to 15, and the ratio of shapes to hearts is 15 to 9.

Ratios can be written in different ways.

	Stars to Hearts	Hearts to Stars	Stars to Shapes	Hearts to Shapes	Shapes to Stars	Shapes to Hearts
Use the Word "to"	6 to 9	9 to 6	6 to 15	9 to 15	15 to 6	15 to 9
Use a Colon (:)	6:9	9:6	6:15	9:15	15:6	15:9
As a Fraction	$\frac{6}{9}$	$\frac{9}{6}$	$\frac{6}{15}$	$\frac{9}{15}$	$\frac{15}{6}$	$\frac{15}{9}$

Example 1

There are 20 baseball players. Seven of the players bat left-handed and 13 bat right-handed. What is the ratio of left-handed batters to baseball players? Give your answer with a colon.

Strategy Compare the part to the whole.

Step 1 Write what you know from the problem.

There are 7 left-handed batters.

There are 13 right-handed batters.

There are 20 baseball players.

Step 2 Determine which numbers describe the parts and which describe the whole.

The batters are divided into two groups, or parts. The parts are the number of left-handed batters and the number of right-handed batters.

The whole is the total number of baseball players.

Step 3 Write a ratio to compare the number of left-handed batters to the number of baseball players. Remember to use a colon.

$$\begin{array}{ccc} \text{left-handed batters} & : & \text{baseball players} \\ \downarrow & & \downarrow \\ 7 & : & 20 \end{array}$$

Solution The ratio of left-handed batters to baseball players is 7:20.

Example 2

Lindsey is folding socks. There are 18 socks with stripes and 22 solid-colored socks. What is the ratio of striped socks to solid-colored socks? Give your answer in words.

Strategy Compare one part to another part.

Step 1 Write what you know from the problem.

There are 18 striped socks.

There are 22 solid-colored socks.

Step 2 Write a ratio to compare the number of striped socks to the number of solid-colored socks.

Remember to use the word "to."

$$\begin{array}{ccc} \text{striped socks to solid-colored socks} \\ \downarrow & & \downarrow \\ 18 & \text{to} & 22 \end{array}$$

Solution The ratio of striped socks to solid-colored socks is 18 to 22.

Example 3

There are 47 flowers in a garden. Of those flowers, 15 are red tulips, 13 are yellow tulips, and 19 are daisies. What is the ratio of flowers to tulips? Give your answer as a fraction.

Strategy Compare the whole to the part.

Step 1 Write what you know from the problem.

There are 15 red tulips.

There are 13 yellow tulips.

There are 19 daisies.

There are 47 flowers in all.

Step 2 Find the total number of tulips.

Red tulips + yellow tulips = the total number of tulips

$$15 + 13 = 28$$

There are 28 tulips.

Step 3 Write a ratio to compare the number of flowers to the number of tulips.

Remember to use a fraction.

$$\frac{\text{Total number of flowers}}{\text{Total number of tulips}} \rightarrow \frac{47}{28}$$

Solution The ratio of flowers to tulips is $\frac{47}{28}$.

2 COACHED EXAMPLE

A bakery makes a batch of everything bagels and plain bagels daily. The ratio of everything bagels to plain bagels is 8:11. What is the ratio of everything bagels to the total number of bagels? What is the ratio of plain bagels to the total number of bagels?

In all, how many bagels are made each day? _____ + _____ = _____

The bakery makes _____ everything bagels to _____ total bagels.

The ratio of everything bagels to the total number of bagels is _____ to _____.

The bakery makes _____ plain bagels to _____ total bagels.

The ratio of plain bagels to the total number of bagels is _____ to _____.

The ratio of everything bagels to the total number of bagels made is _____. The ratio of plain bagels to the total number of bagels made is _____.

3 LESSON PRACTICE

1 A strand of lights has 50 light bulbs. Eight of the bulbs are burned out. What is the ratio of total number of bulbs to the bulbs that are burned out?

