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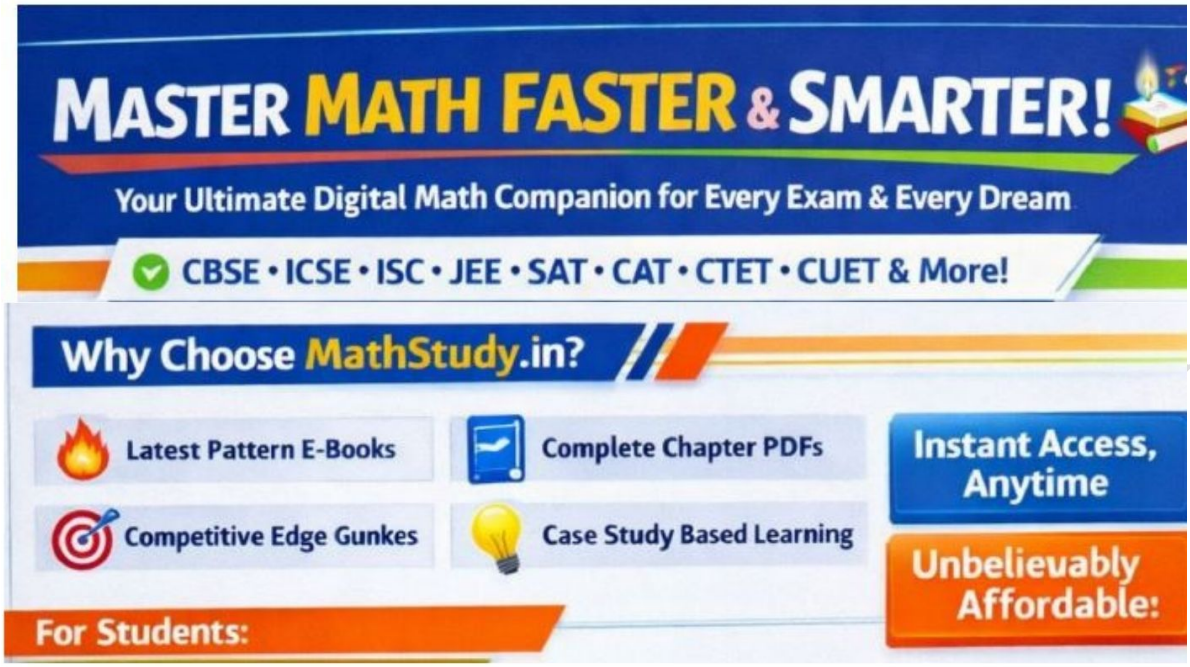

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CHAPTER TEST: SURFACE AREAS AND VOLUMES

Mathematics | Class IX (2026/SAV/09/NCERT/001)

Section A: Multiple Choice Questions (1 Mark Each)

1. **(d)** $\frac{32}{3}\pi r^3$
   Radius $= 2r$. Volume $= \frac{4}{3}\pi(2r)^3 = \frac{4}{3}\pi(8r^3) = \frac{32}{3}\pi r^3$.

2. **(b)** $\pi r(l + \frac{r}{4})$
   TSA $= \pi R(L + R)$. Here $R = \frac{r}{2}$ and $L = 2l$.
   TSA $= \pi(\frac{r}{2})(2l + \frac{r}{2}) = \pi r(l + \frac{r}{4})$.

3. **(c) Same**
   $CSA = 2\pi rh$. New $R = 2r$, New $H = \frac{h}{2}$.
   New $CSA = 2\pi(2r)(\frac{h}{2}) = 2\pi rh$.

4. **(a)** $512\,\mathbf{cm}^3$
   LSA $= 4a^2 = 256 \implies a^2 = 64 \implies a = 8$ cm.
   Volume $= a^3 = 8^3 = 512\,\text{cm}^3$.

