

The Rectangle Is 3 3/4 Centimeters Long And 2 1/2 Centimeters Wide. What Is The Area Of This Rectangle?

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Understanding the dimensions and area of a rectangle is fundamental in geometry, real-world applications, and various fields like architecture, design, and engineering. When given specific measurements, such as length and width, calculating the area becomes a straightforward task that combines basic multiplication with attention to detail—especially when those measurements are provided in mixed numbers or fractions. In this article, we will explore how to interpret the given dimensions, convert mixed numbers to improper fractions, perform the necessary calculations, and understand the significance of the area in practical contexts.

Introduction to Rectangle Dimensions and Area

A rectangle is a four-sided polygon with opposite sides equal and all interior angles right angles (90 degrees). The area of a rectangle is a measure of the space contained within its boundaries. It is calculated by multiplying the length by the width:

$$\text{Area} = \text{Length} \times \text{Width}$$

Knowing how to accurately determine the area is essential in numerous applications, from estimating the amount of flooring needed to planning land plots.

Deciphering the Given Dimensions

The problem states: "The rectangle is 3 3/4 centimeters long and 2 1/2 centimeters wide." This notation suggests mixed numbers, which combine whole numbers with fractional parts. Let's analyze each measurement:

- Length: 3 3/4 centimeters
- Width: 2 1/2 centimeters

At first glance, these seem to be mixed numbers, but they are written without a clear separator (like a plus sign). This can be interpreted as:

- 3 3/4 centimeters = 3 and 34/100 centimeters, or more likely, 3 3/4 centimeters if the notation is an

approximation.

- 2 12 centimeters = 2 and 12/100 centimeters, or possibly 2 1/2 centimeters.

However, the notation may also represent improper fractions or a formatting issue. Given standard measurement notation, it's more probable that:

- 3 34 centimeters corresponds to 3 3/4 centimeters (because "34" might stand for "3/4")

- 2 12 centimeters corresponds to 2 1/2 centimeters (since "12" might be "1/2")

Clarification:

- "3 34 centimeters" is likely intended as 3 3/4 cm

- "2 12 centimeters" is likely intended as 2 1/2 cm

This interpretation aligns with common mixed number notation.

Converting Mixed Numbers to Improper Fractions

To perform the multiplication accurately, it's best to convert mixed numbers into improper fractions.

1. Convert 3 3/4 to an improper fraction:

- Whole number: 3

- Fractional part: 3/4

Calculation:

$$\lfloor 3 \frac{3}{4} = \frac{(3 \times 4) + 3}{4} = \frac{12 + 3}{4} = \frac{15}{4} \rfloor$$

2. Convert 2 1/2 to an improper fraction:

- Whole number: 2

- Fractional part: 1/2

Calculation:

$$\lfloor 2 \frac{1}{2} = \frac{(2 \times 2) + 1}{2} = \frac{4 + 1}{2} = \frac{5}{2} \rfloor$$

Calculating the Area of the Rectangle

Now that we have:

- Length = $\frac{15}{4}$ cm
- Width = $\frac{5}{2}$ cm

The area is:

$$\text{Area} = \text{Length} \times \text{Width} = \frac{15}{4} \times \frac{5}{2}$$

Multiplying fractions:

$$\text{Area} = \frac{15 \times 5}{4 \times 2} = \frac{75}{8}$$

The result, $\frac{75}{8}$, is an improper fraction. For practical purposes, convert it to a mixed number:

$$\frac{75}{8} = 9 \frac{3}{8}$$

Therefore:

$$\boxed{\text{Area} = 9 \frac{3}{8} \text{ square centimeters}}$$

Expressing the Area in Decimal Form

To better understand the size, convert the mixed number to a decimal:

$$\frac{3}{8} = 0.375$$

Adding this to 9:

$$9 + 0.375 = 9.375$$

Final area in decimal:

$$\boxed{\text{Area} \approx 9.375 \text{ square centimeters}}$$

Significance of the Area Calculation

Understanding the area of a rectangle with specific dimensions has numerous practical applications:

Practical Applications

- Flooring and Tiling: Determining how much material is needed to cover a rectangular surface.
- Land Measurement: Estimating the size of a plot of land or garden.

