

MATHEMATICS • CLASS 10

CHAPTER 12

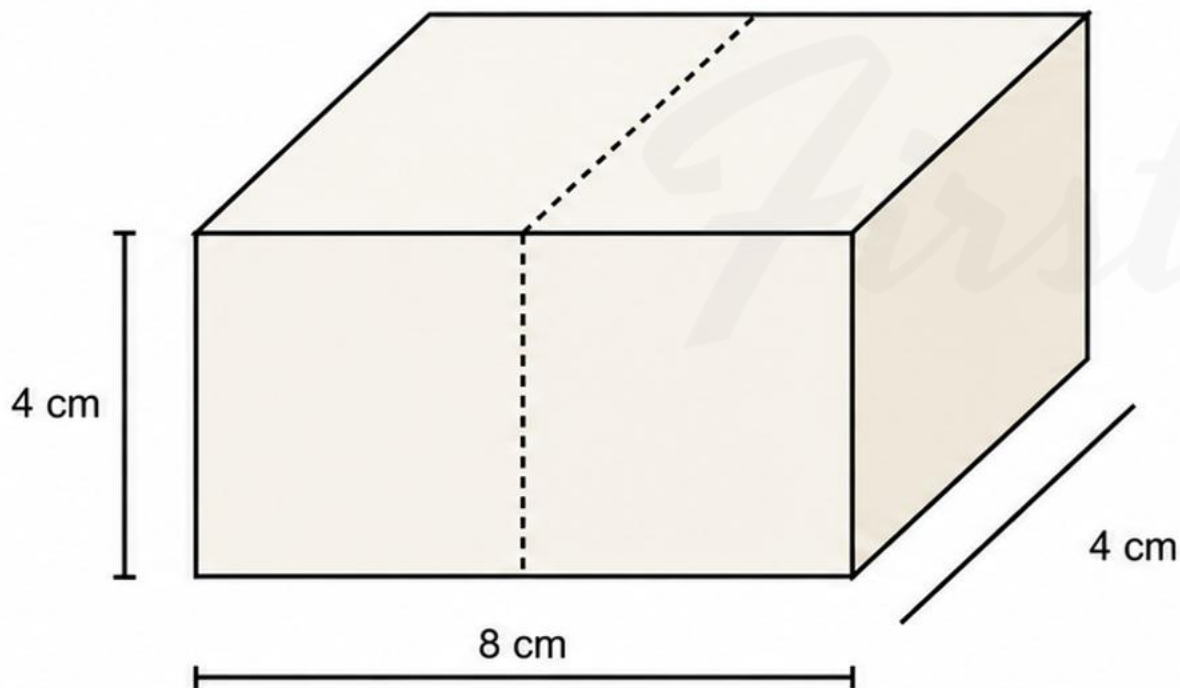
Surface Areas and Volumes

NCERT SOLUTIONS



EXERCISE 12.1 — Q1

- Q1. Two cubes, each of volume 64 cm^3 , are joined end to end.
Find the surface area of the resulting cuboid.



Not to scale.

Let each cube have edge a cm.

$$a^3 = 64 \Rightarrow a = 4 \text{ cm}$$

The joined cuboid has:

$$\text{length} = 4 + 4 = 8 \text{ cm}$$

$$\text{breadth} = 4 \text{ cm}; \text{ height} = 4 \text{ cm}.$$

$$\begin{aligned} \text{Surface area} &= 2(lb + bh + hl) \\ &= 2(8 \times 4 + 4 \times 4 + 4 \times 8) \\ &= 2(32 + 16 + 32) \\ &= 160 \text{ cm}^2. \end{aligned}$$

The two joined faces are inside, so they are not exposed.

Answer: 160 cm^2 .

EXERCISE 12.1 — Q.2

Q2. A vessel is a hollow hemisphere with a hollow cylinder on top. The hemisphere's diameter is 14 cm and the vessel's total height is 13 cm. Find its inner surface area. Use $\pi = \frac{22}{7}$.

$$\text{Radius } r = \frac{14}{2} = 7 \text{ cm}$$

$$\text{Hemisphere height} = r = 7 \text{ cm}$$

$$\text{Cylinder height } h = 13 - 7 = 6 \text{ cm}$$

The open top has no circular base to include.

