

9. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in figure. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the total surface area of the article.

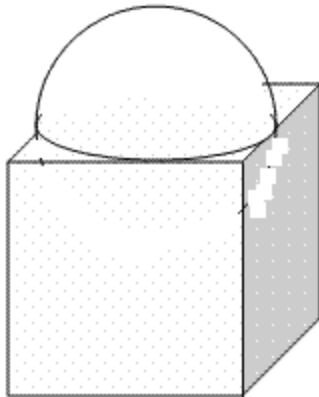
8. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2

7. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per m^2 . (Note that the base of the tent will not be covered with canvas.)

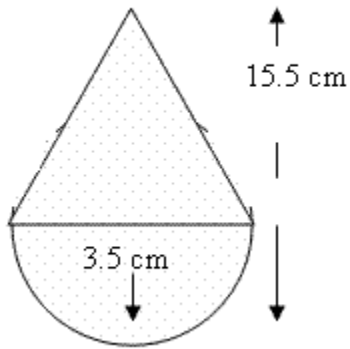
6. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area.

5. A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter d of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

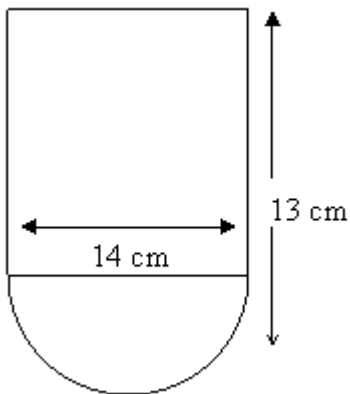
A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid.



A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.



Question: 2. A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.



Question: 1. 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.

Answers

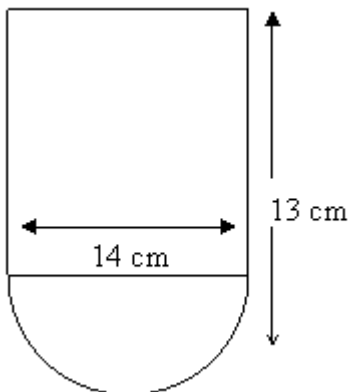
Surface Area And Volume

Exercise 1

Question: 1. 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.

Solution: Side of Cube = $\sqrt[3]{\text{Volume}}$
 $= \sqrt[3]{64} = 4 \text{ cm}$
Length of New cuboid = 8 cm
Height = 4 cm
Width = 4 cm
Surface Area = $2(lb + lh + bh)$
 $= 2(8 \times 4 + 8 \times 4 + 4 \times 4) = 180 \text{ sq cm}$

Question: 2. A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm . Find the inner surface area of the vessel.

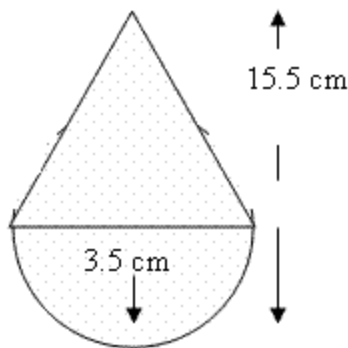


Solution: Radius = 7 cm
 Height of cylindrical portion = $13 - 7 = 6$ cm
 Curved Surface Area of Cylindrical Portion = $2\pi \times r \times h$
 $= 2 \times \frac{22}{7} \times 7 \times 6 = 264$ sq cm

Curved Surface Area of Hemispherical Portion = $2\pi \times r^2$
 $= 2 \times \frac{22}{7} \times 7 \times 7 = 308$ sq cm

Total Surface Area = $308 + 264 = 572$ sq cm

3. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

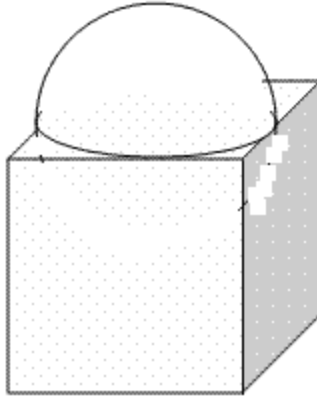


Solution: Radius = 3.5 cm
 Height of Cone = $15.5 - 3.5 = 12$ cm
 Slant Height of Cone = $\sqrt{12^2 + 3.5^2} = \sqrt{144 + 12.25} = \sqrt{156.25} = 12.5$ cm
 Curved Surface Area of Cone = $\pi \times r \times l$
 $= \frac{22}{7} \times 3.5 \times 12.5 = 137.5$

