

Determine Whether Each Pair Of Ratios Forms A Proportion (yes Or No): A) $7/12$, $21/24$ B) $12/39$, $8/36$ C)

Determine Whether Each Pair Of Ratios Forms A Proportion (yes Or No): A) $7/12$, $21/24$ B) $12/39$, $8/36$ C)

When working with ratios and proportions, it's essential to understand how to identify whether two ratios form a proportion. A proportion exists when two ratios are equal, meaning they express the same relationship between quantities. This concept is fundamental in mathematics, especially in solving problems related to similar figures, scaling, and real-world applications like recipes and map reading. In this article, we will explore how to determine whether given pairs of ratios form a proportion, examining examples A, B, and C to clarify the process.

Understanding Ratios and Proportions

What Is a Ratio?

A ratio compares two quantities, showing how many times one value contains or is contained within the other. It is expressed as a fraction or with a colon, such as a/b or $a:b$. For example, if there are 3 apples and 4 oranges, the ratio of apples to oranges is $3/4$.

What Is a Proportion?

A proportion is an equation that states two ratios are equal. For example, $(a/b) = (c/d)$ indicates that the ratio of a to b is the same as the ratio of c to d . When this is true, the ratios form a proportion.

Methods to Determine if Ratios Form a Proportion

There are several approaches to determine whether two ratios form a proportion:

1. Cross-Multiplication

This is the most straightforward method:

- Multiply the numerator of the first ratio by the denominator of the second ratio.
- Multiply the denominator of the first ratio by the numerator of the second ratio.
- If these products are equal, the ratios form a proportion.

Example:

For ratios a/b and c/d , check if $a \times d = b \times c$.

2. Simplify and Compare

- Simplify both ratios to their lowest terms.
- Compare the simplified ratios.
- If they are identical, they form a proportion.

3. Use of Cross-Check or Cross-Products

- Calculate the cross-products and compare.
- If they are equal, the ratios are proportional.

Analyzing the Given Ratios

Let's apply these methods to the provided pairs of ratios.

Pair A: 7/12 and 21/24

Step 1: Cross-multiply

- $7 \times 24 = 168$
- $12 \times 21 = 252$

Since $168 \neq 252$, these ratios do not form a proportion.

Step 2: Simplify both ratios

- 7/12 is already in lowest terms.
- 21/24 can be simplified:
- Divide numerator and denominator by 3:
- $21 \div 3 = 7$
- $24 \div 3 = 8$
- Simplified form: 7/8

Step 3: Compare simplified ratios

- 7/12 and 7/8 are not equal, so not proportional.

Conclusion: No, 7/12 and 21/24 do not form a proportion.

Pair B: 12/39 and 8/36

Step 1: Cross-multiply

- $12 \times 36 = 432$
- $39 \times 8 = 312$

Since $432 \neq 312$, ratios are not proportional based on cross-multiplied products.

Step 2: Simplify both ratios

- 12/39:
- Divide numerator and denominator by 3:
- $12 \div 3 = 4$
- $39 \div 3 = 13$
- Simplified form: 4/13
- 8/36:
- Divide numerator and denominator by 4:
- $8 \div 4 = 2$
- $36 \div 4 = 9$
- Simplified form: 2/9

Step 3: Compare simplified ratios

- 4/13 vs. 2/9
- Cross-multiplied products:
- $4 \times 9 = 36$
- $13 \times 2 = 26$
- Since $36 \neq 26$, ratios are not proportional.

Conclusion: No, 12/39 and 8/36 do not form a proportion.

Pair C: (Suppose the ratios are given, e.g., 3/4 and 6/8)

Step 1: Cross-multiply

- $3 \times 8 = 24$
- $4 \times 6 = 24$

Since both products are equal, the ratios form a proportion.

Step 2: Simplify

- 3/4 is already in lowest terms.
- 6/8 simplifies to 3/4 (dividing numerator and denominator by 2).

Conclusion: Yes, 3/4 and 6/8 form a proportion.

Summary of Results

Pair	Cross-Product Comparison	Simplified Ratios	Proportion?
A) 7/12 and 21/24	$168 \neq 252$	7/12 and 7/8	No
B) 12/39 and 8/36	$432 \neq 312$	4/13 and 2/9	No
C) 3/4 and 6/8	$24 = 24$	3/4 and 3/4	Yes

Practical Applications of Proportions

Understanding whether ratios form a proportion is vital in various real-life contexts:

1. Cooking and Recipes

- Adjusting ingredient quantities while maintaining flavor balance involves proportional reasoning.

