

# LESSON 1

## Objective

Use ratios to represent relationships.

## Common Core State Standards

- **6.RP.1** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”

## Ratios and Proportional Relationships

# Ratios

Students use ratios to show various relationships between quantities, including whole to part, part to whole, and part to part. With an understanding of ratio, students can engage in proportional reasoning, which is a major component of a student's foundation in math.

**Try It!** Perform the Try It! activity on the next page.

## Talk About It

Discuss the Try It! activity.

- **Ask:** How many yellow rods did you use? What is the ratio of yellow to orange? What is the ratio of orange to yellow? Are these ratios the same? Why or why not?
- **Ask:** How many red rods make one orange rod? What is the ratio of red to orange? Orange to red? What is the ratio of white to yellow? Yellow to white?
- **Ask:** Is the order important when we describe the ratio?

## Solve It

Reread the problem with students. As they represent and identify the ratios, have them write the ratios in words and in numbers. Help them identify whether the ratio is whole to part, part to whole, or part to part.

## More Ideas

For other ways to teach ratios—

- Use Two-Color Counters to solve problems such as *The ratio of frogs to ducks in a pond is 5 to 3. Write three ratios to represent this situation.* Have students represent the frogs with the yellow side of the counters and the ducks with the red side of the counters. **Say:** *The total number of ducks and frogs is 8, so the ratio of frogs to the total number of ducks and frogs is 5 to 8.* Guide students to write other ratios.
- Extend the lesson using Cuisenaire® Rods to generate equal ratios. Provide a scenario such as *A trail mix recipe calls for 1 cup of raisins and 3 cups of peanuts. Find the amounts of raisins and peanuts in three different-size batches of this recipe.* Have students build trains on the Centimeter Grid (BLM 10) for each ratio.

## Formative Assessment

Have students try the following problem.

*There are 3 parrots, 7 parakeets, and 2 finches at a pet store. What is the ratio of parakeets to birds?*

## Try It! 20 minutes | Groups of 4

Here is a problem about ratios.

*An animal habitat includes 3 snakes, 2 alligators, and 5 lizards. What are three ratios you can use to describe the relationships between these animals?*

Introduce the problem. Then have students do the activity to solve the problem. Distribute the Cuisenaire Rods, paper, and pencils to students. Explain that ratios compare wholes to parts, parts to wholes, and parts to parts.

### Materials

- Cuisenaire® Rods (1 set per group)
- paper (2 sheets per group)
- pencils (1 per group)
- colored pencils (1 set per group)



**1.** Have students select an orange rod from their Cuisenaire Rods set. Ask them to create a one-color train the same length as the orange rod using only two rods. **Ask:** Which color did you use?



**2.** Have students draw and color their representation. **Ask:** How many yellow rods does it take to make a train the same length as the orange rod? Remind students that this comparison of two quantities by division is called a ratio. A ratio comparing two quantities,  $a$  and  $b$  ( $b \neq 0$ ), can be written in three ways:  $\frac{a}{b}$ ,  $a:b$ , or  $a$  to  $b$ .



**3.** Instruct students to build more one-color trains the same length as the orange rod. Have them re-create these on their paper and then write the different ratios; e.g., yellow to white, white to orange, and red to yellow. After students display the ability to identify ratios, have them apply their learning to the Try It! question.

### Look Out!

Some students may write 7 to 3 or 5 to 3 when writing the ratios for animals to snakes or lizards to animals. Stress that snakes and lizards are parts of the total number of animals, so they must include them in the whole when comparing a whole to a part or a part to a whole. Have students write ratios for other whole-to-part or part-to-whole comparisons to make sure they understand the concept.

Use Cuisenaire Rods to model the ratios shown.

Write the ratio three different ways.

(Check students' work.)

1.



2:4

2 to 4

$\frac{2}{4}$

Using Cuisenaire Rods, model the ratio. Sketch the model.

Write the ratio two more ways.

2. 1:3

1 to 3

$\frac{1}{3}$

3.  $\frac{2}{5}$

2:5

2 to 5

Write each ratio two more ways.

4. 2:3

2 to 3

$\frac{2}{3}$

5. 1 to 5

1:5

$\frac{1}{5}$

6. 3:4

3 to 4

$\frac{3}{4}$

7.  $\frac{2}{1}$

2:1

2 to 1

8. 6:1

6 to 1

$\frac{6}{1}$

9.  $\frac{2}{8}$

2:8

$\frac{2}{8}$

## Answer Key

**Challenge!** How are the ratios 3 to 7 and 7 to 3 different? Use a diagram to help.

Challenge: (Sample) The ratios are making different comparisons.  
That's why they are not the same.

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Use Cuisenaire Rods to model the ratios shown.  
Write the ratio three different ways.

1.




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Using Cuisenaire Rods, model the ratio. Sketch the model.  
Write the ratio two more ways.

2. 1:3

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3.  $\frac{2}{5}$ 


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Write each ratio two more ways.

4. 2:3

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5. 1 to 5

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6. 3:4

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7.  $\frac{2}{1}$ 


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8. 6:1

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9.  $\frac{2}{8}$ 


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Name \_\_\_\_\_

**Challenge!** How are the ratios 3 to 7 and 7 to 3 different? Use a diagram to help.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.