

Q5. Here Are Two Fractions. $\frac{7}{5}$ And $\frac{5}{7}$ Work Out Which Of The Fractions Is Closer To 1 You Must Show All

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Understanding how to compare fractions and determine which is closer to a specific number, such as 1, is a fundamental skill in mathematics. When faced with the fractions $\frac{7}{5}$ and $\frac{5}{7}$, it might seem challenging at first glance to see which one is nearer to 1. However, by systematically analyzing these fractions, converting them into decimal form, or using other mathematical techniques, we can confidently identify the fraction closest to 1. This guide will explore various methods to compare these fractions thoroughly, ensuring a clear understanding of the process.

Understanding Fractions and Their Relationship to 1

What Does It Mean for a Fraction to Be Close to 1?

A fraction is close to 1 when its value is nearly equal to 1. Since 1 can be written as a fraction itself ($\frac{1}{1}$), comparing fractions to 1 involves looking at how their values differ from 1. For example:

- Fractions greater than 1 are called improper fractions, such as $\frac{7}{5}$.
- Fractions less than 1 are called proper fractions, such as $\frac{5}{7}$.

The goal is to see which of these two fractions— $\frac{7}{5}$ or $\frac{5}{7}$ —is numerically closest to 1.

Why Is This Important?

Understanding how to compare fractions to 1 is essential in many areas of mathematics, including ratios, proportions, and real-world measurements. It helps develop intuition about the size of fractions and their relative position to whole numbers.

Method 1: Converting Fractions to Decimals

One of the simplest ways to compare fractions is to convert them into decimal form. Decimals are often easier to compare visually or through simple subtraction.

Step-by-Step Conversion

1. Convert $\frac{7}{5}$ into a decimal:
 - Divide 7 by 5: $7 \div 5 = 1.4$
2. Convert $\frac{5}{7}$ into a decimal:
 - Divide 5 by 7: $5 \div 7 \approx 0.7142857$

Comparing the Decimals to 1

- $7/5 \approx 1.4$
- $5/7 \approx 0.714$

Now, compare how close each decimal is to 1:

- Distance of $7/5$ from 1: $|1.4 - 1| = 0.4$
- Distance of $5/7$ from 1: $|0.7142857 - 1| \approx 0.2857$

Since 0.2857 is less than 0.4, $5/7$ is closer to 1 than $7/5$.

Conclusion from Method 1:

The fraction $5/7$ is closer to 1 than $7/5$.

Method 2: Cross-Multiplication Technique

Another effective method for comparing two fractions without converting to decimals involves cross-multiplication.

How Cross-Multiplication Works

Given two fractions, a/b and c/d :

- Calculate $a \times d$ and $c \times b$.
- The fraction with the smaller product is closer to 1 if we are comparing their proximity to 1.

Applying Cross-Multiplication to Our Fractions

Compare $7/5$ and $5/7$:

- Cross-multiplied products:
- $7 \times 7 = 49$
- $5 \times 5 = 25$

But, we need to compare their difference from 1, so a more precise approach is to compare their absolute difference from 1 by considering their distance in terms of numerator and denominator.

Alternatively, we can analyze their deviation from 1 by rewriting each fraction:

- For $7/5$:
- $7/5 = 1 + 2/5$
- For $5/7$:
- $5/7 \approx 0.7143$, which is less than 1, so:
- $1 - 5/7 \approx 0.2857$

From this, it's clear that $5/7$ is less than 1, but its difference from 1 is approximately 0.2857, while $7/5$ exceeds 1 by 0.4, as previously calculated.

Conclusion from Method 2:

Again, the smaller difference indicates $5/7$ is closer to 1.

Method 3: Visual Representation and Intuitive Understanding

Visual aids can help deepen understanding, especially for learners who find number lines helpful.

Plotting on a Number Line

- Mark 1 on the number line.
- Plot $7/5$:
- Since $7/5 = 1.4$, place a point slightly to the right of 1.
- Plot $5/7$:
- Since $5/7 \approx 0.714$, place a point slightly to the left of 1.

The visual distance from these points to 1 confirms that $5/7$ is closer.

Implication of Visuals

Visual comparison reinforces the numeric calculations, solidifying the conclusion that $5/7$ is the fraction nearer to 1.

Summary: Which Fraction Is Closer to 1?

By analyzing the fractions through multiple methods:

- Decimal conversion shows $5/7$ is approximately 0.714, closer to 1 than $7/5$, which is 1.4.
- Cross-multiplication and difference calculations support this conclusion.
- Visual representation confirms that $5/7$ is the closer fraction.

Final Answer:

The fraction $5/7$ is closer to 1 than $7/5$.

Additional Tips for Comparing Fractions to 1

- Always consider converting to decimals for quick comparisons.
- Use cross-multiplication to avoid decimal inaccuracies.
- Visual tools like number lines can aid understanding.
- Remember, fractions less than 1 are closer to 1 if their numerator is just slightly less than the denominator, and vice versa for fractions greater than 1.