2. Map Reading and Scale

- Maps use ratios to represent real-world distances; proportions help scale measurements accurately.

3. Business and Finance

- Ratios like profit margins and interest rates are used to evaluate financial health; understanding proportions aids in analysis.

4. Science and Engineering

- Ratios are common in chemical concentrations, speed calculations, and structural designs; proportions ensure accuracy and consistency.

Tips for Quickly Determining if Ratios Are Proportional

- Always consider simplifying ratios to their lowest terms for easier comparison.
- Use cross-multiplication for quick verification.
- Remember that equal ratios in simplified form confirm a proportion.
- Practice with various pairs to become proficient in identifying proportions.

Conclusion

Determining whether two ratios form a proportion is a fundamental skill in mathematics with wide-ranging applications. By employing methods such as cross-multiplication and simplifying ratios, you can efficiently ascertain if ratios are proportional. Applying these techniques to the given examples confirms that pairs A and B do not form proportions, while pair C does. Mastery of these concepts enhances problem-solving skills and supports success in academic and real-world scenarios.

Whether you are working on math homework, analyzing data, or scaling recipes, understanding ratios and proportions is an invaluable skill. Keep practicing with different pairs of ratios, and soon, identifying proportions will become second nature.

Frequently Asked Questions

Does the pair $7/12$ and $21/24$ form a proportion?

Yes

Does the pair $12/39$ and $8/36$ form a proportion?

No

How can you determine if two ratios form a proportion?

By cross-multiplying and checking if the products are equal.

Are $7/12$ and $21/24$ proportional?

Yes

Are $12/39$ and $8/36$ proportional?

No

What is the simplified form of $7/12$?

It cannot be simplified further.

What is the simplified form of $21/24$?

The simplified form is $7/8$.

Additional Resources

Determining whether pairs of ratios form proportions is a fundamental concept in mathematics, particularly in the study of ratios, fractions, and proportionate reasoning. This process involves understanding the properties of equivalent ratios and applying methods such as cross-multiplication or simplifying fractions to verify if two ratios are proportional. In this article, we will analyze each pair of ratios—specifically $\frac{7}{12}$ and $\frac{21}{24}$, and $\frac{12}{39}$ and $\frac{8}{36}$ —to determine whether they form a true proportion. We will explore the methods used for comparison, the significance of proportions in real-world applications, and provide a detailed step-by-step approach for each case. Our examination aims to clarify the concept of proportionality, enhance problem-solving skills, and highlight the importance of ratios in various contexts, including mathematics, science, and everyday life.

Understanding Ratios and Proportions

What is a Ratio?

A ratio is a comparison of two quantities expressed as a fraction or quotient. It shows how many times one value contains or is contained within the other. For example, the ratio $\frac{7}{12}$ indicates that for every 12 units of one quantity, there are 7 units of another. Ratios can be written in different forms—such as a fraction, with a colon (7:12), or in words (7 to 12).

What is a Proportion?

A proportion is an equation that states two ratios are equivalent. For two ratios $\frac{a}{b}$ and $\frac{c}{d}$, they form a proportion if:

$$\frac{a}{b} = \frac{c}{d}$$

Proportions are fundamental in solving problems involving scale, similarity, and comparison. Recognizing when ratios form a proportion allows us to solve for unknown quantities, compare different quantities accurately, and understand relationships between parts of a whole.

Methods for Determining Whether Ratios Form a Proportion

Several methods can be used to verify if two ratios form a proportion:

1. Cross-Multiplication

This is the most straightforward and common method. To check if $\frac{a}{b}$ and $\frac{c}{d}$ form a proportion, cross-multiply:

$$\frac{a}{b} \times d \quad \text{and} \quad b \times c$$

If these two products are equal (i.e., $a \times d = b \times c$), then the ratios form a proportion.

2. Simplifying and Comparing

Another approach is to simplify both ratios to their lowest terms and then compare directly. If the simplified forms are identical, the ratios form a proportion.

3. Using Decimal Equivalence

Convert both ratios to decimal form and compare. If the decimal equivalents are equal, the ratios form a proportion. However, this method can sometimes introduce rounding errors, so cross-multiplication is generally more reliable.

Analysis of Pair A: 7/12 and 21/24

Step 1: Express the Ratios

The first ratio is $\frac{7}{12}$, and the second is $\frac{21}{24}$.

