

Lesson 6 Solving Problems by Finding Equivalent Ratios Answer Key

Lesson 6: Solving Problems by Finding Equivalent Ratios Answer Key is a pivotal topic in mathematics education, particularly in middle school curriculums where students encounter ratios and proportions. Understanding how to solve problems using equivalent ratios is a critical skill that extends beyond the classroom and into real-life applications such as cooking, budgeting, and scaling recipes. This article will delve into the core concepts of equivalent ratios, provide a comprehensive guide to solving problems, and offer an answer key for common exercises related to this lesson.

Understanding Ratios and Equivalent Ratios

What is a Ratio?

A ratio is a comparison of two quantities that describes how much of one thing there is compared to another. Ratios can be expressed in several forms, including:

1. Fraction Form: $\frac{a}{b}$
2. Colon Form: $a:b$
3. Word Form: "a to b"

For example, if there are 4 apples and 2 oranges, the ratio of apples to oranges can be expressed as $\frac{4}{2}$, $4:2$, or "4 to 2".

What are Equivalent Ratios?

Equivalent ratios are ratios that express the same relationship between two quantities, even if they are represented by different numbers. For example, the ratios $1:2$ and $2:4$ are equivalent because they both represent the same proportional relationship.

To find equivalent ratios, you can:

- Multiply or divide both terms of the ratio by the same non-zero number.

For example:

- Starting with the ratio $3:5$:
- Multiply both terms by 2: $6:10$
- Divide both terms by 3: $1:\frac{5}{3}$

Finding Equivalent Ratios

Steps to Find Equivalent Ratios

To find equivalent ratios, students can follow these steps:

1. Identify the Ratio: Start with the given ratio that needs to be made equivalent.
2. Choose a Multiplier or Divisor: Decide whether to multiply or divide both parts of the ratio.
3. Calculate: Perform the multiplication or division.
4. Write the New Ratio: Present the new equivalent ratio in the desired format (fraction, colon, or word).

Examples of Finding Equivalent Ratios

Let's explore some practical examples to illustrate how to find equivalent ratios.

- Example 1: Find two equivalent ratios for $(2:3)$.

- Multiply by 2: $(2 \times 2 : 3 \times 2 = 4:6)$

- Multiply by 3: $(2 \times 3 : 3 \times 3 = 6:9)$

Thus, equivalent ratios for $(2:3)$ are $(4:6)$ and $(6:9)$.

- Example 2: Find equivalent ratios for $(5:8)$.

- Divide by 1: $(5:8)$ (itself)

- Multiply by 4: $(5 \times 4 : 8 \times 4 = 20:32)$

The equivalent ratios are $(5:8)$ and $(20:32)$.

Solving Problems with Equivalent Ratios

Application of Equivalent Ratios

Understanding equivalent ratios allows students to tackle various real-world problems. Here are some common scenarios where finding equivalent ratios is applicable:

1. Cooking: Adjusting ingredient quantities in recipes.
2. Map Reading: Understanding scale ratios on maps.
3. Finance: Comparing costs and budgeting.
4. Sports: Analyzing player statistics and performance metrics.

Sample Problems

Let's solve a few sample problems that demonstrate how to apply equivalent ratios:

- Problem 1: A recipe calls for 2 cups of flour for every 3 cups of sugar. How much flour is needed for 9 cups of sugar?

To solve:

- Set up the ratio: $\frac{2 \text{ cups of flour}}{3 \text{ cups of sugar}} = \frac{x \text{ cups of flour}}{9 \text{ cups of sugar}}$
- Cross-multiply: $2 \times 9 = 3 \times x \rightarrow 18 = 3x$
- Solve for x : $x = 6$

Therefore, 6 cups of flour are needed for 9 cups of sugar.

- Problem 2: If a car travels 120 miles using 4 gallons of fuel, how many gallons are needed to travel 300 miles?

To solve:

- Set up the ratio: $\frac{120 \text{ miles}}{4 \text{ gallons}} = \frac{300 \text{ miles}}{y \text{ gallons}}$
- Cross-multiply: $120y = 4 \times 300 \rightarrow 120y = 1200$
- Solve for y : $y = 10$

Thus, 10 gallons are needed to travel 300 miles.

Answer Key for Common Exercises

Here's a simplified answer key for typical exercises that involve finding equivalent ratios and solving associated problems.

1. Exercise: Find two equivalent ratios for $(4:5)$.

- Answer: $(8:10, 12:15)$

2. Exercise: If a painting's width is 3 feet and height is 4 feet, what is the equivalent ratio if the height is increased to 8 feet?

- Answer: $(6:8)$

3. Exercise: A recipe requires 1 cup of milk for every 2 cups of flour. How much milk is needed for 10 cups of flour?

- Answer: 5 cups of milk.

4. Exercise: If a car travels 150 miles using 5 gallons of fuel, how far can it travel on 8 gallons?

- Answer: 240 miles.

5. Exercise: Find the equivalent ratio for $(7:10)$ when both terms are multiplied by 3.

- Answer: $(21:30)$

Conclusion

In summary, Lesson 6: Solving Problems by Finding Equivalent Ratios Answer Key equips students with essential skills that are applicable in numerous real-life contexts. By understanding the concept of ratios and how to find equivalent ones, learners can confidently tackle problems across various subjects. The problem-solving techniques outlined in this article, along with the answer key, provide a solid framework for mastering this fundamental aspect of mathematics. As students continue to practice and apply these concepts, they will enhance their analytical skills, which will serve them well in their educational journey and everyday life.

Frequently Asked Questions

What are equivalent ratios and how are they used in problem-solving?

Equivalent ratios are pairs of ratios that express the same relationship between numbers. They are used in problem-solving to simplify comparisons or to find missing values in proportional relationships.

How can I determine if two ratios are equivalent?

To determine if two ratios are equivalent, cross-multiply the ratios and check if the products are equal. If the cross-products are the same, the ratios are equivalent.

What steps should I follow to solve a problem involving equivalent ratios?

1. Identify the ratios involved in the problem. 2. Set up equivalent ratios based on the information given. 3. Use cross-multiplication if necessary. 4. Solve for the unknown variable. 5. Check your answer by ensuring the ratios are indeed equivalent.

Can you give an example of finding an equivalent ratio in a real-world scenario?

Sure! If a recipe calls for 2 cups of flour for every 3 cups of sugar, an equivalent ratio could be 4 cups of flour for 6 cups of sugar. This maintains the same proportion between the ingredients.

What role do equivalent ratios play in understanding proportions?

Equivalent ratios are fundamental in understanding proportions because they allow us to see how two quantities relate to each other, which is essential for solving problems involving scaling, resizing, and comparisons.

How does Lesson 6 on solving problems by finding equivalent ratios relate to other mathematical concepts?

Lesson 6 connects to concepts such as fractions, percentages, and algebra. Understanding equivalent ratios enhances skills in simplifying fractions, calculating percentages, and solving algebraic equations involving proportions.

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