

HELP!!What Is The Volume Of The Rectangular Prism?2 Inches8 Inches4 InchesA14 Cubic InchesB112 Cubic

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Introduction to Rectangular Prisms

Understanding the concept of volume is essential in geometry and real-life applications such as packaging, construction, and storage. The rectangular prism, also known as a cuboid, is a three-dimensional shape with six rectangular faces. Calculating its volume helps determine how much space it occupies. In this article, we will explore how to find the volume of a rectangular prism with specific dimensions and analyze the options provided to determine the correct answer.

What Is a Rectangular Prism?

Definition and Characteristics

A rectangular prism is a solid shape with:

- Six rectangular faces
- Opposite faces that are congruent
- Edges that meet at right angles
- Three dimensions: length, width, and height

Common Examples

- A box or carton
- A brick
- A book

1. Rectangular shape facilitates easy calculation of volume
2. Used extensively in storage and packaging industries

Understanding the Dimensions Provided

The problem provides the dimensions of a rectangular prism as:

- Length: 2 inches
- Width: 8 inches
- Height: 4 inches

Additionally, there are options for the volume:

- A) 14 cubic inches
- B) 112 cubic inches

But before selecting an answer, we need to understand how to compute the volume of such a shape.

Calculating the Volume of a Rectangular Prism

The Formula

The volume (V) of a rectangular prism is calculated using the formula:

$$V = \text{length} \times \text{width} \times \text{height}$$

Where:

- Length (l)
- Width (w)
- Height (h)

Applying the Dimensions

Given:

- $l = 2$ inches
- $w = 8$ inches
- $h = 4$ inches

Calculating:

$$V = 2 \times 8 \times 4$$

Step-by-step:

1. Multiply length and width:

$$2 \times 8 = 16$$

2. Multiply the result by height:

$[16 \times 4 = 64]$

Therefore, the volume of the rectangular prism is 64 cubic inches.

Analyzing the Provided Options

The options given are:

- A) 14 cubic inches
- B) 112 cubic inches

Our calculated volume (64 cubic inches) does not match either option directly. This discrepancy indicates that there might be an error in the options or some additional context missing.

Possible Explanations for the Discrepancy

1. Typographical Error

- Perhaps the options are incorrectly listed or mistyped.
- The correct volume, based on the calculations, should be 64 cubic inches.

2. Different Dimensions or Units

- Maybe the dimensions provided are not all correct, or units are inconsistent.
- Verify if the dimensions are accurately interpreted.

3. Alternative Volume Calculation

- Could there be an additional factor or a different interpretation?

Reevaluating the Options in Context

Given the straightforward calculation, the volume is clearly 64 cubic inches. Since neither option A nor B matches, it suggests:

- The options provided are possibly incorrect.
- The correct answer is not listed.

However, among the options:

- Option A: 14 cubic inches – too small compared to our calculated volume.
- Option B: 112 cubic inches – larger and closer to twice the calculated volume.

If, hypothetically, the dimensions were different, for example:

- Length: 2 inches
- Width: 8 inches
- Height: 7 inches

Then:

$$V = 2 \times 8 \times 7 = 112$$

which matches option B.

Therefore, if the height was 7 inches instead of 4 inches, the volume would be 112 cubic inches.

Conclusion and Final Thoughts

Based on the initial dimensions provided (2 inches, 8 inches, 4 inches), the correct volume of the rectangular prism is 64 cubic inches. This calculation is straightforward using the volume formula for rectangular prisms. The options provided—14 and 112 cubic inches—do not align with the calculated value, suggesting potential errors or misprints.

Key takeaways:

- Always verify the dimensions and units before calculations.
- Use the formula $V = l \times w \times h$ for rectangular prisms.
- If options do not match your calculations, recheck the problem statement and given data.

In summary:

- For the given dimensions (2, 8, 4 inches), the volume is 64 cubic inches.
- If the height was 7 inches, the volume would be 112 cubic inches, matching option B.
- The provided options may contain errors or require clarification.

Understanding how to compute the volume accurately is fundamental in geometry, and recognizing discrepancies helps improve problem-solving skills. Always double-check your data and calculations to arrive at the correct answer.

Frequently Asked Questions

How do I find the volume of a rectangular prism with dimensions 2 inches, 8 inches, and 4 inches?

Multiply the length, width, and height: $2 \times 8 \times 4 = 64$ cubic inches.

What is the correct volume of a rectangular prism measuring 2 inches by 8 inches by 4 inches?

The volume is 64 cubic inches.

Why is the volume of the rectangular prism 64 cubic inches, and not 14 or 112?

Because volume is calculated by multiplying all three dimensions: $2 \times 8 \times 4 = 64$. The options 14 and 112 are incorrect based on this calculation.

Can the volume of the rectangular prism be 14 cubic inches?

No, because 14 cubic inches would require dimensions that multiply to 14, which doesn't match the given measurements.

Is 112 cubic inches the volume of the prism with these dimensions?

No, since $2 \times 8 \times 4$ equals 64, not 112. 112 would correspond to different dimensions.

What formula do I use to find the volume of a rectangular prism?

Use the formula: Volume = length $\times$ width $\times$ height.

If the options are A: 14 cubic inches and B: 112 cubic inches, which one is correct for these

dimensions?

Neither; the correct volume is 64 cubic inches, which isn't listed among the options.

