Understanding of Total Surface Area of a Right Circular Cylinder

- A right circular cylinder has two flat circular faces (top and bottom) and one curved surface.

- The total surface area (TSA) of a cylinder includes the area of both circular bases and the curved surface area.

- TSA gives the total outer area that needs to be covered if the cylinder is wrapped or painted.
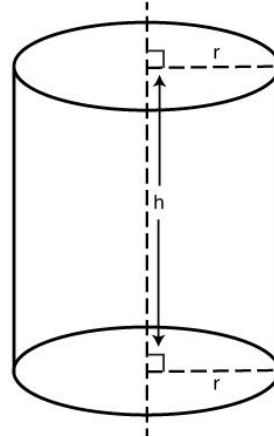
Formula:

$$\text{Volume (V)} = \pi r^2 h$$

here,

$\pi = \dfrac{22}{7} = 3.141,$

r = radius, h = height

Important Points

- Curved Surface Area (CSA) = $2\pi rh$.

- Area of each circular base = πr^2.

- Total Surface Area (TSA) = $2\pi r(h + r)$.

- π can be taken as $\dfrac{22}{7}$ or 3.14 depending on the question.

- TSA is always expressed in square units like cm², m².

Examples with Solutions

Example: Find TSA with Simple Values

➢ **Find the total surface area of a cylinder with radius 7 cm and height 10 cm.**

Solution: TSA = $2\pi r(h + r)$ = $2 \times \dfrac{22}{7} \times 7 \times (10 + 7)$ = $2 \times \dfrac{22}{7} \times 7 \times 17$ = $2 \times 22 \times 17$ = 748 cm²

Example: TSA Using π = 3.14

➢ **Find the total surface area of a cylinder of radius 5 cm and height 12 cm using π = 3.14.**

Solution: TSA = $2 \times 3.14 \times 5 \times (12 + 5)$ = $2 \times 3.14 \times 5 \times 17$ = 534.8 cm²

Example: Find Radius When TSA is Given

> **The total surface area of a cylinder is 528 cm² and height is 10 cm. Find the radius.**

Solution: TSA = 2πr(h + r)

$528 = 2 \times \frac{22}{7} \times r \times (10 + r)$

Solve step-by-step to find r ≈ 6 cm

Example: TSA with Fractional Dimensions

> **Find the TSA of a cylinder with radius $\frac{3}{2}$ m and height 5 m using π = $\frac{22}{7}$.**

Solution: TSA = $2 \times \frac{22}{7} \times \frac{3}{2} \times \left(5 + \frac{3}{2}\right)$

$$= \frac{22}{7} \times 3 \times \left(\frac{13}{2}\right)$$

$$= \frac{22 \times 3 \times 13}{14} = \frac{858}{14} \approx 61.29 \text{ m}^2$$

Example: Compare TSA of Two Cylinders

> **Cylinder A has radius 4 cm and height 6 cm. Cylinder B has radius 3 cm and height 8 cm. Which has greater TSA?**

TSA of A = 2πr(h + r)

$$= 2 \times \frac{22}{7} \times 4 \times (6 + 4)$$

$$= 2 \times \frac{22}{7} \times 4 \times 10 = 251.43 \text{ cm}^2$$

TSA of B = $2 \times \frac{22}{7} \times 3 \times (8 + 3)$

$$= 2 \times \frac{22}{7} \times 3 \times 11 = 207.43 \text{ cm}^2$$

Answer: Cylinder A has greater TSA.

Summary Points

- TSA of a right circular cylinder = 2πr(h + r).
- Always add height and radius before multiplying.
- Use same units for radius and height.
- Express final answer in square units.
- TSA includes both circular ends and curved surface area.