SpeedLabs

MATHS

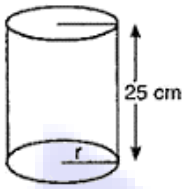
CBSE 9th

TEEVRA EDUTECH PVT. LTD.

SURFACE AREAS AND VOLUMES
Exercise- 13.6

1. The circumference of the base of a cylindrical vessel is 132 cm and its height is 25 cm. How many litres of water can it hold? ($1\ m^3 = 1000$)

Ans - Height of vessel $=(h) = 25$ cm



Circumference of base of vessel

$= 132$ cm

$\Rightarrow 2\pi r = 132$

$\Rightarrow 2 \times \frac{22}{7} \times r = 132$

$\Rightarrow r = \frac{132 \times 7}{2 \times 22} = 21cm$

Now, Volume of cylindrical vessel

$= \frac{34650}{1000}$ liters $[\because 1000\ cm^3 = 1$ liter$]$

$= 34.65$ cm

Q.2 The inner diameter of a cylindrical wooden pipe is 24 cm and its out diameter is 28 cm. The length of the pipe is 35 cm. Find the mass of the pipe, if $1cm^3$ of wood has a mass of 0.5 g.

Ans - Inner diameter of pipe $= 28$ cm

Inner radius of pipe (r)

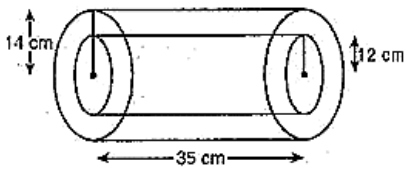
$= \frac{24}{2} = 12$ cm

And Outer diameter of pipe $= 28$ cm

$\therefore$ Outer radius of pipe (R)

$= \frac{28}{2} = 14$ m

Length of pipe $(h) = 35$ cm



Volume of wood = Volume of outer cylinder – Volume of inner cylinder

$\pi R^2 h - \mu r^2 = \pi h(R^2 - r^2)$

$\frac{22}{7} \times 35[(14)^2 - (12)^2]$

$= 110\ [\ 196 - 144\ ] = 110 \times 52$

$= 5720\ cm^3$

$\because$ Weight of 1 cm^3 of wood = 0.6 g

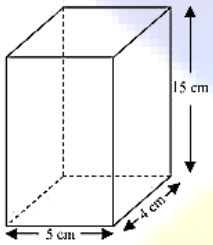
$\therefore$ Weight of 5720 cm^3 of wood

$= 0.6 \times 5720 = 3432\ g = 3.432\ kg$

Q.3 A soft drink is available in two packs (i) a tin can with a rectangular base of length 5 cm and width 4 cm, having height of 15 cm (ii) a plastic cylinder with circular base of diameter 7 cm and height 10 cm. Which container has greater capacity and how much?

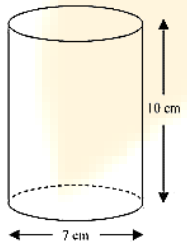
Ans - I case: Length of tin (l)= 5 cm, Width of tin (b) = 4 cm

and Height of tin (h) = 15 cm



Then, Capacity of tin = l × b × h = 5 x 4 x 15 = 300 cm^3

II case: Diameter of base of cylinder = 7 cm



Radius of base of cylinder (r) = $\frac{7}{2}$ cm

Height of cylinder (h′) = 10 cm

Capacity of cylinder = $\pi r^2 h'$

= $\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 10 =$ 385 cm3

From the cases I and II, we observed that cylindrical container has greater capacity by (385 – 300) = 85 cm^3.

Q.4 If the lateral surface of a cylinder is 94.2 cm2 and its height is 5 cm, then find (i) radius of its base (ii) its volume. [Use $\pi = 3.14$]

Ans - **(i)** Height (h) of cylinder = 5 cm

Let radius of cylinder be r.