5. **(a)** $1 : 1$
   Sphere area $= 4\pi r^2$. Cylinder height $h = 2r$.
   Cylinder CSA $= 2\pi rh = 2\pi r(2r) = 4\pi r^2$. Ratio $= 1 : 1$.

Section B: Short Answer Questions (2 Marks Each)

6. Radius $r = 10$ cm.
   TSA of hemisphere $= 3\pi r^2 = 3 \times 3.14 \times (10)^2 = 3 \times 3.14 \times 100 = \mathbf{942}\,\text{cm}^\mathbf{2}$.

7. $r = 2.1$ cm, $h = 20$ cm. Slant height $l = \sqrt{r^2 + h^2} = \sqrt{4.41 + 400} = \sqrt{404.41} \approx 20.11$ cm.
   CSA of cob $= \pi rl = \frac{22}{7} \times 2.1 \times 20.11 = 6.6 \times 20.11 = 132.726\,\text{cm}^2$.
   Number of grains $= 132.726 \times 4 \approx \mathbf{531}$ grains.

8. Volume $= \frac{4}{3}\pi r^3 = 38808$.
   $r^3 = \frac{38808 \times 3 \times 7}{4 \times 22} = 441 \times 21 = 9261 \implies \mathbf{r = 21}$ cm.
   Surface Area $= 4\pi r^2 = 4 \times \frac{22}{7} \times 21 \times 21 = \mathbf{5544}\,\text{cm}^\mathbf{2}$.

9. Vol. of sphere = Vol. of cone. Sphere radius $R = 1.5$ cm.
   $\frac{4}{3}\pi(1.5)^3 = \frac{1}{3}\pi r^2(3) \implies 4 \times 3.375 = 3r^2 \implies 13.5 = 3r^2 \implies r^2 = 4.5$.
   $\mathbf{r} = \sqrt{\mathbf{4.5}} \approx \mathbf{2.12}$ cm.

Section C: Long Answer Questions (4 Marks Each)

10. Inner $r = 100$ cm, thickness $= 1$ cm, Outer $R = 101$ cm.
    Vol. of iron $= \frac{2}{3}\pi(R^3 - r^3) = \frac{2}{3} \times \frac{22}{7} \times (101^3 - 100^3) = \frac{44}{21} \times (1030301 - 1000000)$.
    Vol. $= \frac{44 \times 30301}{21} = \mathbf{63487.8}\,\text{cm}^\mathbf{3}$ (or $0.0635\,\text{m}^3$).

11. $CSA = 2\pi rh = 2 \times \frac{22}{7} \times 7 \times 10 = 440\,\text{m}^2$.
    Cost $= 440 \times 4 =$ Rs **1760**.
    Volume $= \pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 10 = 1540\,\text{m}^3$.
    Capacity in Litres $= 1540 \times 1000 = \mathbf{15,40,000}$ Litres.

12. **Case 1 (about 3cm):** $r = 4, h = 3$. $V_1 = \frac{1}{3}\pi(4^2)(3) = 16\pi$.
    Case 2 (about 4cm): $r = 3, h = 4$. $V_2 = \frac{1}{3}\pi(3^2)(4) = 12\pi$.
    Difference $= 16\pi - 12\pi = 4\pi = 4 \times 3.14 = \mathbf{12.56}\,\text{cm}^\mathbf{3}$.

13. Vol. when full $= 15.625\,\text{m}^3 \implies a^3 = 15.625 \implies a = 2.5$ m.
    Current volume = Base Area $\times$ Depth $= (2.5 \times 2.5) \times 1.3 = 6.25 \times 1.3 = 8.125\,\text{m}^3$.
    Volume used $= 15.625 - 8.125 = \mathbf{7.5}\,\text{m}^\mathbf{3}$.

Section D: NCERT Highlights (1 Mark Each)

1. $1 : 3$
2. $\sqrt{l^2 + b^2 + h^2}$
3. 9 (Since area $\propto r^2$, $3^2 = 9$)
4. 1000