

Lesson
1

Understanding Ratios

6.RP.1

Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.



Understand the Standards

Some engines require a special fuel mixture. For example, the majority of 2-cycle engines, such as engines in many lawn mowers and trimmers, use a fuel mixture that is part gas and part oil. The recipe for this mixture is very exact. To keep the engines running properly, the gas and oil must be mixed in the correct ratio.

The instruction manual for a riding lawn mower says to mix 80 ounces of gas with 2 ounces of oil. What is the ratio of gas to oil, written in simplest form, for this lawn mower?

Words to Know

ratio
simplest form
equivalent ratios



80 ounces gas

+



2 ounces oil

A **ratio** is a comparison of two numbers, often expressed as a fraction. A ratio can compare a part to a part, a part to a whole, or a whole to a part. A ratio can be written in any of the following forms.

 $\frac{a}{b}$ $a:b$

a to b

A ratio is in **simplest form** when its terms have no common factors other than 1. For example, the simplest form of 4:6 is 2:3 since 2 and 3 have no common factors other than 1. If the ratio is written in fraction form, reduce the fraction as much as possible to find the simplest form.

Two ratios are **equivalent ratios** if they have the same simplest form. For example, $\frac{16}{20}$ and $\frac{8}{10}$ are equivalent ratios since $\frac{16}{20} = \frac{4}{5}$ and $\frac{8}{10} = \frac{4}{5}$.



Guided Instruction

To write and simplify ratios, follow some simple steps.

- Step 1** Read the problem carefully. Decide what quantities are being compared. Write the comparison using words.

gas to oil

- Step 2** Check to see if the units on the quantities are the same.

In this problem, the quantities are both given in ounces.

- Step 3** Paying careful attention to the order of the words, replace the words with numbers from the problem. There is no need to include units since they are the same.

80 to 2

- Step 4** Write the ratio as a fraction.

$$\frac{80}{2}$$

- Step 5** Write the ratio in simplest form by reducing the fraction. In this case, divide the numerator and denominator by 2 to reduce the fraction.

$$\frac{80 \div 2}{2 \div 2} = \frac{40}{1}$$

The ratio of gas to oil in the mixture is $\frac{40}{1}$.



80 ounces **gas**

+



2 ounces **oil**



On Your Own

Use the strategy above to write a fraction, in simplest form, for each situation.

- A recipe calls for 3 cups of flour and 1 cup of sugar. What is the ratio of flour to sugar?

- In Mr. Jones's class, 22 students are right-handed and 4 are left-handed. What is the ratio of right-handed students to left-handed students?

- 10 boys and 18 girls are going on the sixth-grade science trip. What is the ratio of girls to boys going on the trip?

- There are 40 sixth-graders and 32 seventh-graders working on a highway cleanup project. What is the ratio of sixth-graders to the total number of students working on the project?

Use what you now know about ratios to write a fraction, in simplest form, to represent each situation.

5. There are 21 roses and 18 tulips in Sara's garden. What is the ratio of roses to tulips in her garden?

6. Marco found a box of books in his attic that contained 14 mysteries, 8 biographies, and 4 comics. What is the ratio of comics to mysteries in the box?

7. There are 28 windows in Maria's house. She has washed 20 of the windows so far. What is the ratio of the number of windows she has washed to the number of windows she has not washed?

8. Mrs. Clements is giving a math test with 40 multiple-choice questions and 25 fill-in-the-blank questions. What is the ratio of the number of multiple-choice questions on the test to the total number of questions on the test?

Answer the questions. Share your ideas with a classmate.

9. There are 120 eighth-graders at a certain middle school. 96 of them have already taken Beginning Algebra. What is the ratio of eighth-graders who have already taken Beginning Algebra to those who have not yet taken Beginning Algebra?

10. There are 12 tigers, 18 alligators, and 27 monkeys at the local zoo. Is the ratio of tigers to alligators equivalent to the ratio of alligators to monkeys? Why or why not?

Answer the questions below.

11. David has 54 marbles. 24 of them are black, 18 are red, and 12 are blue. Which fraction represents the ratio of black marbles to blue marbles?

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

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

C. $\frac{4}{3}$

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

12. What is the simplest form of $\frac{8}{18}$?

A. $\frac{4}{9}$

B. 8:18

C. 2:9

D. $\frac{16}{36}$

13. Write three ratios, in three different forms, that are equivalent to the ratio $\frac{4}{5}$.

Elevate

14. Mike's mom made two bags of mixed nuts. She put 14 ounces of peanuts and 8 ounces of almonds in the first bag. In the second bag, she put 12 ounces of almonds and 20 ounces of peanuts. She told Mike that the ratio of peanuts to almonds in both bags was the same. Was she correct? Why or why not?

Elevate

15. Michelle's Craft Shoppe sells a package of beads that has a ratio of 30 red beads to 5 green beads. If 12 red beads are added to the package, how many green beads must be added in order for the ratio of bead colors to stay the same? Explain how you found your answer.



**Critical
Thinking**

16. The fraction $\frac{5}{1}$ is simplified to 5. Why can't you simplify the ratio $\frac{5}{1}$? Work with a partner to develop an explanation. Make a presentation to your class to share your ideas. Discuss the different ideas as a class and decide which explanation is best.