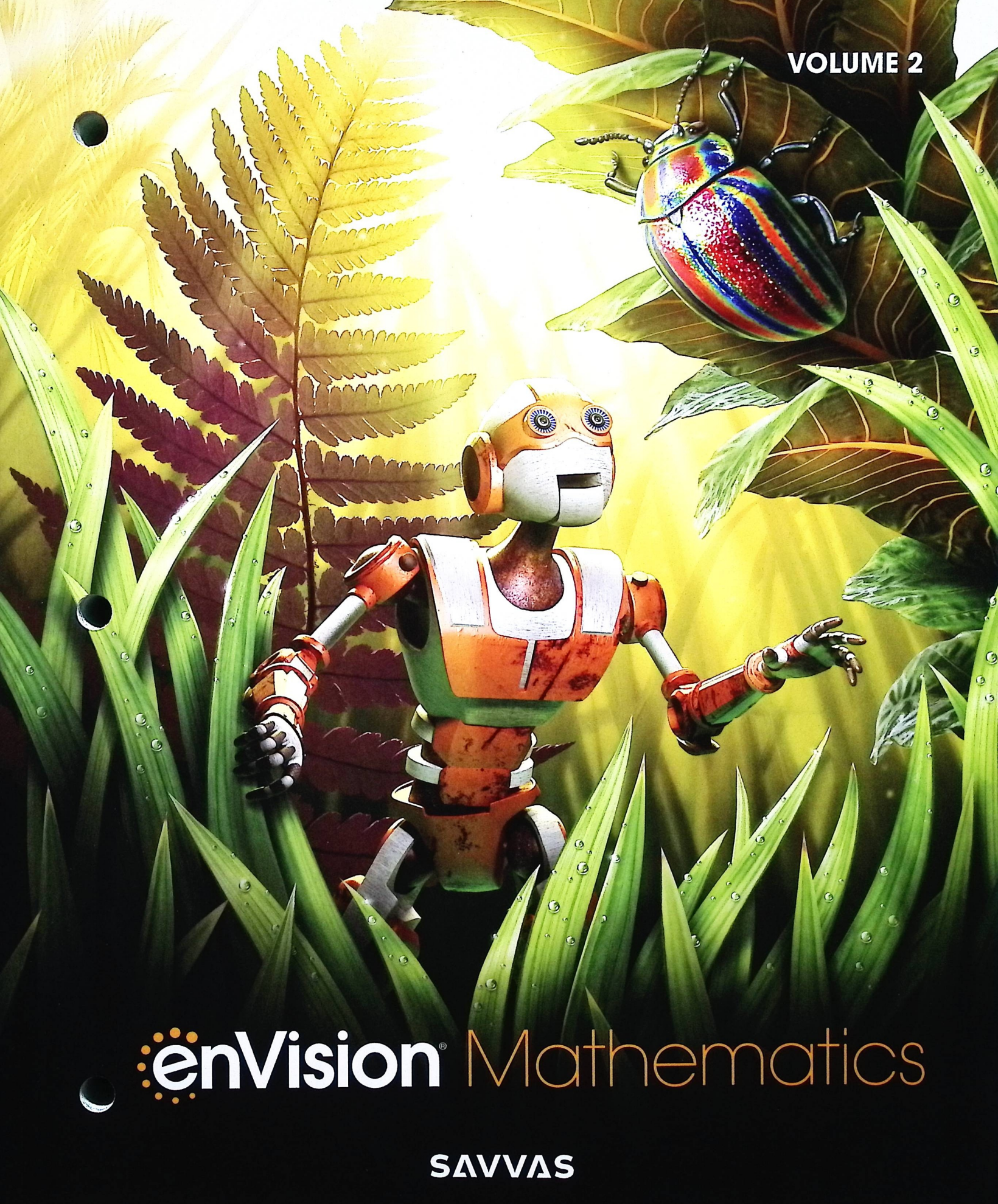
VOLUME 2
enVision® Mathematics
SAVVAS

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2. Integers and Rational Numbers
3. Numeric and Algebraic Expressions
4. Represent and Solve Equations and Inequalities
5. Understand and Use Ratio and Rate
6. Understand and Use Percent
7. Solve Area, Surface Area, and Volume Problems
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# Lesson 5-1
## Understand Ratios

Go Online

**I can...**
use a ratio to describe the relationship between two quantities.

## Explore It!

ACTIVITY

**A band just released an album that contains both pop songs and R&B (rhythm and blues) songs.**

**A.** How can you describe the relationship between the number of pop songs and the number of R&B songs on the album?

**B.** How does the bar diagram represent the relationship between the number of pop songs and the number of R&B songs?

## Focus on math practices

**Reasoning** Another album has 2 pop songs and 10 R&B songs. Draw a bar diagram that you could use to represent the relationship between the number of pop songs and the number of R&B songs.

