

The Height Of A Cylinder Shaped Storage Container Is 8.7 Inches And The Diameter Is 6 Inches . What Is

The Height Of A Cylinder Shaped Storage Container Is 8.7 Inches And The Diameter Is 6 Inches . What Is a common question that arises when considering storage solutions, whether for organizing household items, laboratory materials, or commercial products. Understanding the dimensions of a cylindrical container is essential for determining its capacity, fitting it into designated spaces, or assessing its suitability for specific uses. In this article, we will explore the geometric properties of cylindrical storage containers, how to calculate their volume and surface area, and practical applications of these calculations to help you make informed decisions.

Understanding the Dimensions of a Cylinder

What Are the Key Measurements?

A cylinder's size is primarily defined by two measurements:

- **Height (h):** The distance from the base to the top of the cylinder.
- **Diameter (d):** The distance across the circular base passing through the center.

In our case, the container has:

- Height, $h = 8.7$ inches
- Diameter, $d = 6$ inches

From the diameter, we can find the radius (r), which is half of the diameter:

- Radius, $r = d/2 = 6/2 = 3$ inches

Understanding these dimensions allows us to perform various calculations, such as volume and surface area, which are crucial for evaluating storage capacity and material requirements.

Calculating the Volume of the Cylinder

Why Is Volume Important?

The volume of a cylindrical container tells us how much space it can hold. This measurement is vital for inventory planning, storage efficiency, and ensuring the container meets specific capacity needs.

Formula for Volume

The volume (V) of a cylinder is given by the formula:

$$V = \pi r^2 h$$

where:

- π is approximately 3.1416
- r is the radius of the base
- h is the height of the cylinder

Calculating the Volume

Given:

- $r = 3$ inches
- $h = 8.7$ inches

Plugging into the formula:

$$V = 3.1416 \times (3)^2 \times 8.7$$

$$V = 3.1416 \times 9 \times 8.7$$

$$V = 3.1416 \times 78.3$$

$$V \approx 246.0 \text{ cubic inches}$$

Thus, the storage container can hold approximately 246 cubic inches of material.

Practical Implications of the Volume

- Converting to other units: To better understand, convert cubic inches to liters or gallons.
- 1 cubic inch $\approx$ 0.016387 liters
- Volume in liters: $246 \times 0.016387 \approx 4.03$ liters
- 1 gallon $\approx$ 16.387 liters
- Volume in gallons: $4.03 / 16.387 \approx 0.246$ gallons
- Application: This container can hold roughly 4 liters or about one-quarter of a gallon, suitable for small storage needs.

Calculating the Surface Area of the Cylinder

Why Surface Area Matters

Surface area calculations are important for estimating material costs, coating requirements, or cleaning surface exposure.

Surface Area Formula

The total surface area (A) of a cylinder is:

$$A = 2\pi r^2 + 2\pi r h$$

where:

- $2\pi r^2$ accounts for the top and bottom circles
- $2\pi r h$ accounts for the side (lateral surface area)

Calculating the Surface Area

Using previous values:

- $r = 3$ inches
- $h = 8.7$ inches

Calculate each part:

- Top and bottom area:

$$2 \times 3.1416 \times 3^2 = 2 \times 3.1416 \times 9 = 56.5488 \text{ sq. inches}$$

- Lateral surface area:

$$2 \times 3.1416 \times 3 \times 8.7 = 2 \times 3.1416 \times 26.1 \approx 164.0 \text{ sq. inches}$$

Total surface area:

$$A = 56.55 + 164.0 = 220.55 \text{ square inches}$$

Interpretation: To coat, paint, or insulate the container, approximately 220.55 square inches of material would be needed.

Design Considerations for Cylinder-Shaped Storage Containers

Material Selection

Depending on the intended use, material choices vary:

- **Plastic:** Lightweight, corrosion-resistant, suitable for food or chemical storage.
- **Metal:** Durable, often used in industrial settings.
- **Glass:** Transparent, ideal for laboratory or display purposes.

Manufacturing Factors

Designing a container involves:

1. Ensuring structural integrity based on wall thickness.
2. Considering ease of handling and stacking.
3. Incorporating features like lids or handles.

Capacity vs. Space Efficiency

While a larger volume offers more storage, it also requires more space. Balancing these factors depends on application needs.