Curved Surface Area of Hemisphere = $2\pi \times r^2$
 $= 2 \times \frac{22}{7} \times 3.5 \times 3.5 = 77$

Total Curved Surface Area = $137.5 + 77 = 214.5$ sq cm

4. A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid.



Solution: The greatest diameter = Side of The Cube = 7 cm

Surface Area

= Surface Area of Cube - Surface Area of Base of Hemisphere + Curved Surface Area of Hemisphere

Surface Area of Cube = $6 \times \text{Side}^2 = 6 \times 49 = 294$ sq cm

Surface Area of Base of Hemisphere

$$= \pi \times r^2 = \frac{22}{7} \times 3.5 \times 3.5 = 38.5 \text{ sq cm}$$

Curved Surface Area of Hemisphere = $2 \times 38.5 = 77$ sq cm

Total Surface Area = $294 - 38.5 + 77 = 332.5$ sq cm

5. A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter d of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

Solution: This question can be solved like previous question. Here the curved surface of the hemisphere is a depression, unlike a projection in the previous question.

$$\text{Total Surface Area} = 6d^2 - \pi \times \left(\frac{d}{2}\right)^2 + 2\pi \times \left(\frac{d}{2}\right)^2 = 6d^2 + \pi \times \left(\frac{d}{2}\right)^2$$

6. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area.



Solution: Height of Cylinder = $14 - 5 = 9$ cm

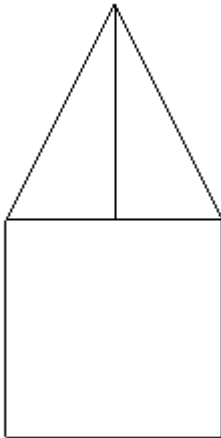
Radius = 2.5

Curved Surface Area of Cylinder = $2 \times \pi \times r \times h$
 $= 2 \times \pi \times 2.5 \times 9 = 45\pi$

Curved Surface Area of Two Hemispheres = $4 \times \pi \times r^2$
 $= 4 \times \pi \times 2.5^2 = 25\pi$

Total Curved Surface Area = $25\pi + 45\pi = 220$ sq cm

7. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per m^2 . (Note that the base of the tent will not be covered with canvas.)



Solution: Curved Surface Area of Cylinder = $2 \times \pi \times r \times h$
 $= 2 \times \pi \times 2 \times 2.1 = 8.4\pi$

Curved Surface Area of Cone = $\pi \times r \times l$
 $= \pi \times 2 \times 2.8 = 5.6\pi$

Total Curved Surface Area = $5.6\pi + 8.4\pi = 14 \times \frac{22}{7} = 44$

Cost of Canvas = $500 \times 44 = 22000$ Rupees

8. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2 .

Solution: Total Surface Area of Cylinder

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

$$= 2\pi \times 0.7(0.7 + 2.4) = 4.34\pi$$

Slant Height of Cone

$$= \sqrt{2.4^2 + 0.7^2} = \sqrt{5.76 + 0.49} = \sqrt{6.25} = 2.5$$

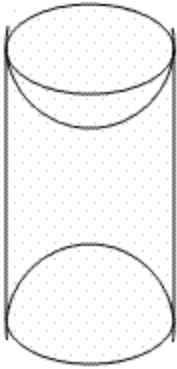
$$\text{Total Surface Area of Cone} = \pi \times r^2 + \pi \times r \times l = \pi \times r(r + l)$$

$$= \pi \times 0.7(0.7 + 2.5) = 2.24\pi$$

Remaining Surface Area of Structure

$$= 4.34\pi + 2.24\pi - 0.49\pi = 6.09 \times \frac{22}{7} = 19.14 \text{ sq cm}$$

9. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in figure. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the total surface area of the article.



Solution: Curved Surface Area of Cylinder = $2 \times \pi \times r \times h$
 $= 2 \times \pi \times 3.5 \times 10 = 70\pi$

Curved Surface Area of Two Hemispheres = $4 \times \pi \times r^2$
 $= 4 \times \pi \times 3.5 \times 3.5 = 49\pi$

Total Surface Area = $70\pi + 49\pi = 119\pi = 374$ sq cm