# Volume of a Right Circular Cylinder

## Understanding of Volume of a Right Circular Cylinder

- A right circular cylinder is a solid with two identical circular bases placed one exactly above the other and connected by a curved surface.
- The volume of a cylinder measures the space enclosed within it.
- Volume depends on the area of the circular base and the height between the two bases.

### **Important Points**

- Volume of a cylinder =  $\pi r^2 h$ .
- r = radius of the base, h = height of the cylinder.
- Use  $\pi = \frac{22}{7}$  or  $\pi = 3.14$  as per the given instruction.
- Volume is always expressed in cubic units like cm<sup>3</sup>, m<sup>3</sup>.
- Make sure the radius and height are in the same unit before calculating.

## **Examples with Solutions**

#### **Example: Basic Volume Calculation**

#### > Find the volume of a cylinder with radius 5 cm and height 10 cm.

**Solution:** Volume =  $\pi r^2 h = \frac{22}{7} \times 5 \times 5 \times 10$ 

$$= \frac{22}{7} \times 25 \times 10$$
$$= \frac{2200}{7} \approx 314.29 \text{ cm}^3$$

## Example: Volume with Different $\pi$ Value

> Find the volume of a cylinder with radius 4 cm and height 7 cm taking  $\pi$  = 3.14.

**Solution:** Volume =  $3.14 \times 4 \times 4 \times 7$ 

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## Example: Finding Height When Volume and Radius are Given

## $\succ$ The volume of a cylinder is 616 cm<sup>3</sup> and the radius is 7 cm. Find its height.

**Solution:** Volume =  $\pi r^2 h$ 

$$616 = \frac{22}{7} \times 7 \times 7 \times h$$
  
 $616 = 154h$   
 $h = \frac{616}{154} = 4 \text{ cm}$ 

#### **Example: Volume with Fractional Dimensions**

> Find the volume of a cylinder with radius  $\frac{3}{2}$  m and height 5 m.

Solution: Volume = 
$$\pi r^2 h = \frac{22}{7} \times \left(\frac{3}{2}\right) \times \left(\frac{3}{2}\right) \times 5$$
  
=  $\frac{22}{7} \times \frac{9}{4} \times 5$   
=  $\frac{22 \times 9 \times 5}{7 \times 4} = \frac{990}{28} \approx 35.36 \text{ m}^3$ 

#### **Example: Compare Volumes of Two Cylinders**

Cylinder A has radius 3 cm and height 7 cm. Cylinder B has radius 2 cm and height 9 cm. Which cylinder has greater volume?

Volume of A = 
$$\frac{22}{7} \times 3 \times 3 \times 7 = \frac{22}{7} \times 9 \times 7 = 198 \text{ cm}^3$$
  
Volume of B =  $\frac{22}{7} \times 2 \times 2 \times 9 = \frac{22}{7} \times 4 \times 9 = \frac{22}{7} \times 36 = 113.14 \text{ cm}^3$ 

Answer: Cylinder A has greater volume.

#### **Summary Points**

- Volume of a right circular cylinder =  $\pi r^2 h$ .
- Always ensure radius and height are in the same units.
- Use  $\frac{22}{7}$  if radius is multiple of 7, otherwise use 3.14 for  $\pi$ .
- Volume tells how much space is inside the cylinder.
- Final answer should always be in cubic units.