How do I verify the volume calculation for a rectangular prism?

Multiply the three measurements: 2 inches, 8 inches, and 4 inches to get the volume (64 cubic inches).

Additional Resources

Volume of a Rectangular Prism: A Comprehensive Guide

Understanding the volume of a rectangular prism is fundamental in various fields—from basic geometry to real-world applications like packaging, construction, and manufacturing. In this article, we will dissect the concept of volume, walk through calculations with specific dimensions, explore common misconceptions, and provide expert insights to help you master this essential geometric measurement.

What Is a Rectangular Prism?

A rectangular prism—also known as a rectangular box—is a three-dimensional shape characterized by six rectangular faces. It has length, width, and height, making it a versatile shape in both mathematical theory and practical use.

Features of a Rectangular Prism:

- Faces: 6 rectangular faces
- Edges: 12 edges
- Vertices: 8 vertices
- Dimensions: Length (L), Width (W), Height (H)

This shape's defining property is that all its faces are rectangles, which simplifies volume calculations and surface area assessments.

Understanding Volume: The Basic Concept

Volume refers to the amount of space occupied within a three-dimensional object. For a rectangular prism, calculating volume involves understanding the relationship between its dimensions.

Why Is Volume Important?

- Determines how much space an object takes up.
- Critical for storage, shipping, manufacturing.
- Used in calculating capacity in containers, tanks, and rooms.

Mathematically, the volume (V) of a rectangular prism is calculated as:

$$V = L \times W \times H$$

where:

- (L) = Length
- (W) = Width
- (H) = Height

This formula applies because the volume of a rectangular prism is essentially the product of its three dimensions.

Calculating the Volume: Step-by-Step Example

Let’s consider the specific dimensions provided:

- Length = 8 inches
- Width = 4 inches
- Height = 2 inches

Step 1: Identify Dimensions

Dimension	Value
Length	8 in
Width	4 in
Height	2 in

Step 2: Apply the Volume Formula

$$V = L \times W \times H$$

$$V = 8 \text{ in} \times 4 \text{ in} \times 2 \text{ in}$$

Step 3: Perform the Calculation

$$V = (8 \times 4) \times 2 = 32 \times 2 = 64 \text{ cubic inches}$$

Result: The volume of this rectangular prism is 64 cubic inches.

Analyzing the Given Options

The problem statement mentions options for the volume:

- A) 14 Cubic Inches
- B) 112 Cubic Inches

However, based on our calculations, the volume is 64 cubic inches, which is not among the listed options. This discrepancy suggests a need to verify the dimensions or check for potential errors or misinterpretations.

Possible reasons for the mismatch:

- The dimensions provided (2 inches, 8 inches, 4 inches) may have been incorrectly associated with the options.
- The options might correspond to different dimensions or a different problem altogether.

Let's verify calculations with the given options:

- Option A (14 cubic inches):

To get 14 cubic inches from three dimensions, factors would need to multiply to 14, such as $(2 \times 7 \times 1)$, which doesn't match the provided dimensions.

- Option B (112 cubic inches):

To reach 112 cubic inches:

$(8 \times 4 \times 3.5 = 112)$

But since the provided dimensions are 2, 8, and 4 inches, their product is 64, not 112.

Understanding the Correct Calculation and Its Implications

Given the detailed calculation, the correct volume based on the provided

dimensions (2 in, 8 in, 4 in) is 64 cubic inches. Therefore, neither option A nor B aligns with the accurate calculation, indicating a possible typo or misprint in the options.

Additional Insights and Common Mistakes

When calculating the volume of a rectangular prism, it's essential to:

- Double-check dimensions: Make sure all measurements are accurate and in the correct units.
- Use consistent units: All dimensions should be in the same units (inches, centimeters, etc.).
- Apply the formula correctly: Multiply all three dimensions; avoid adding or subtracting.

Common Mistakes Include:

- Using only two dimensions instead of three.
- Confusing surface area with volume.
- Mixing units (e.g., inches with centimeters) without converting.

Real-World Applications and Importance of Accurate Volume Calculation

Understanding and accurately calculating the volume of a rectangular prism has practical implications, such as:

- Packaging: Ensuring boxes can contain specific items.
- Storage Planning: Calculating total capacity of storage containers.
- Manufacturing: Designing components with precise volume specifications.
- Fluid Dynamics: Estimating the capacity of tanks or reservoirs.

For example, if a shipping box measures 8 inches by 4 inches by 2 inches, knowing it can hold approximately 64 cubic inches of material helps in planning logistics and storage.

Summary and Final Thoughts

- The volume of a rectangular prism is calculated by multiplying its length, width, and height.
- For the given dimensions (2 inches, 8 inches, 4 inches), the volume is 64 cubic inches.
- Discrepancies in multiple-choice options highlight the importance of verifying calculations and understanding the problem context.
- Accurate measurement and calculation are vital across industries, from packaging to architecture.

In essence, mastering the calculation of volume for rectangular prisms empowers you to make informed decisions in everyday tasks and professional projects alike. Whether designing a product, organizing storage, or solving geometric puzzles, this fundamental skill provides a solid foundation for spatial reasoning and practical problem-solving.

Remember: Always verify your dimensions, use the correct formula, and double-check your calculations to ensure accuracy in your volume assessments. The key to success lies in attention to detail and a clear understanding of the underlying principles.

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