**Essential Question** What is a mathematical way to compare quantities?

VISUAL LEARNING ASSESS

## EXAMPLE 1 Write Ratios to Compare Quantities

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**Tom's Pet Service takes care of cats and dogs. Currently, there are more dogs than cats. Compare the number of cats to the number of dogs. Then compare the number of cats to the total number of pets at Tom's Pet Service.**

A **ratio** is a relationship in which for every $x$ units of one quantity there are $y$ units of another quantity.

A ratio can be written three ways.

$x$ to $y$

$x:y$

$\frac{x}{y}$

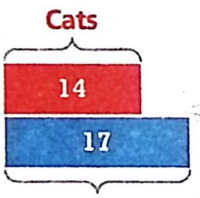
The quantities $x$ and $y$ in a ratio are called **terms**.

Use a ratio to compare the number of cats to the number of dogs.

14 to 17

14:17

$\frac{14}{17}$



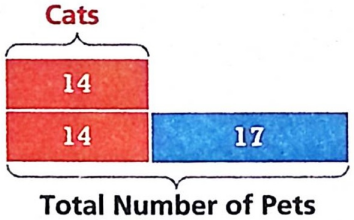

This ratio compares one part to another part.

Use a ratio to compare the number of cats to the total number of pets.

14 to 31

14:31

$\frac{14}{31}$




This ratio compares one part to the whole.

## Try It!

What are three ways to write the ratio of the number of dogs to the total number of pets?

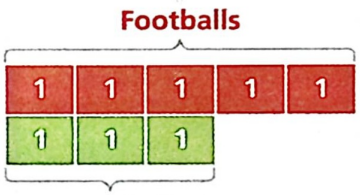
**Convince Me!** Is the ratio of dogs to cats the same as the ratio of cats to dogs? Explain.

## EXAMPLE 2 Use a Bar Diagram to Solve a Ratio Problem

**The ratio of footballs to soccer balls at a sporting goods store is 5 to 3. If the store has 100 footballs in stock, how many soccer balls does it have?**

Use a bar diagram to show the ratio 5:3.

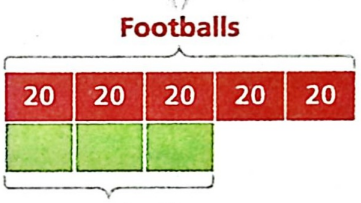
Use 5 boxes for footballs.



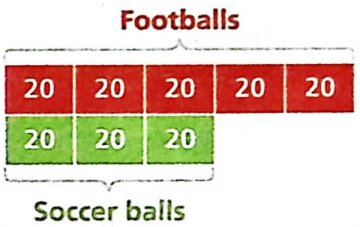

Use 3 boxes for soccer balls.

Use the same diagram to represent 100 footballs.

Because $100 \div 5 = 20$, write 20 in each red box.




Each box represents the same value. Write 20 in each green box.



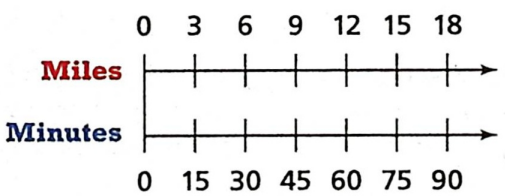

There are 3 green boxes, so the total number of soccer balls is $3 \times 20$, or 60.

The sporting goods store has 60 soccer balls in stock.

## EXAMPLE 3 Use a Double Number Line Diagram to Solve a Ratio Problem

**Chen can ride his bike 3 miles in 15 minutes. At this rate, how long will it take Chen to ride his bike 18 miles?**

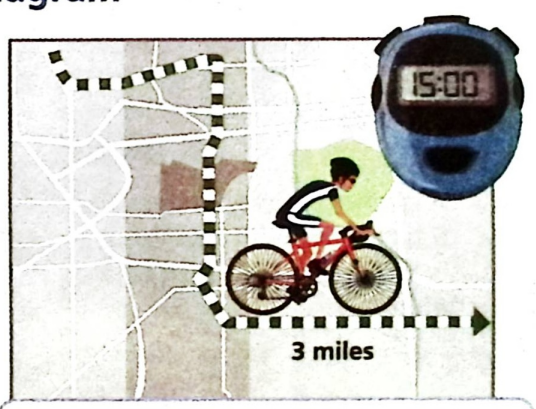
Use a double number line diagram. Show 15 minutes for every 3 miles.




