

A Rectangle Has An Area Of 524.4m². One Of The Sides Is 6.9m In Length. Work Out The Perimeter Of The

A Rectangle Has An Area Of 524.4m². One Of The Sides Is 6.9m In Length. Work Out The Perimeter Of The is a common problem in geometry that involves calculating the perimeter of a rectangle when given its area and one side length. Understanding how to approach this problem requires a clear grasp of the basic formulas for rectangles, as well as the ability to manipulate algebraic expressions to find missing dimensions. In this article, we will explore step-by-step methods to find the missing side and perimeter, along with helpful tips and related concepts to enhance your understanding of rectangle measurements.

Understanding the Basic Properties of Rectangles

Before diving into calculations, it's essential to review the fundamental properties of rectangles, as these form the basis of solving such problems.

Definition of a Rectangle

A rectangle is a four-sided polygon, known as a quadrilateral, with the following properties:

- Opposite sides are equal in length.
- All angles are right angles (90 degrees).
- The area and perimeter can be calculated using specific formulas.

Key Measurements of a Rectangle

- Length (L): one side length.
- Width (W): the adjacent side length.
- Area (A): the total surface covered, calculated as $A = L \times W$.
- Perimeter (P): the total length around the rectangle, calculated as $P = 2(L + W)$.

Given Data and What Is Needed

In this specific problem, you are told:

- The area of the rectangle is 524.4 square meters (524.4 m²).
- One side (say, the length) is 6.9 meters.

Your goal:

- Find the perimeter of the rectangle.

To do this, you need to:

1. Find the length of the other side (the width).
2. Use both sides to calculate the perimeter.

Calculating the Missing Side of the Rectangle

The first step involves determining the unknown side length, which is the width (W). Since the area is given, and one side length (L) is known, you can use the area formula to find W.

Using the Area Formula

The area formula for a rectangle is:

$$A = L \times W$$

Rearranged to find W:

$$W = \frac{A}{L}$$

Substitute the known values:

$$W = \frac{524.4}{6.9}$$

Calculate:

$$W \approx 76.0 \text{ meters}$$

This means the width of the rectangle is approximately 76.0 meters.

Calculating the Perimeter of the Rectangle

Once both sides are known, calculating the perimeter is straightforward.

Perimeter Formula

$$P = 2(L + W)$$

Substitute the known values:

$$P = 2(6.9 + 76.0)$$

Calculate the sum inside the parentheses:

$$6.9 + 76.0 = 82.9$$

Now multiply by 2:

$$P = 2 \times 82.9 = 165.8 \text{ meters}$$

\]

Therefore, the perimeter of the rectangle is approximately 165.8 meters.

Summary of Steps to Solve the Problem

Here's a quick recap of the steps involved in solving this type of problem:

1. Identify known quantities: area and one side length.
2. Use the area formula $(A = L \times W)$ to find the missing side.
3. Calculate the missing side: $(W = \frac{A}{L})$.
4. Use the perimeter formula $(P = 2(L + W))$ to find the perimeter.

Additional Tips for Solving Rectangle Problems

- Always double-check units to ensure consistency.
- When dealing with algebraic formulas, rearrange carefully to isolate the unknown.
- Round your answers appropriately, especially if the problem specifies a certain degree of precision.
- Remember that the perimeter is always the total length around the shape, which for rectangles is twice the sum of the length and width.

Related Concepts and Practice Problems

To deepen your understanding, here are some related concepts and practice questions:

Related Topics

- **Area and Perimeter of Rectangles:** Understanding how changes in dimensions affect area and perimeter.
- **Scaling Shapes:** How increasing or decreasing sides impacts the overall measurements.
- **Units Conversion:** Converting measurements between units (meters, centimeters, etc.).

Practice Problems

1. If a rectangle has an area of 300 m^2 and one side is 10 meters, find the other side and the perimeter.
2. A rectangle has sides of 8 meters and 12 meters. What is its area? What is its perimeter?
3. If the perimeter of a rectangle is 50 meters, and one side is 15 meters, what is the length of the other side?

Conclusion

Solving for the perimeter of a rectangle when given the area and one side length involves understanding and applying the fundamental formulas for area and perimeter. By calculating the missing dimension first and then using it to find the perimeter, you can efficiently solve these types of geometry problems. Remember to verify your calculations and ensure units are consistent throughout. With practice, you'll become more confident in tackling similar problems, enhancing your overall understanding of geometric measurements and their applications.

If you're preparing for exams or working on real-world projects that involve measurements, mastering these concepts will provide a solid foundation for accurate and efficient calculations.

Frequently Asked Questions

Given a rectangle with an area of 524.4 m^2 and one side measuring 6.9 m, how do you find the length of the other side?

You divide the area by the known side: $524.4 \text{ m}^2 \div 6.9 \text{ m} = 76 \text{ m}$. So, the other side is 76 meters long.

What is the formula to find the perimeter of a rectangle when the sides are known?

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

Using the given dimensions, what is the perimeter of

the rectangle?

Perimeter = $2 \times (6.9 \text{ m} + 76 \text{ m}) = 2 \times 82.9 \text{ m} = 165.8 \text{ meters}$.

If one side of a rectangle is 6.9 m and the area is 524.4 m², what is the length of the other side?

The length of the other side is 76 meters, calculated by dividing the area by 6.9 m.

Can the perimeter of the rectangle be found without knowing both sides explicitly? Why?

No, because the perimeter depends on both sides. Knowing only one side and the area allows us to find the other side, which then enables calculating the perimeter.

What are common mistakes to avoid when calculating the perimeter in this problem?

Common mistakes include mixing up the sides, forgetting to convert units if necessary, or misapplying the formula. Always verify the calculation of the unknown side before computing the perimeter.