- Fabric and Material Cutting: Calculating the amount of fabric, paper, or other materials required for projects.
- Design and Layout: Planning spaces efficiently in architecture or interior design.
- Manufacturing: Ensuring components fit within specified dimensions.

Why Precise Measurement Matters

Using mixed numbers and fractions accurately ensures precise calculations. Small errors can lead to material shortages or excess, impacting costs and efficiency.

Additional Tips for Working with Mixed Numbers and Fractions

- Always convert mixed numbers to improper fractions before multiplication or division.
- Simplify fractions when possible to make calculations easier.
- Use a calculator for complex fractions to avoid arithmetic errors.
- Convert the final answer into both fraction and decimal forms for clarity and application needs.

Summary

In conclusion, the dimensions given—interpreted as $3\frac{3}{4}$ centimeters for length and $2\frac{1}{2}$ centimeters for width—allow us to calculate the area of the rectangle precisely. The steps involve converting mixed numbers to improper fractions, multiplying, and simplifying the result.

Final Result:

- Area = $\frac{75}{8}$ cm²
- In mixed number form: $9\frac{3}{8}$ cm²
- In decimal form: approximately 9.375 cm²

This calculation provides a clear understanding of the rectangle's size, enabling practical application in various fields.

Conclusion

Understanding how to interpret mixed number dimensions and accurately compute the area of a rectangle is a fundamental skill in mathematics that translates directly to real-world scenarios. Whether you're designing a room, planning a garden, or working on a craft project, knowing how to

perform these calculations ensures precision and efficiency. Remember to always convert mixed numbers into improper fractions for ease of multiplication, and double-check your work for accuracy. With these skills, you can confidently handle any rectangle measurement problem and apply it effectively in your projects.

Frequently Asked Questions

How do you find the area of a rectangle with sides $3\frac{3}{4}$ cm and $2\frac{1}{2}$ cm?

Convert the mixed numbers to improper fractions, then multiply length by width: $(15/4) \times (5/2) = 75/8 \text{ cm}^2$, which is $9\frac{3}{8} \text{ cm}^2$.

What is the area of a rectangle measuring $3\frac{3}{4}$ cm by $2\frac{1}{2}$ cm?

The area is $9\frac{3}{8}$ square centimeters.

Why do we convert mixed numbers to improper fractions when calculating area?

Converting to improper fractions simplifies multiplication, making calculations more straightforward and accurate.

Can the area be expressed as a decimal? If so, what is it?

Yes. $75/8 \text{ cm}^2$ equals 9.375 cm^2 , so the area is 9.375 square centimeters.

What are the steps to calculate the area of a rectangle with mixed number dimensions?

First, convert each mixed number to an improper fraction, then multiply the two fractions. Finally, simplify or convert to decimal if needed.

Is the area of the rectangle larger or smaller than 10 cm^2 ?

Since the area is $9\frac{3}{8} \text{ cm}^2$, it is slightly less than 10 cm^2 .

How can understanding mixed numbers help in real-world measurements?

Knowing how to work with mixed numbers allows for precise calculations in measurements involving fractions, common in construction, tailoring, and cooking.

What is the importance of understanding area calculations for rectangles in everyday life?

It helps in estimating space, planning layouts, purchasing materials, and understanding geometrical concepts for practical tasks.

Additional Resources

The Rectangle Is $3\frac{3}{4}$ Centimeters Long And $2\frac{1}{2}$ Centimeters Wide. What Is The Area Of This Rectangle?

In the world of geometry, understanding the properties of basic shapes such as rectangles is fundamental. Whether you're a student tackling homework problems or a professional applying mathematical principles in real-world scenarios, grasping how to compute the area of a rectangle is an essential skill. Today, we delve into a specific problem involving dimensions expressed in mixed numbers: a rectangle measuring $3\frac{3}{4}$ centimeters in length and $2\frac{1}{2}$ centimeters in width. Our goal is to determine its area accurately and explore the methods behind the calculation, ensuring clarity for readers at various levels of mathematical familiarity.

Understanding the Dimensions: Interpreting Mixed Numbers

Before we dive into calculations, it's crucial to interpret the given measurements correctly. The dimensions are presented as mixed numbers:

- Length: $3\frac{3}{4}$ centimeters
- Width: $2\frac{1}{2}$ centimeters

Mixed numbers combine whole numbers and proper fractions. They are written with the whole number part followed by a fractional part, such as $3\frac{3}{4}$ or $2\frac{1}{2}$ in this case.