CSA of cylinder = 94.2 cm^2

$2\pi rh = 94.2$ cm2

$(2 \times 3.14 \times r \times 5)$ cm = 94.2 cm^2

r = 3 cm

(ii) Volume of cylinder = $\pi r^2 h$

$= (3.14 \times (3)^2 \times 5)\ cm^3$

$= 141.3\ cm^3$

Q.5 It costs Rs 2200 to paint the inner curved surface of a cylindrical vessel 10 m deep. If the cost of painting is at the rate of Rs 20 per m^2, find

(i) Inner curved surface area of the vessel

(ii) Radius of the base

(iii) Capacity of the vessel

Ans - Total cost to paint inner curved surface area of the vessel = Rs. 2200

Rate = Rs. 20 per square meter

(i) Inner curved surface area of vessel $= \frac{\text{Total cost}}{\text{Rate}} = \frac{2200}{20}$

$= 110\ m^2$

(ii) Depth of the vessel (h) = 10 m

Now, Inner surface area of vessel

$= 110\ m^2$

$\Rightarrow 2\pi rh = 110$

$\Rightarrow 2 \times \frac{22}{7} \times r \times 10 = 110$

$\Rightarrow r = \frac{11 \times 7}{2 \times 22 \times 10} = 1.75m$

(iii) Since r = 1.75 m and

h = 10 m

∴ Capacity of vessel

= Volume of cylinder = $\pi r^2 h$

$= \frac{22}{7} \times 1.75 \times 1.75 \times 10 = 96.25\ m^3$

$= 96.25$ kl [$\because 1\ m^3 = 1$ kl]

Q.6 The capacity of a closed cylindrical vessel of height 1 m is 15.4 litres. How many square metres of metal sheet would be needed to make it?

Assume $\pi = \frac{22}{7}$

Ans - Let the radius of the circular end be r.

Height (h) of cylindrical vessel = 1 m

Volume of cylindrical vessel = 15.4 litres = 0.0154 m^3

$\pi r^2 h = 0.0154\ m^2$

$\left(\frac{22}{7} \times r^2 \times 1\right) m = 0.0154 m^3$

$\Rightarrow r = 0.07$ m

Total suface area of vessel = $2\pi r\ (r + h)$

$= \left[2 \times \frac{22}{7} \times 0.07(0.07 + 1)\right] m^2$

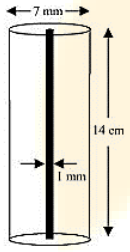
$= 0.44 \times 1.07\ m^2$

$0.4708\ m^2$

Therefore, 0.4708 m^2 of the metal sheet would be required to make the cylindrical vessel.

Q.7 A lead pencil consists of a cylinder of wood with solid cylinder of graphite filled in the interior. The diameter of the pencil is 7 mm and the diameter of the graphite is 1 mm. If the length of the pencil is 14 cm, find the volume of the wood and that of the graphite. Assume $\pi = \frac{22}{7}$

Ans -



Radius (r1) of pencil $= \left(\frac{7}{2}\right)$ mm $= \left(\frac{0.7}{2}\right)$ cm = 0.35 cm

Radius (r2) of graphite $= \left(\frac{1}{2}\right)$ mm $= \left(\frac{0.1}{2}\right)$ cm = 0.05 cm

Height (h) of pencil = 14 cm

Volume of wood in pencil = $\pi(r_1^2 - \pi r_2^2)h$

$= \left[\frac{22}{7}\{(0.35)^2 - (0.05)^2 \times 14\}\right] cm^2$

$= \left[\frac{22}{7}\ (0.1225 - 0.0025) \times 14\right] cm^2$

$= (44 \times 0.12) cm^3$

$= 5.28\ cm^3$

Volume of graphite $= \pi_2^2 h = \left[\frac{22}{7} \times (0.05)^2 \times 14\right] cm^3$

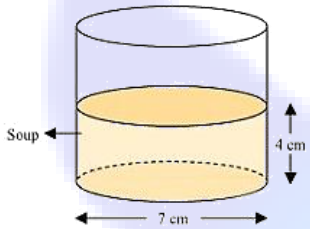
$(44 \times 0.0025) cm^2$

$= 0.11\ cm^3$

Q.8 A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with soup to a height of 4 cm, how much soup the hospital has to prepare daily to serve 250 patients?

Assume $\pi = \frac{22}{7}$

Ans -



Radius (r) of cylindrical bowl $= \left(\frac{7}{2}\right) cm = 3.5\ cm$

Height (h) of bowl, up to which bowl is filled with soup = 4 cm

Volume of soup in 1 bowl = $\pi r^2 h$

$= \left(\frac{22}{7} \times (3.5)^2 \times 4\right) cm^3$

$= (11 \times 3.5 \times 4)\ cm^3$

$= 154\ cm^3$

Volume of soup given to 250 patients $= (250 \times 154)\ cm^3$

$= 38500\ cm^3$

$= 38.5$ litres.