Practical Applications and Examples

Household Storage

A cylinder with an 8.7-inch height and 6-inch diameter can store:

- Craft supplies like yarn or fabric
- Small toys or collectibles
- Kitchen ingredients like rice or flour in bulk

Laboratory Use

In labs, such containers are useful for:

- Holding chemical reagents
- Sample storage

- Mixing small quantities of solutions

Industrial and Commercial Use

For manufacturing or shipping:

- Bulk packaging of powders
- Storage of small parts or hardware
- Transporting liquids with proper sealing

Summary: Key Takeaways

- The container's dimensions (8.7 inches tall and 6 inches in diameter) define its capacity and surface area.
- Its volume is approximately 246 cubic inches (about 4 liters).
- Its surface area is roughly 220.55 square inches, relevant for material considerations.
- Understanding these measurements helps in assessing suitability for various storage needs, optimizing space, and estimating costs.

Conclusion

Knowing how to analyze the dimensions of a cylindrical storage container provides valuable insights into its capacity and physical properties. Whether you are designing new storage solutions, evaluating existing containers, or planning for manufacturing, mastering these calculations is essential. The dimensions you provided—8.7 inches in height and a 6-inch diameter—offer a compact yet versatile volume suitable for many applications. By applying basic geometric formulas, you can determine the volume, surface area, and material requirements, ensuring your storage needs are met efficiently and effectively.

If you want to explore further, consider how variations in height or diameter impact capacity, or how different materials influence the design and usability of your cylindrical containers. Understanding these principles empowers you to make smarter choices in storage and design projects.

Frequently Asked Questions

What is the volume of a cylinder with a height of 8.7 inches and a diameter of 6 inches?

The volume is approximately 98.2 cubic inches, calculated using $V = \pi r^2 h$, where $r = 3$ inches, so $V \approx 3.1416 \times 9 \times 8.7 \approx 245.2$ cubic inches.

How do you find the radius of a cylinder with a diameter of 6 inches?

The radius is half the diameter, so $r = 6 \div 2 = 3$ inches.

What is the surface area of the cylinder described?

The surface area is approximately 157.08 square inches, calculated as $A = 2\pi r(h + r) = 2 \times 3.1416 \times 3 \times (8.7 + 3) \approx 157.08$ sq in.

How does the height of 8.7 inches affect the storage capacity of the cylinder?

A taller height increases the volume, thus allowing the container to store more material; with 8.7 inches height, the capacity is around 98.2 cubic inches.

If the diameter of the cylinder is increased to 8 inches while keeping the height at 8.7 inches, what is the new volume?

The new volume would be approximately 174.5 cubic inches, since $r = 4$ inches, $V = \pi \times 4^2 \times 8.7 \approx 3.1416 \times 16 \times 8.7 \approx 174.5$ in³.

What is the importance of knowing the height and diameter of a storage container?

These measurements help determine the container's capacity, fit within storage spaces, and suitability for specific storage needs.

Can you calculate the lateral surface area of the cylinder with the given dimensions?

Yes, the lateral surface area is approximately 164.04 square inches, calculated as $L = 2\pi rh = 2 \times 3.1416 \times 3 \times 8.7 \approx 164.04$ sq in.

What are practical uses for a storage container with these dimensions?

Such a container can be used for storing liquids, grains, or small items, especially when space is limited and specific capacity is needed.

Additional Resources

The Height Of A Cylinder Shaped Storage Container Is 8.7 Inches And The Diameter Is 6 Inches. What Is – this question often arises when assessing storage capacity, determining material needs, or simply understanding the dimensions of a cylindrical container. Whether you're a student working on a math problem, a manufacturer designing a product, or a DIY enthusiast planning a project, understanding how to interpret and utilize these measurements is essential. In this comprehensive guide, we will explore how to analyze the given dimensions, calculate various properties such as volume and surface area, and understand their practical implications.

Understanding the Dimensions of a Cylindrical Storage Container

Before diving into calculations, it's important to clearly understand the key dimensions provided:

- Height (h): 8.7 inches
- Diameter (d): 6 inches

From the diameter, we can easily find the radius:

- Radius (r): $d / 2 = 6 / 2 = 3$ inches

Knowing the height and radius allows us to compute important properties like volume, surface area, and even discuss manufacturing considerations.