Count by 3s along the top number line until you get to 18 miles.

Count by 15s for the same number of spaces along the bottom number line.

Chen can ride 18 miles in 90 minutes.



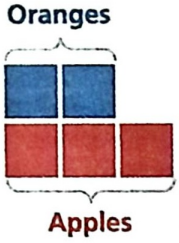

**Model with Math** A double number line diagram can represent a constant relationship between two values with different units.

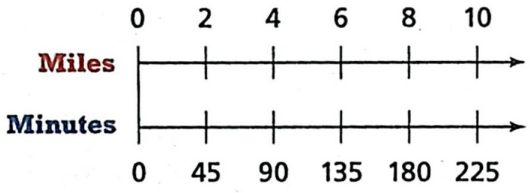
## Try It!

Chen's friend Alisa can ride her bike 2 miles in 7 minutes. Use a bar diagram or a double number line diagram to find how long it would take Alisa to ride 10 miles if she rides at the same rate.

## KEY CONCEPT

A ratio compares two quantities. A ratio can be written 3 ways: $x$ to $y$, $x:y$, or $\frac{x}{y}$. Ratios can be represented using bar diagrams and double number line diagrams.




The ratio of oranges to apples is 2:3, 2 to 3, or $\frac{2}{3}$.

The ratio of miles to minutes is 2:45, 2 to 45, or $\frac{2}{45}$.

# Do You Understand?

1. **Essential Question** What is a mathematical way to compare quantities?

2. **Reasoning** What are two different types of comparisons that a ratio can be used to make?

3. A science classroom has 5 turtles and 7 frogs. What is the ratio of frogs to total animals?

4. Tye is making trail mix with 3 cups of nuts for every 4 cups of granola. If Tye has 6 cups of nuts, how many cups of granola should he use?

# Do You Know How?

**In 5–7, use three different ways to write a ratio for each comparison.**

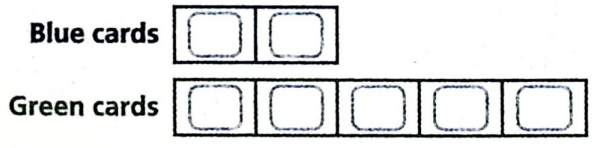
A sixth-grade basketball team has 3 centers, 5 forwards, and 6 guards.

5. Forwards to guards

6. Centers to total players

7. Guards to centers

8. The ratio of blue cards to green cards is 2 to 5. There are 8 blue cards. Complete the diagram and explain how you can find the number of green cards.



Name: _____

PRACTICE TUTORIAL

# Practice & Problem Solving

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**In 9–14, use the data to write a ratio for each comparison in three different ways.**

A person's blood type is denoted with the letters A, B, and O, and the symbols + and −. The blood type A+ is read as *A positive*. The blood type B− is read as *B negative*.

**Blood Donors**

| Type | Donors |
|---|---|
| A+ | 45 |
| B+ | 20 |
| AB+ | 6 |
| O+ | 90 |
| A− | 21 |
| B− | 0 |
| AB− | 4 |
| O− | 9 |
| Total | 195 |

**9.** O+ donors to A+ donors

**10.** AB− donors to AB+ donors

**11.** B+ donors to total donors

**12.** O− donors to A− donors

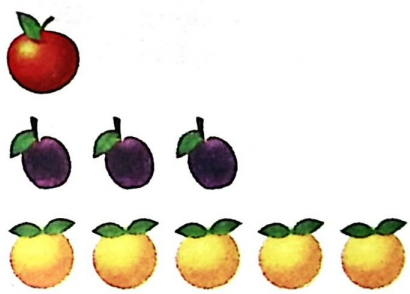
**13.** A+ and B+ donors to AB+ donors

**14.** A− and B− donors to AB− donors

**15.** Which comparison does the ratio $\frac{90}{9}$ represent?

**16.** Which comparison does the ratio 20:21 represent?

**17.** Sam is packing gift boxes with fruit. For each apple, he packs 3 plums and 5 oranges. If he puts 3 apples in a box, how many plums and oranges will Sam put in the box? Draw a diagram to solve the problem.



**18.** Write a ratio that compares the number of teal squares to the total number of squares in the quilt.

**19. Reasoning** Rita's class has 14 girls and 16 boys. How does the ratio 14:30 describe Rita's class?