- A. 8:8
- B. 42:50
- C. 50:8
- D. 50:58

2 Daphne likes to read. The table shows how many of each genre of book she has.

Daphne's Books

Genre	Number of Books
Fiction	23
Nonfiction	18
Young Adult	45
Children's	62

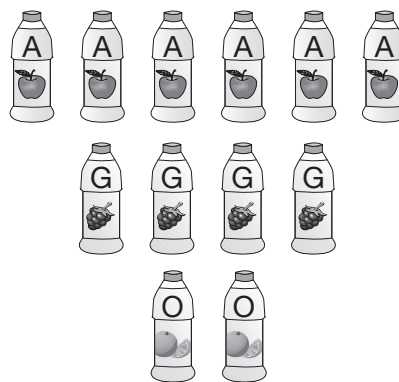
Which ratio does **not** describe Daphne's books?

- A. 23 to 18
- B. 148:50
- C. 62:148
- D. $\frac{45}{62}$

3 For every 4 boys in the choir there are 5 girls. What is the ratio of boys to girls?

- A. $\frac{4}{5}$
- B. $\frac{5}{4}$
- C. $\frac{4}{9}$
- D. $\frac{9}{5}$

4 A grocery store receives a case containing the bottles of juice shown below.



Which of the following statements is **not** true?

- A. The ratio of total bottles to bottles of apple juice is 12 to 6.
- B. The ratio of bottles of orange juice to bottles of grape juice is 4 to 2.
- C. The ratio of bottles of grape juice to total bottles is 4 to 12.
- D. The ratio of bottles of apple juice and grape juice to bottles of orange juice is 10:2

5 A traffic signal has 1 red, 1 yellow, and 1 green light. Which relationship can be described by the ratio 1 to 3?

- A. number of lights on a traffic signal
- B. red lights to the total number of lights
- C. lights that are not red to the total number of lights
- D. lights that are yellow or green to the total number of lights

6 A box of greeting cards contains 7 graduation cards, 4 thank you cards, 3 blank cards, and 2 get well cards. Which statement is true? Mark all that apply.

- A. The ratio of graduation cards to thank you cards is 7:4.
- B. The ratio of get well cards to blank cards is 3:2.
- C. The ratio of blank cards to thank you cards is 3:4.
- D. The ratio of thank you cards to get well cards is 2:4.
- E. The ratio of all cards to thank you cards is 16:4.

7 A cooking magazine has 4 soup recipes, 8 chicken recipes, 3 bread recipes, and 5 dessert recipes. Write a ratio for each relationship in the table in fraction form.

Relationship	Ratio
Soup recipes to bread recipes	
Chicken recipes to all recipes	
Bread and dessert recipes to chicken recipes	
Soup and bread recipes to chicken and dessert recipes	

8 A car dealer has 4 white cars, 10 black cars, 6 red cars, and 8 silver cars on the lot. For each ratio in the table, select whether it describes a part-to-whole, whole-to-part, or part-to-part relationship.

Ratio	Part-to-Whole	Whole-to-Part	Part-to-Part
$\frac{4}{10}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\frac{28}{8}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\frac{10}{6}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\frac{6}{28}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 9 Ricardo bought 3 pounds of red grapes, 4 pounds of green grapes, and 1 pound of black grapes. What is the ratio of green grapes to red grapes that Ricardo bought? Write the ratio using the word "to".

- 10 There are 50 white stars, 7 red stripes, and 6 white stripes on the U.S. flag. What is the relationship between stars and red stripes? Select a ratio that could be used to describe the relationship. Mark all that apply.

- A. 50:7
- B. 7:6
- C. $\frac{50}{7}$
- D. 6 to 50
- E. 50 to 7
- F. 50 to 13

- 11 There are 23 students in a sixth-grade class. Eleven students play basketball. Look at the ratios. Decide if the ratio describes a part-to-part, whole-to-part, or part-to-whole relationship. Write the ratio in the correct box.

23:11	$\frac{11}{12}$	$\frac{12}{23}$	12 to 11	11 to 23	$\frac{23}{12}$
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Part-to-Part	Whole-to-Part	Part-to-Whole

- 12 Look at the calendar shown below.

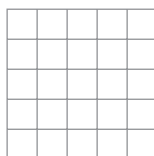
June						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

What is the ratio of Saturdays and Sundays to the number of days in June? Use words to explain your answer.

- 13 Darcy is tiling a square area of her bathroom floor. For every 13 white tiles used, she wants to use 12 gray tiles.

Part A

On the grid, shade tiles to show a pattern that would match the ratio of white tiles to gray tiles that Darcy would like to use.



Part B

Is the ratio of white tiles to gray tiles the same as the ratio of gray tiles to white tiles? Explain.