

A Rectangle Has A Length Of $1\frac{4}{7}$ Yards And A Width Of $5\frac{3}{14}$ Yards. What Is The Perimeter (distance

A Rectangle Has A Length Of $1\frac{4}{7}$ Yards And A Width Of $5\frac{3}{14}$ Yards. What Is The Perimeter (Distance)?

Understanding how to find the perimeter of a rectangle is a fundamental skill in geometry. When the dimensions are given in mixed numbers, additional steps are required to convert them into improper fractions or decimals before applying the perimeter formula. This article provides a comprehensive guide to calculating the perimeter of a rectangle with the given dimensions, including conversion of mixed numbers, applying the perimeter formula, and interpreting the result.

Understanding the Dimensions of the Rectangle

What Are Mixed Numbers?

- A mixed number combines a whole number and a fraction, such as $1\frac{4}{7}$.
- They are often used to represent measurements that are not whole numbers.
- For calculations, mixed numbers are typically converted into improper fractions or decimals.

The Given Dimensions

- Length: $1\frac{4}{7}$ yards
- Width: $5\frac{3}{14}$ yards

Converting Mixed Numbers to Improper Fractions

Conversion Process

1. Identify the whole number and the fractional part.
2. Multiply the whole number by the denominator of the fractional part.
3. Add the numerator of the fractional part to this product.
4. Write the result over the original denominator.

Calculating the Length

For the length $1\frac{4}{7}$:

- Whole number: 1
- Fraction: $\frac{4}{7}$
- Compute: $1 \times 7 + 4 = 7 + 4 = 11$
- Improper fraction: $\frac{11}{7}$

Calculating the Width

For the width $5\frac{3}{14}$:

- Whole number: 5
- Fraction: $\frac{3}{14}$
- Compute: $5 \times 14 + 3 = 70 + 3 = 73$
- Improper fraction: $\frac{73}{14}$

Calculating the Perimeter of the Rectangle

Perimeter Formula

The perimeter P of a rectangle is given by:

$$P = 2 \times (\text{length} + \text{width})$$

Applying the Formula with Improper Fractions

- Length: $11/7$ yards
- Width: $73/14$ yards
- Calculate: $P = 2 \times (11/7 + 73/14)$

Finding a Common Denominator

To add the fractions, find the least common denominator (LCD) of 7 and 14.

- LCD of 7 and 14: 14
- Convert $11/7$ to a fraction with denominator 14:
- $11/7 = (11 \times 2)/(7 \times 2) = 22/14$

Adding the Fractions

$$22/14 + 73/14 = (22 + 73)/14 = 95/14$$

Calculating the Perimeter

$$P = 2 \times (95/14) = (2 \times 95)/14 = 190/14$$

Simplifying the Result

- Simplify $190/14$ by dividing numerator and denominator by 2:
- $190 \div 2 = 95$

- $14 \div 2 = 7$
- Final perimeter: $95/7$ yards

Converting the Perimeter to a Mixed Number

Performing the Division

- Divide 95 by 7:
- $95 \div 7 = 13$ with a remainder of 4

Expressing as a Mixed Number

- The quotient is 13, and the remainder is 4.
- Write the fractional part: $4/7$.
- Final answer: $13(4/7)$ yards.

Summary and Final Result

The perimeter of the rectangle with dimensions $1(4/7)$ yards by $5(3/14)$ yards is **$13(4/7)$ yards**. This measurement indicates the total distance around the rectangle.

Understanding mixed number conversions, fraction addition, and simplification are key skills in solving such problems efficiently.

Additional Tips for Similar Problems

- Always convert mixed numbers to improper fractions before performing arithmetic operations.
- Find the least common denominator for adding fractions with different denominators.
- After calculations, consider simplifying fractions to their lowest terms.

- Use mixed number form for easier interpretation of the final answer.

Conclusion

Calculating the perimeter of a rectangle with mixed number dimensions involves several steps: converting mixed numbers to improper fractions, adding fractions with different denominators, multiplying to find the total perimeter, and simplifying the result. Mastery of these steps ensures accurate calculations and a clear understanding of geometric measurements. Whether you are working with measurements in yards, meters, or any other units, these methods are universally applicable and fundamental to solving geometry problems efficiently.

Frequently Asked Questions

How do you convert mixed numbers into improper fractions when calculating the perimeter of a rectangle?

To convert mixed numbers into improper fractions, multiply the whole number by the denominator and add the numerator. For example, $1\frac{4}{7}$ becomes $(1 \times 7 + 4)/7 = 11/7$.

What is the formula for calculating the perimeter of a rectangle?

The perimeter of a rectangle is calculated by adding twice the length and twice the width:
 $\text{Perimeter} = 2 \times (\text{length} + \text{width})$.

How do you find the perimeter of a rectangle with mixed number dimensions?

Convert both the length and width from mixed numbers to improper fractions, add them, then multiply the sum by 2 to find the perimeter.

What is the perimeter of a rectangle with length $1\frac{4}{7}$ yards and width $5\frac{3}{14}$ yards?

First, convert to improper fractions: $1\frac{4}{7} = 11/7$, and $5\frac{3}{14} = 73/14$. Find common denominator and add: $11/7 = 22/14$, so sum = $22/14 + 73/14 = 95/14$. Multiply by 2:
 $\text{Perimeter} = 2 \times 95/14 = 190/14 = 95/7$ yards, approximately 13.57 yards.

Why is it important to convert mixed numbers to

improper fractions before calculating the perimeter?

Converting to improper fractions simplifies addition and multiplication, ensuring accuracy when calculating the perimeter.

Can you simplify the perimeter calculation for the given rectangle dimensions?