Inner area = curved area of cylinder + curved area of hemisphere

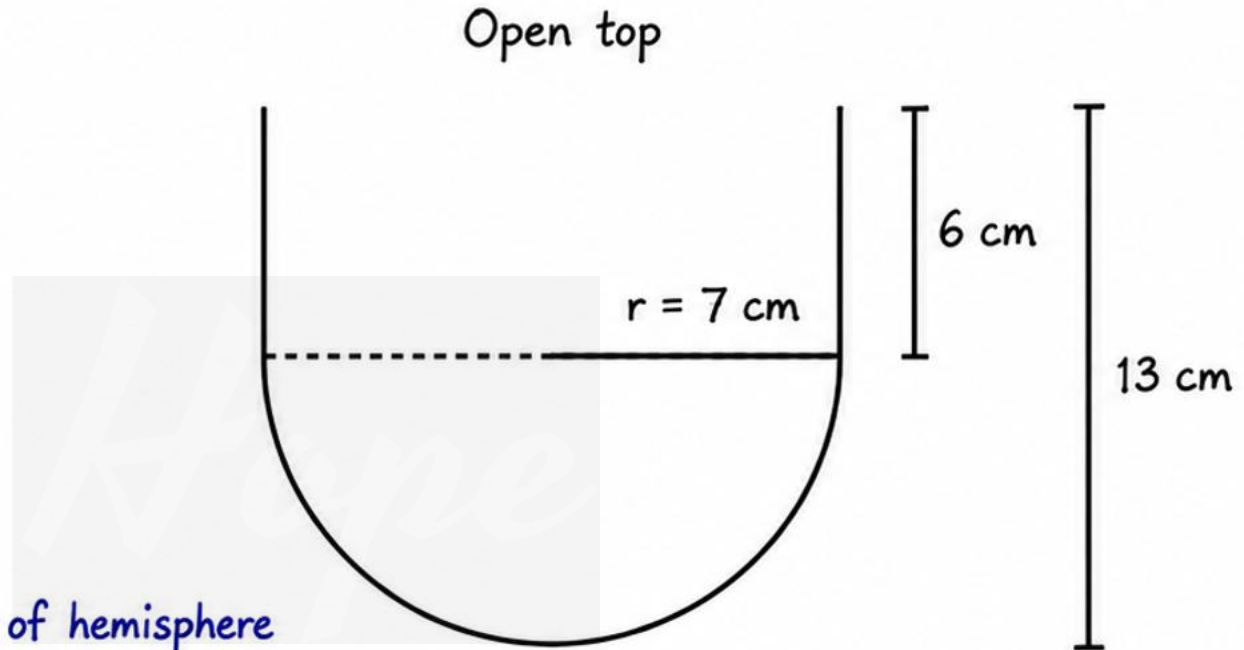
$$= 2\pi rh + 2\pi r^2$$

$$= 2\pi r(h + r)$$

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

$$= 572 \text{ cm}^2.$$

Answer: 572 cm².



Axial section (not to scale).

EXERCISE 12.1 — Q3

Q3. A toy is a cone of radius 3.5 cm mounted on a hemisphere of the same radius. Its total height is 15.5 cm. Find its total surface area.

Use $\pi = \frac{22}{7}$.

Radius $r = 3.5$ cm

Cone height $h = 15.5 - 3.5 = 12$ cm

Slant height $l = \sqrt{h^2 + r^2}$
 $= \sqrt{12^2 + 3.5^2} = \sqrt{156.25} = 12.5$ cm

The common circular face is hidden inside.

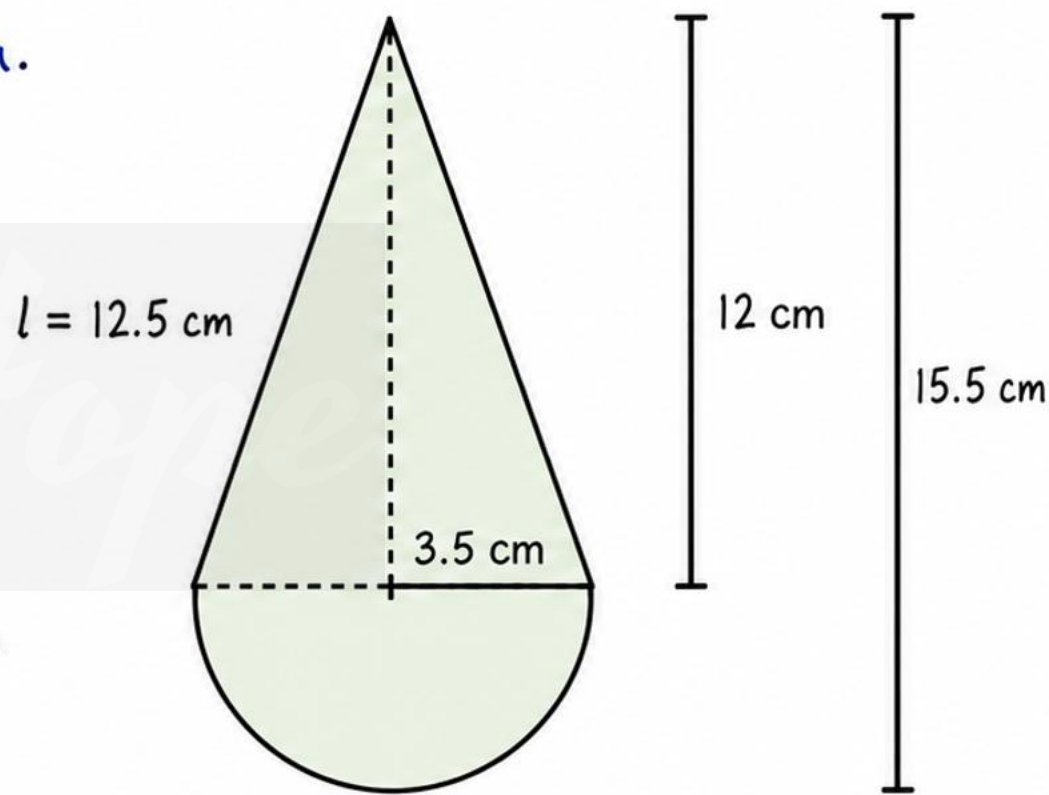
Surface area = curved cone area + curved hemisphere area