Step 1: Converting Mixed Numbers to Improper Fractions

To perform calculations efficiently, especially multiplication, converting mixed numbers into improper fractions is a standard approach.

- For $3\frac{3}{4}$:
- Whole number: 3
- Fractional part: $\frac{3}{4}$ (but since 3/4 is an integer, it appears as the numerator of a fraction with denominator 1)
- However, considering the notation, it's likely that "3/4" is shorthand for " $\frac{3}{4}$ " (which is a common fractional notation). Alternatively, it could be "34" as a whole number, but that would be inconsistent with the second dimension.
- Assumption: Given the context and common usage, the notation " $3\frac{3}{4}$ " probably means 3 and $\frac{3}{4}$ centimeters (i.e., $3\frac{3}{4}$).
- Similarly, " $2\frac{1}{2}$ " likely means 2 and $\frac{1}{2}$ centimeters (i.e., $2\frac{1}{2}$).

Note: If the original problem intended for "34" to be " $\frac{3}{4}$ " and "12" to be " $\frac{1}{2}$," the notation aligns

with common fractional forms.

Therefore:

- Length: $3 \frac{3}{4}$ cm
- Width: $2 \frac{1}{2}$ cm

Step 2: Convert to Improper Fractions

- $3 \frac{3}{4}$:
- Whole number: 3
- Fraction: $\frac{3}{4}$
- Convert: $(3 \times 4 + 3)/4 = (12 + 3)/4 = 15/4$

- $2 \frac{1}{2}$:
- Whole number: 2
- Fraction: $\frac{1}{2}$
- Convert: $(2 \times 2 + 1)/2 = (4 + 1)/2 = 5/2$

Calculating the Area: Applying the Formula

The area A of a rectangle is given by:

$$A = \text{length} \times \text{width}$$

Using our converted improper fractions:

$$A = (15/4) \times (5/2)$$

Step 1: Multiply the numerators and denominators

- Numerator: $15 \times 5 = 75$
- Denominator: $4 \times 2 = 8$

Step 2: Write the product

- $A = 75/8$ square centimeters

Step 3: Simplify or convert to mixed number

- To convert $75/8$ into a mixed number:
- Divide 75 by 8:

$$8 \times 9 = 72; \text{ remainder} = 75 - 72 = 3$$

- So:

$$75/8 = 9 \frac{3}{8} \text{ centimeters}^2$$

Final Answer: The Area of the Rectangle

The area of the rectangle is $9 \frac{3}{8}$ square centimeters.

This precise measurement offers a clear understanding of the rectangle's size, which can be useful in various applications—from construction and design to education.

Practical Implications and Real-World Applications

Understanding how to compute the area of a rectangle with fractional dimensions is more than an academic exercise. It has tangible applications in various fields:

- Architecture & Interior Design: When measuring spaces or materials that are specified in fractional inches or centimeters, accurate calculations ensure proper planning and resource allocation.
- Manufacturing & Fabrication: Precise measurements in mixed units are common, especially when cutting materials like fabric, wood, or metal.
- Educational Contexts: Developing skills in converting mixed numbers and performing fractional multiplication enhances overall numeracy and problem-solving capabilities.

Tips for Accurate Calculations with Mixed Numbers

- Always convert mixed numbers to improper fractions first to simplify multiplication and division.
- Simplify fractions when possible to make the calculations easier.
- Double-check conversions to prevent errors, especially when dealing with complex fractions or multiple steps.
- Use a calculator for complex fractions to ensure accuracy, particularly when dealing with larger numbers.

Concluding Remarks

The process of determining the area of a rectangle with dimensions expressed as mixed numbers underscores the importance of clear steps and careful conversion. By interpreting the given measurements correctly, converting to improper fractions, and applying the basic area formula, we arrived at an exact measurement: $9 \frac{3}{8}$ square centimeters.

This exercise exemplifies how foundational mathematical skills—like fraction conversion and multiplication—are essential in both academic and practical contexts. Whether designing a new space, calculating materials needed, or simply honing problem-solving skills, understanding these principles empowers individuals to approach real-world challenges confidently and accurately.

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