Practice Problems to Reinforce Your Skills

1. Compare $\frac{9}{8}$ and $\frac{8}{9}$ and determine which is closer to 1.
2. Is $\frac{11}{10}$ or $\frac{10}{11}$ nearer to 1? Show your reasoning.
3. Find which of the following fractions is closest to 1: $\frac{13}{12}$, $\frac{12}{13}$, or $\frac{14}{13}$.

Practicing these types of problems enhances your ability to quickly compare fractions and develop mathematical intuition.

In conclusion, understanding and comparing fractions relative to 1 involves multiple strategies, including decimal conversion, cross-multiplication, and visual aids. Applying these methods to the fractions $\frac{7}{5}$ and $\frac{5}{7}$ demonstrates that $\frac{5}{7}$ is nearer to 1, a conclusion supported by consistent calculations and visual confirmation. Mastery of these techniques is a valuable component of mathematical literacy, enabling learners to analyze and interpret fractions confidently in diverse contexts.

Frequently Asked Questions

Which fraction, $\frac{7}{5}$ or $\frac{5}{7}$, is closer to 1?

To determine which is closer to 1, compare their distances from 1 by subtracting each from 1. $\frac{7}{5}$ is 1.4, so $|1 - \frac{7}{5}| = 0.4$. $\frac{5}{7}$ is approximately 0.714, so $|1 - \frac{5}{7}| \approx 0.286$. Since $0.286 < 0.4$, $\frac{5}{7}$ is closer to 1.

How do you find out which fraction is closer to 1?

Subtract each fraction from 1 and compare the absolute differences. The smaller the difference, the closer the fraction is to 1.

Is $\frac{7}{5}$ greater than 1? How does that affect its closeness to 1?

Yes, $\frac{7}{5}$ is greater than 1 (since $\frac{7}{5} = 1.4$). Fractions greater than 1 are farther from 1 than those less than 1, unless they are very close to 1 itself.

Calculate the difference between $\frac{5}{7}$ and 1. Show your work.

1 minus $\frac{5}{7}$ equals $\frac{7}{7}$ minus $\frac{5}{7}$, which is $\frac{2}{7}$. So, the difference is $\frac{2}{7} \approx 0.286$.

Calculate the difference between $\frac{7}{5}$ and 1. Show your work.

$\frac{7}{5}$ minus 1 equals $\frac{7}{5}$ minus $\frac{5}{5}$, which is $\frac{2}{5}$. So, the difference is $\frac{2}{5} = 0.4$.

Which fraction has a smaller difference from 1: $\frac{7}{5}$ or $\frac{5}{7}$?

Why?

$5/7$ has a smaller difference from 1, approximately 0.286, compared to $7/5$'s difference of 0.4. Therefore, $5/7$ is closer to 1.

Can a fraction greater than 1 be closer to 1 than a fraction less than 1? Provide an example based on the given fractions.

Yes. For example, $7/5$ (which is 1.4) is 0.4 away from 1, while $5/7$ (approximately 0.714) is about 0.286 away. Since $5/7$ is closer, a fraction greater than 1 can be closer to 1 than a fraction less than 1, depending on their values.

Additional Resources

Understanding Which Fraction Is Closer to 1: A Detailed Analysis of $7/5$ and $5/7$

When comparing fractions to determine which one is nearer to the value of 1, it's essential to understand the nature of fractions, their decimal equivalents, and the methods used for comparison. In this comprehensive review, we will thoroughly analyze the fractions $7/5$ and $5/7$, exploring their properties, converting them to decimals, and applying mathematical principles to identify which is closer to 1. We will also discuss various methods for comparison, common pitfalls, and practical tips to approach such problems confidently.

Understanding the Fractions: $7/5$ and $5/7$

Before diving into calculations, it's crucial to understand the basic characteristics of these fractions.

What Do These Fractions Represent?

- $7/5$: This is an improper fraction because the numerator (7) is larger than the denominator (5). It indicates a quantity greater than 1.
- $5/7$: This is a proper fraction, as the numerator (5) is less than the denominator (7). It indicates a quantity less than 1.

Visualizing the Fractions

- $7/5$: Think of 7 parts out of 5, which can be visualized as 1 whole ($5/5$) plus an additional $2/5$. Therefore, $7/5$ equals $1 + 2/5$.
- $5/7$: Think of 5 parts out of 7, which is slightly less than 1, since $5/7$ is less than $7/7$ (which equals 1).

Converting Fractions to Decimals for Easier Comparison

To compare the fractions against 1, converting them to decimal form provides a straightforward approach.

Step-by-Step Conversion

1. Convert $\frac{7}{5}$:

$$\frac{7}{5} = 1.4$$

2. Convert $\frac{5}{7}$:

$$\frac{5}{7} \approx 0.7142857$$

Initial Observations

- $\frac{7}{5}$ as a decimal is 1.4, which is greater than 1.
- $\frac{5}{7}$ as a decimal is approximately 0.7143, which is less than 1.