$$= \pi r l + 2\pi r^2$$

$$= \pi r (l + 2r)$$

$$= \frac{22}{7} \times 3.5 \times (12.5 + 7)$$

$$= 214.5 \text{ cm}^2.$$



Not to scale.

Answer: 214.5 cm^2 .

EXERCISE 12.1 — Q4

Q4. A cubical block of side 7 cm is surmounted by a hemisphere. Find the greatest possible diameter of the hemisphere and the surface area of the solid. Use $\pi = \frac{22}{7}$.

The circular base must fit on the square face.

Greatest diameter = cube edge = 7 cm

Radius $r = 3.5$ cm

The covered circle on the cube is not exposed.

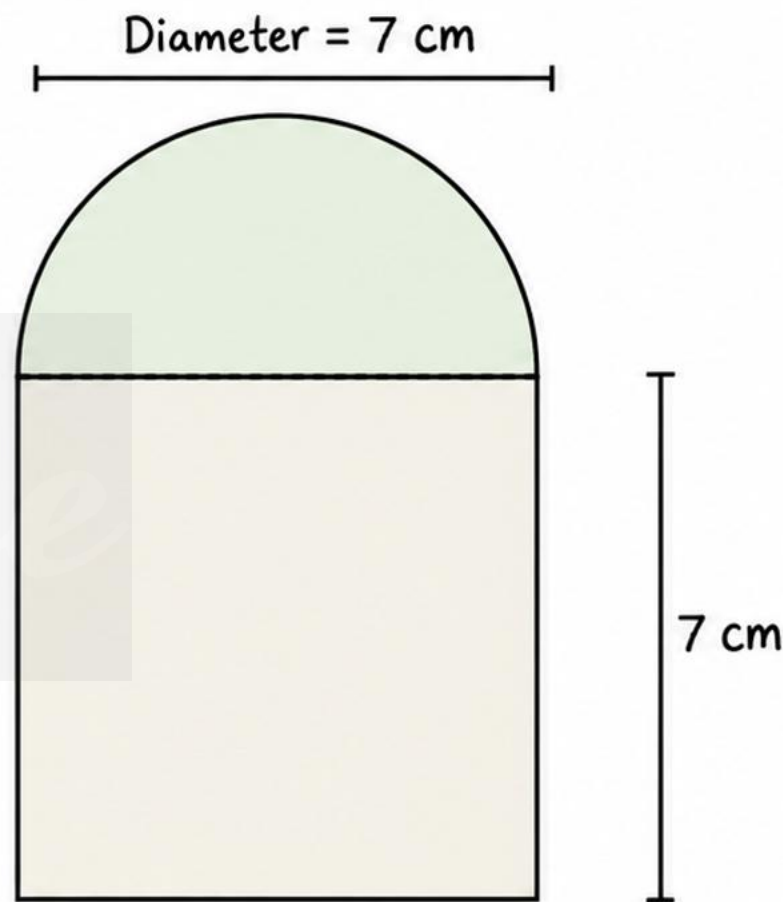
Surface area = cube area - covered circle + curved hemisphere

$$= 6a^2 - \pi r^2 + 2\pi r^2$$

$$= 6a^2 + \pi r^2$$

$$= 6 \times 7^2 + \frac{22}{7} \times 3.5^2$$

$$= 294 + 38.5 = 332.5 \text{ cm}^2.$$



Not to scale.

Answers: greatest diameter = 7 cm; area = 332.5 cm^2 .



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