

Objective

Determine whether a relationship is proportional by checking for equivalent ratios.

Common Core State Standards

7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Ratios and Proportional Relationships

Proportional Relationships II

A proportion is an equation that sets two ratios equal to each other. If that equation is true, then the relationship is proportional. Students have checked to see if relationships are proportional by graphing, but now they will check by using their skills with equivalent fractions.

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

Talk About It

Discuss the Try It! activity.

- Ask: What was the first ratio, or fraction, you built? (2:8, or $\frac{2}{8}$) What does the ratio represent? (the number of green apples to the total number of apples) What was the second ratio, or fraction, you built? (1:4, or $\frac{1}{4}$) What does the ratio represent? (the number of green apples to the total number of apples)
- Ask: How can you tell if the two ratios are equivalent? (you can build the fractions and compare or simplify)
- Ask: Is this a proportional relationship? Why or why not? (yes; the ratios are equivalent)

Solve It

Reread the problem with the students. Have students build the two ratios and draw them on the Fraction Squares BLM. Ask students to explain whether the ratios are equivalent and write an equation to represent the equivalent ratios. (2:8 = 1:4, or $\frac{2}{8} = \frac{1}{4}$)

More Ideas

For other ways to teach about proportional relationships and equivalent ratios-

- Have students use Fraction Tower[®] Equivalency Cubes to build each ratio. Then, they can compare the heights of the towers to see if they are equivalent and therefore represent a proportional relationship.
- Have students make the fractions using Deluxe Rainbow Fraction[®] Circles. They can measure the fractions with Rainbow Fraction Circle Rings or compare by stacking to determine whether the fractions are equivalent and therefore represent a proportional relationship.

Formative Assessment

Have students try the following problem.

In Rob's group, there are 2 boys and 3 girls. In Caren's group, there are 4 boys and 6 girls. Which equation shows that the groups are proportional?

A.
$$\frac{2}{6} = \frac{1}{3}$$
 B. $\frac{2}{5} = \frac{4}{10}$ **C.** $\frac{2}{4} = \frac{3}{6}$ **D.** $\frac{2}{3} = \frac{4}{6}$

Try It! 15 minutes | Groups of 4

Here is a problem about proportional relationships.

In a bag of 8 apples, 2 of the apples are green. In a bag of 4 apples, 1 is green. Is this a proportional relationship?

Introduce the problem. Then have students do the activity to solve the problem. Distribute the materials.

Materials

• Deluxe Rainbow Fraction[®] Squares

• BLM 2



1. Ask: In the first bag, what is the ratio of green apples to all apples? Have students use Fraction Squares to represent the ratio 2:8, or $\frac{2}{9}$, on their Fraction Squares BLM.



3. Ask: How can you tell if these ratios are equivalent? Encourage students to stack the fractions to show they are equivalent. Explain that since the ratios are equivalent, the relationship is proportional.



2. Ask: In the second bag, what is the ratio of green apples to all apples? Have students use Fraction Squares to represent the ratio 1:4, or $\frac{1}{4}$, on their Fraction Squares BLM.

🛦 Look Out!

Students might orient the Fraction Squares differently and therefore think they are not equivalent. Encourage students to align the Fraction Squares pieces vertically and start in the top left corner each time.



2

Ratios and Proportional Relationships



(Check students' work.)

Use Fraction Squares. Complete the model to answer the question.

1. In the teacher's pencil jar, there are 10 pencils, 4 of which do not have an eraser. In Julio's pencil bag, there are 5 pencils, 3 of which do not have an eraser. Is the relationship proportional?



Using Fraction Squares, model the problem. Draw the model and use it to answer the question.

2. In a bag of 4 instruments, 2 instruments are shakers. In a box of 8 instruments, 4 are shakers. Is the relationship proportional?



No

Yes

14

| | Yes | |
|--|-----|--|
| | | |
| | | |
| | | |

No

Use Fraction Squares to determine if the relationship is proportional.

- **3.** In PE, 5 of every 6 girls finished a run in less than 10 minutes. Two of every 3 boys finished in less than 10 minutes. Is the relationship proportional?
- **4.** Sal paid \$2 for 4 pounds of grapes. Bo paid \$1 for 2 pounds of grapes. Is the relationship proportional?

Yes

Use equivalent ratios to determine if the relationship is proportional.

- 5. Roberto can ride his bike 4 miles in 20 minutes. Patricia can ride her bike 10 miles in 50 minutes. Is the relationship proportional?
- 6. Pearla answered 4 of the 5 questions right on the quiz. Then, on the test, she answered 15 of the 20 questions right. Is the relationship proportional?





ETA hand2mind[™]

Answer Key

Challenge! Ms. Turny's class ratio of boys to girls is 2:3, and Mr. Straight's class ratio of boys to girls is 8:12. Explain how you know if the data portrays a proportional relationship.

Challenge: If the data forms equivalent ratios, then the relationship is proportional. Since 2:3 = 8:12, the data does portray a proportional relationship.



Use Fraction Squares. Complete the model to answer the question.

1. In the teacher's pencil jar, there are 10 pencils, 4 of which do not have an eraser. In Julio's pencil bag, there are 5 pencils, 3 of which do not have an eraser. Is the relationship proportional?

Name



Ratios and Proportional Relationships

Using Fraction Squares, model the problem. Draw the model and use it to answer the question.

2. In a bag of 4 instruments, 2 instruments are shakers. In a box of 8 instruments, 4 are shakers. Is the relationship proportional?



vesso,

Use Fraction Squares to determine if the relationship is proportional.

- **3.** In PE, 5 of every 6 girls finished a run in less than 10 minutes. Two of every 3 boys finished in less than 10 minutes. Is the relationship proportional?
- **4.** Sal paid \$2 for 4 pounds of grapes. Bo paid \$1 for 2 pounds of grapes. Is the relationship proportional?

Use equivalent ratios to determine if the relationship is proportional.

- 5. Roberto can ride his bike 4 miles in 20 minutes. Patricia can ride her bike 10 miles in 50 minutes. Is the relationship proportional?
- 6. Pearla answered 4 of the 5 questions right on the quiz. Then, on the test, she answered 15 of the 20 questions right. Is the relationship proportional?

ETA hand2mind[™]

Challenge! Ms. Turny's class ratio of boys to girls is 2:3, and Mr. Straight's class ratio of boys to girls is 8:12. Explain how you know if the data portrays a proportional relationship.

Name