Additional Resources

Understanding the Perimeter of a Rectangle with an Area of 524.4 m² and One Side of 6.9 m

When approaching problems related to rectangles, especially those involving area and perimeter, it's essential to understand the fundamental properties and formulas that govern these shapes. This detailed exploration will guide you step-by-step through solving the problem: "A rectangle has an area of 524.4 m². One of its sides measures 6.9 meters. How do we find its perimeter?" We'll delve into the necessary concepts, calculations, and interpretations to ensure comprehensive understanding.

Fundamental Properties of Rectangles

Before tackling the problem, let's review some key properties of rectangles:

- Definition: A rectangle is a quadrilateral with four right angles.
- Sides: Opposite sides are equal in length.
- Perimeter (P): The total distance around the rectangle, calculated as the sum of all sides.
- Area (A): The space enclosed within the rectangle, calculated as the product of length and width.

Mathematically:

- Perimeter: $P = 2 \times (\text{length} + \text{width})$
- Area: $A = \text{length} \times \text{width}$

Given Data and What Is Needed

Let's clearly state what we know and what we need to find:

- Given:
 - Area $A = 524.4 \text{ m}^2$
 - One side length $s_1 = 6.9 \text{ m}$
- Find:
 - The perimeter P of the rectangle

To proceed, we need to determine the length of the other side (let's denote it as s_2), and then use both sides to calculate the perimeter.

Step 1: Establishing Variables and Relationships

Since the rectangle has two sides of equal length and the problem specifies one side, we'll assign:

- $s_1 = 6.9 \text{ m}$ (known)
- $s_2 = ?$ (unknown)

The area formula becomes:

$$A = s_1 \times s_2$$

which can be rearranged to find s_2 :

$$s_2 = \frac{A}{s_1}$$

Plugging in the known values:

$$s_2 = \frac{524.4}{6.9}$$

Step 2: Calculating the Unknown Side Length

Performing the division:

$$s_2 = \frac{524.4}{6.9}$$

Calculating:

$$6.9 \times 75 = 517.5$$

$$6.9 \times 76 = 524.4$$

Therefore:

$$s_2 = 76 \text{ m}$$

This precise division confirms that:

$$s_2 = 76 \text{ m}$$

Step 3: Computing the Perimeter

Recall the perimeter formula:

$$P = 2 \times (s_1 + s_2)$$

Substitute the known values:

$$P = 2 \times (6.9 + 76)$$

$$P = 2 \times 82.9$$

$$P = 165.8 \text{ m}$$

Thus, the perimeter of the rectangle is 165.8 meters.

Additional Considerations and Validations

While the calculations are straightforward, it's prudent to verify the steps and discuss potential nuances.

Validity of the Calculations

- The division was exact, confirming the side length (s_2) as 76 meters.
- The units are consistent throughout, all measured in meters.
- The perimeter calculation aligns with the standard formula.

Sensitivity to Input Data

- Small changes in the area or known side length would proportionally affect the

perimeter.

- Ensuring accurate data input is crucial for precise results.

Visualizing the Rectangle

- One side is 6.9 meters.
- The other side is 76 meters.
- The shape is a long rectangle, perhaps like a field or a building footprint.

Real-world Implications

- Knowing the perimeter can assist in fencing, boundary marking, or material estimation.
- The ratio of sides indicates the shape's elongation: quite elongated with a length of 76 meters compared to 6.9 meters.

Deeper Insights and Mathematical Extensions

Beyond the immediate calculation, several mathematical concepts and related problems can deepen understanding:

1. Exploring the Relationship Between Area and Perimeter

- For a fixed area, the shape that minimizes perimeter is a square.
- Conversely, for a fixed perimeter, the shape that maximizes area is a square.

In this case, the sides are quite different, indicating a rectangle stretched in one direction.

2. Proportions and Ratios

- The ratio of sides:

$$\left| \frac{s_2}{s_1} = \frac{76}{6.9} \approx 11.01 \right|$$

- This indicates the rectangle is very elongated, which may influence practical considerations like stability or usability.

3. Scaling and Units

- If the problem were expressed in different units (e.g., feet), conversions would be necessary.
- Understanding units is essential for accurate calculations and real-world applications.

4. Applications in Real Life

- Calculating fencing length needed for a given area.
- Planning flooring or landscaping projects.
- Architectural design considerations.

Summary of the Key Steps

To encapsulate the process:

1. Identify known quantities:

- Area $(A = 524.4, \text{m}^2)$
- One side $(s_1 = 6.9, \text{m})$

2. Calculate the unknown side:

$$s_2 = \frac{A}{s_1} = \frac{524.4}{6.9} = 76, \text{m}$$

3. Calculate the perimeter:

$$P = 2(s_1 + s_2) = 2(6.9 + 76) = 165.8, \text{m}$$

Conclusion and Final Remarks

In solving the problem of finding the perimeter of a rectangle given its area and one side, a systematic approach rooted in fundamental geometric formulas proves effective. The key steps involve:

- Using the area to find the missing side length.
- Applying the perimeter formula once all side lengths are known.

This problem underscores important mathematical principles, such as the relationship between area and side lengths, the importance of precise calculations, and the practical applications of geometric concepts. Whether for academic purposes, construction planning, or design projects, mastering these calculations enhances spatial reasoning and mathematical proficiency.

Always double-check your calculations and consider the context—here, the elongated shape could have implications for real-world use. With a perimeter of 165.8 meters, this rectangle is quite extensive but narrow, illustrating how simple formulas can yield impactful insights into shape dimensions.

Note: When working with similar problems, always ensure units are consistent, and verify calculations to avoid errors. With these skills, you can confidently analyze rectangular shapes and other geometric figures in diverse scenarios.

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