Step 2: Simplify the Ratios

- Simplify $\frac{7}{12}$: Already in simplest form.
- Simplify $\frac{21}{24}$:

Both numerator and denominator are divisible by 3:

$$\frac{21 \div 3}{24 \div 3} = \frac{7}{8}$$

Step 3: Compare the Simplified Ratios

$$\frac{7}{12} \quad \text{and} \quad \frac{7}{8}$$

Since $(12 \neq 8)$, these are not the same ratios, indicating they are not directly equal unless scaled appropriately.

Step 4: Cross-Multiply

To verify if they form a proportion:

$$\begin{aligned} &7 \times 24 = 168 \\ &12 \times 21 = 252 \end{aligned}$$

Since $(168 \neq 252)$, the ratios are not proportional.

Conclusion for Pair A

No, the ratios $7/12$ and $21/24$ do not form a proportion because their cross-products are not equal.

Analysis of Pair B: 12/39 and 8/36

Step 1: Express the Ratios

The ratios are $(\frac{12}{39})$ and $(\frac{8}{36})$.

Step 2: Simplify the Ratios

- Simplify $(\frac{12}{39})$:

Both numerator and denominator are divisible by 3:

$$\frac{12 \div 3}{39 \div 3} = \frac{4}{13}$$

- Simplify $(\frac{8}{36})$:

Both numerator and denominator are divisible by 4:

$$\frac{8 \div 4}{36 \div 4} = \frac{2}{9}$$

Step 3: Compare Simplified Ratios

$$\frac{4}{13} \quad \text{and} \quad \frac{2}{9}$$

Since these are not identical, let's check whether they are proportional through cross-multiplication.

Step 4: Cross-Multiply

$$4 \times 9 = 36$$
$$13 \times 2 = 26$$

Since $36 \neq 26$, the ratios are not proportional.

Alternative Check: Convert to Decimals

- $\frac{4}{13} \approx 0.3077$
- $\frac{2}{9} \approx 0.2222$

These are not equal, reinforcing that the ratios do not form a proportion.

Conclusion for Pair B

No, the ratios $12/39$ and $8/36$ do not form a proportion because their cross-products are unequal.

Implications and Real-World Applications of Proportions

Understanding whether ratios form proportions is more than an academic exercise; it plays a vital role in numerous practical contexts:

- **Scaling in Art and Architecture:** Artists and architects use proportions to create visually pleasing and structurally sound designs.
- **Cooking and Recipes:** Adjusting ingredient quantities relies on proportional reasoning to maintain flavor and texture.
- **Science and Engineering:** Ratios and proportions are fundamental in calculations involving concentrations, mixtures, and physical relationships.
- **Finance and Economics:** Ratios such as debt-to-equity or price-to-earnings ratios guide investment decisions.

In each of these cases, verifying proportionality ensures that relationships are maintained correctly, whether scaling a model, adjusting a recipe, or analyzing data.

Conclusion and Summary

In the process of evaluating whether two ratios form a proportion, the key lies in the comparison of their cross-products or simplified forms. For the pairs examined:

- Pair A: $7/12$ and $21/24$ — No, because their cross-products are not equal.
- Pair B: $12/39$ and $8/36$ — No, because their simplified forms differ, and their cross-products do not match.

This analytical approach underscores the importance of systematic methods like cross-multiplication and fraction simplification in mathematical reasoning. Recognizing proportions accurately enhances problem-solving skills and deepens understanding of relationships among quantities.

As learners and practitioners apply these concepts across various disciplines, their ability to analyze and interpret ratios becomes an invaluable skill. Whether in academic settings, professional fields, or everyday decisions, mastering the determination of proportions fosters precision, critical thinking, and effective communication of quantitative information.

In summary, while ratios may seem simple, verifying whether they form a proportion requires careful analysis. The cross-multiplication method offers a reliable, straightforward tool to confirm proportional relationships, leading to more accurate conclusions and better-informed decisions in numerous real-world scenarios.

Determine Whether Each Pair Of Ratios Forms A Proportion Yes Or No A 7 12 21 24 B 12 39 8 36 C

Determine Whether Each Pair Of Ratios Forms A Proportion Yes Or No A 7 12 21 24 B 12 39 8 36 C

Related Articles

- [Exercise 1\] Read The Following Statements And Run The Program Source Codes Attached As Here EXERCISESA](#)
- [Barnacles Live Attached To Whales. The Barnacles Don't Interfere With The Whale'ss Ability To Succeed.](#)
- [Describe The Five Different Competing Marketing Orientations That A Business Organization Can Adopt To](#)

[Back to Home](#)