Calculating the Volume of the Cylinder

Why is Volume Important?

The volume of a storage container indicates how much material or substance it can hold. This is crucial for determining capacity, ordering the right size, or estimating storage efficiency.

The Formula for the Volume of a Cylinder

The volume (V) of a cylinder is given by:

$$V = \pi r^2 h$$

Where:

- (r) = radius of the base
- (h) = height
- $(\pi) \approx 3.1416$

Step-by-Step Calculation

Using the provided dimensions:

- $r = 3$ inches
- $h = 8.7$ inches

Plug into the formula:

$$V = 3.1416 \times (3)^2 \times 8.7$$

Calculate (r^2) :

$$3^2 = 9$$

Multiply:

$$V = 3.1416 \times 9 \times 8.7$$

Calculate (3.1416×9) :

$$3.1416 \times 9 \approx 28.2744$$

Now multiply by 8.7:

$$28.2744 \times 8.7 \approx 246.0581$$

Result:

The volume of the cylinder is approximately 246.06 cubic inches.

Practical Implications

- This volume tells you the maximum capacity of the container.
- If measuring liquids, this helps determine how much liquid can be stored or transported.
- For solid materials, it indicates how much material the container can hold before overflowing.

Calculating the Surface Area of the Cylinder

Why Surface Area Matters

Surface area indicates the amount of material needed to manufacture the container, the amount of coating or paint required, and can influence insulation or thermal properties.

Surface Area Formula

The total surface area (A) of a cylinder is:

$$A = 2\pi r^2 + 2\pi r h$$

Where:

- $(2\pi r^2)$ accounts for the top and bottom circles
- $(2\pi r h)$ accounts for the lateral surface (the side)

Step-by-Step Calculation

Using the known dimensions:

$$A = 2 \times 3.1416 \times 3^2 + 2 \times 3.1416 \times 3 \times 8.7$$

Calculate each component:

1. Top and bottom area:

$$2 \times 3.1416 \times 9 = 2 \times 28.2744 = 56.5488$$

2. Lateral surface area:

$$2 \times 3.1416 \times 3 \times 8.7 \approx 2 \times 3.1416 \times 3 \times 8.7$$

$$\text{Calculate } (3.1416 \times 3 = 9.4248)$$

Then multiply:

$$2 \times 9.4248 \times 8.7 \approx 2 \times 81.964 \approx 163.928$$

Add both parts:

$$[$$

$A \approx 56.5488 + 163.928 \approx 220.477$
\\]

Result:

The surface area is approximately 220.48 square inches.

Additional Considerations for Practical Use

Material Selection and Manufacturing

Knowing both the volume and surface area helps in choosing appropriate materials and estimating costs:

- Material quantity: For plastic, metal, or glass, calculate how much raw material is needed based on surface area.
- Cost estimation: Thicker materials or special coatings increase costs; understanding surface area supports accurate budgeting.

Transportation and Storage

- Weight estimation: With the material density known, you can estimate the weight of the container.
- Stacking and space planning: Knowing the dimensions helps optimize storage space and stacking arrangements.

Design Adjustments

- If the container needs to fit into a specific space, adjusting height or diameter might be necessary.
- To increase capacity, increasing height or radius are options, each affecting the surface area and material use differently.

Summary of Key Calculations

Property	Calculation Result	Explanation
Radius (r)	3 inches	Half of the diameter
Volume (V)	approximately 246.06 in³	Maximum storage capacity
Surface Area (A)	approximately 220.48 in²	Material surface for manufacturing or coating

Final Thoughts

Understanding the dimensions of a cylinder—height and diameter—allows for comprehensive analysis of its capacity, manufacturing needs, and practical applications. The calculations provided serve as a foundation for various engineering, design, and logistical tasks. Whether you're planning a storage solution, designing a new product, or solving a math problem, mastering these formulas and their implications is invaluable.

In conclusion, when asked about the height of a cylinder-shaped storage container being 8.7 inches and the diameter being 6 inches, the key is to translate these measurements into meaningful properties like volume and surface area. Armed with these calculations, you can make informed decisions about its use, manufacture, or integration into larger systems.

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