Determining Which Fraction Is Closer to 1

The core question is: Between $\frac{7}{5}$ and $\frac{5}{7}$, which is closer to 1?

Method 1: Absolute Difference from 1

One of the most effective methods is to find the absolute difference between each fraction and 1. The smaller the difference, the closer the fraction is to 1.

- Difference for $\frac{7}{5}$:

$$|1 - 1.4| = 0.4$$

- Difference for $\frac{5}{7}$:

$$|1 - 0.7143| \approx 0.2857$$

Conclusion: Since $0.2857 < 0.4$, $5/7$ is closer to 1 than $7/5$.

Method 2: Visualizing the Distance on the Number Line

Plotting the fractions on a number line:

- $7/5$ is at 1.4, 0.4 units away from 1 on the right.
- $5/7$ is at approximately 0.7143, about 0.2857 units away from 1 on the left.

This visual confirms that $5/7$ is nearer to 1 because its distance from 1 is smaller.

Mathematical Insights and Alternative Approaches

While decimal conversion and absolute differences are straightforward, alternative methods deepen understanding and can be more efficient in certain contexts.

Method 3: Comparing Cross Products

Cross-multiplied comparison can avoid decimal approximations:

- To check if $7/5$ is closer to 1 than $5/7$, compare the absolute differences without decimals.

Calculate:

$$\begin{aligned} &|7/5 - 1| = \frac{|7 - 5|}{5} = \frac{2}{5} = 0.4 \end{aligned}$$

$$\begin{aligned} &|5/7 - 1| = \frac{|5 - 7|}{7} = \frac{2}{7} \approx 0.2857 \end{aligned}$$

Again, the smaller value indicates the fraction closer to 1.

Method 4: Using the Difference Between Fractions and 1

Alternatively, compare the differences directly:

$$\begin{aligned} &\text{Difference for } 7/5 = |7/5 - 1| = \left| \frac{7}{5} - \frac{5}{5} \right| = \frac{2}{5} \end{aligned}$$

$$\begin{aligned} &\text{Difference for } 5/7 = |5/7 - 1| = \left| \frac{5}{7} - \frac{7}{7} \right| = \frac{2}{7} \end{aligned}$$

Since $(\frac{2}{7} \approx 0.2857)$ and $(\frac{2}{5} = 0.4)$, the comparison confirms that $5/7$ is

closer to 1.

Summary of Findings

- $7/5$ equals 1.4, which is 0.4 units away from 1.
- $5/7$ is approximately 0.7143, which is about 0.2857 units away from 1.
- Therefore, $5/7$ is closer to 1 because the absolute difference is smaller.

Additional Considerations and Common Misconceptions

Understanding the comparison process is vital to avoid common errors.

Misconception 1: Comparing the Fractions' Numerators and Denominators Directly

- Do not assume that the larger numerator or denominator indicates proximity to 1.
- For proper and improper fractions, conversion or difference calculations are necessary.

Misconception 2: Confusing Larger Absolute Differences with Closeness

- Remember, the key is the absolute difference from 1, not just the size of the numerator or denominator.
- For example, $7/5$ is larger than 1, but its difference from 1 is 0.4, which is still less than other fractions far from 1.

Misconception 3: Rounding Errors in Decimal Approximations

- When using decimal conversions, be cautious about rounding.
- For precision, use fractions and cross-multiplied comparisons where possible.

Practical Tips for Comparing Fractions to 1

- Always convert fractions to decimals for quick comparisons, but verify with exact calculations if necessary.
- Use the absolute difference from 1 as the primary metric.
- Cross-multiplied comparisons are more precise and avoid rounding issues.
- Visualize on the number line for an intuitive understanding.
- Practice with different fractions to build intuition and familiarity.

Conclusion: Which Fraction Is Closer to 1?

After thorough analysis, the conclusion is clear:

The fraction $\frac{5}{7}$ is closer to 1 than $\frac{7}{5}$.

This conclusion is supported by multiple methods:

- Decimal conversions show 0.7143 vs. 1.4.
- Absolute differences are approximately 0.2857 for $\frac{5}{7}$ and 0.4 for $\frac{7}{5}$.
- Cross-multiplied comparisons confirm these findings.

Final Remarks

The process of determining which fraction is nearer to a specific value like 1 involves multiple steps and methods, each reinforcing the other. Whether using decimal conversions, absolute difference calculations, or cross-multiplied comparisons, the key is to approach with clarity and precision. Mastering these techniques enhances mathematical intuition and strengthens problem-solving skills, especially in fraction comparisons and similar numerical analyses.

In summary, when comparing $\frac{7}{5}$ and $\frac{5}{7}$ to 1, the fraction $\frac{5}{7}$ is definitively closer to 1, as demonstrated through detailed calculations and multiple comparison techniques.

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