Yes. After converting, the sum of length and width is $95/14$ yards. Multiply by 2 to get the perimeter: $(2 \times 95/14) = 190/14 = 95/7$ yards, which simplifies to approximately 13.57 yards.

What are common mistakes to avoid when calculating the perimeter with mixed number dimensions?

Common mistakes include failing to convert mixed numbers to improper fractions, adding incorrectly, or forgetting to multiply the sum by 2. Always double-check conversions and calculations.

Additional Resources

A Rectangle Has A Length Of $1\frac{4}{7}$ Yards And A Width Of $5\frac{3}{14}$ Yards. What Is The Perimeter (distance)?

Introduction

In the world of geometry, understanding the properties of basic shapes such as rectangles is fundamental. Whether you're designing a garden, constructing a piece of furniture, or solving a math problem, knowing how to calculate the perimeter—the total distance around a shape—is essential. In this article, we will explore a specific problem involving a rectangle with fractional dimensions: a length of $1\frac{4}{7}$ yards and a width of $5\frac{3}{14}$ yards. Our goal is to determine the perimeter of this rectangle with clear, step-by-step reasoning.

Understanding the Problem

The problem provides two measurements:

- Length: $1\frac{4}{7}$ yards
- Width: $5\frac{3}{14}$ yards

These measurements are given as mixed numbers, which combine whole numbers and fractions. To accurately compute the perimeter, we need to convert these mixed numbers into improper fractions, perform necessary calculations, and then apply the perimeter

formula for rectangles.

The Perimeter Formula for a Rectangle

Before diving into calculations, it's important to recall the basic formula for the perimeter of a rectangle:

$$\text{Perimeter (P)} = 2 \times (\text{Length} + \text{Width})$$

This formula indicates that to find the perimeter, we add the length and width together, then multiply the sum by two.

Step 1: Converting Mixed Numbers to Improper Fractions

Mixed numbers are often easier to work with when converted to improper fractions. Let's convert both measurements:

Length: $1\frac{4}{7}$

- Whole number: 1
- Fraction: $\frac{4}{7}$

To convert to an improper fraction:

$$\text{Improper fraction} = (\text{Whole number} \times \text{Denominator}) + \text{Numerator}$$

$$\rightarrow (1 \times 7) + 4 = 7 + 4 = 11$$

So,

$$1\frac{4}{7} = \frac{11}{7}$$

Width: $5\frac{3}{14}$

- Whole number: 5
- Fraction: $\frac{3}{14}$

Conversion:

$$(5 \times 14) + 3 = 70 + 3 = 73$$

Thus,

$$\frac{5(3/14)}{1} = \frac{73}{14}$$

Step 2: Finding a Common Denominator

To add the two fractions, they need to have the same denominator. The denominators are 7 and 14, and their least common multiple (LCM) is 14.

- Convert $\frac{11}{7}$ to denominator 14:

$$\frac{11}{7} = \frac{11 \times 2}{7 \times 2} = \frac{22}{14}$$

- The width is already $\frac{73}{14}$.

Now, we have:

- Length: $\frac{22}{14}$
- Width: $\frac{73}{14}$

Step 3: Adding the Length and Width

Adding the two fractions:

$$\frac{22}{14} + \frac{73}{14} = \frac{22 + 73}{14} = \frac{95}{14}$$

The sum of the length and width is $\frac{95}{14}$ yards.

Step 4: Calculating the Perimeter

Applying the perimeter formula:

$$P = 2 \times (\text{Length} + \text{Width}) = 2 \times \frac{95}{14}$$

Multiplying:

$\frac{190}{14}$

$$2 \times \frac{95}{14} = \frac{2 \times 95}{14} = \frac{190}{14}$$

Simplify the fraction:

$$\frac{190}{14} = \frac{95}{7}$$

So, the perimeter is $\left(\frac{95}{7}\right)$ yards.

Step 5: Converting Back to a Mixed Number

Expressing the perimeter as a mixed number:

- Divide numerator by denominator:

$$95 \div 7 = 13 \text{ with a remainder of } 4$$

- The quotient is 13, and the remainder is 4, so:

$$\frac{95}{7} = 13 \frac{4}{7}$$

Final answer:

The perimeter of the rectangle is $13\frac{4}{7}$ yards.

Additional Insights and Practical Applications

Understanding how to handle fractions and mixed numbers is crucial in various real-world scenarios. For example, when measuring materials for construction, calculating fencing lengths, or designing layouts, precise measurements can involve fractional dimensions. Converting mixed numbers to improper fractions simplifies calculations, ensuring accuracy.

Furthermore, this process exemplifies the importance of mathematical literacy in everyday life and professional contexts. Whether dealing with fractional measurements in carpentry, architecture, or landscaping, mastering these basic calculations is invaluable.

Summary of Steps

To summarize the process:

1. Convert mixed numbers to improper fractions.
2. Find a common denominator to add fractions.
3. Add the fractions to find the sum of length and width.
4. Multiply by 2 to find the perimeter.
5. Simplify the result to a mixed number for clarity.

Conclusion

Calculating the perimeter of a rectangle with fractional dimensions may seem complex initially, but by systematically converting mixed numbers, finding common denominators, and applying basic arithmetic principles, the task becomes manageable. In this specific case, a rectangle measuring $1\frac{4}{7}$ yards in length and $5\frac{3}{14}$ yards in width has a perimeter of $13\frac{4}{7}$ yards. This exercise underscores the importance of understanding fractions and their operations—skills that are fundamental in both academic settings and practical applications.

Whether you're a student tackling math homework or a professional dealing with measurements, mastering these concepts ensures precision and confidence in your calculations.

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