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? (1000 cm^3 = 1 litre)

→ C = 132 cm, h = 25 cm

$2\pi r = 132$

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

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

$r = 3 \times 7$

$r = 21$ cm

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

$= \frac{22}{7} \times (21)^3 \times 25$

$= \frac{22}{7_1} \times 3 \times 21 \times 21 \times 25$

$= 22 \times 3 \times 21 \times 25$

$= 34,650 \text{ cm}^3$

volume of cylinder (in litre) $= \frac{34650}{1000}$

$= 34.65$ litre

② The inner diameter of a cylindrical wooden pipes is 24cm and its outer diameter is 28cm. The length of the pipe is 35 cm. Find the mass of the pipe, if $1 cm^3$ of wood has a mass of 0.6 g.

→ Inner diameter of a cylinder = 24cm

Inner radius $= \frac{24}{2_1} = 12$ cm

outer diameter = 28cm

Outer radius $= \frac{28}{2_1} = 14$ cm

Volume of the wood used in the pipe $= \pi (R^2 - r^2) h$

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

$= \frac{22}{7} \times 76 (144 - 196) \times 35$

$= \frac{22}{7_1} \times 52 \times 35^5$

$= 22 \times 52 \times 5$

$= 5720 \text{ cm}^3$

mass of 1 cm^3 of wood $= 0.6 \text{ g}$

∴ mass of 5720 cm^3 of wood $=$

$0.6 \times 5720 \text{ g} = 3432 \text{ g}$

mass of the pipe $= 3432 \text{ g}$

Sulekha

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

→

(i) A tin can with a rectangular base

$l = 5cm$

$b = 4cm$

$h = 15cm$

volume of the tincan $= lbh$

$= 5 \times 4 \times 15$

$= 20 \times 15$

$= 300\ cm^3$

(ii) A plastic cylinder with circular base

$= d = 7\ cm \quad r = \frac{7}{2}$

$h = 10\ cm$

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volume of cylindrical plastic pack

$= \pi r^2 h$

$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2_1} \times 10^5$

$= \frac{22 \times 7 \times 5}{2_1}$

$= \frac{77 \times 5}{}$

$= 385 cm^3$

Difference in the capacities of the two packs.

$(300 - 385) = 85 cm^3$

Hence, the plastic cylinder with circular base has greater capacity by $85 cm^3$.

Sulekha

(4) If the lateral surface of a cylinder is $94.2\ cm^2$ and it's height is 5 cm, then find.

(i) radius of its base

→ $2\pi rh = 94.2\ cm^2$

$2 \times 3.14 \times 5 \times r = 94.2$

$r = \frac{94.2}{2 \times 3.14 \times 5}$

$r = \frac{94.2 \times 10}{2 \times 3.14 \times 100 \times 5}$

~~$47 : 1.5$~~

$r = \frac{942}{2 \times 314 \times 5}$

$r = \frac{1.5}{5}$

$r = \frac{1.5 \times 10}{5}$

$r = \frac{15}{5} = 3\ cm$

(ii) its volume.

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

$= 3.14 \times 3 \times 3 \times 5$

$= 3.14 \times 9 \times 5$

$= 3.14 \times 45$

$= 141.30 \text{ cm}^3$

$= 141.3 \text{ cm}^3$

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

(i) inner curved surface area of the vessel.

Inner curved surface area of vessel = $\frac{\text{Total cost}}{\text{cost of painting per } m^2}$

$= \frac{2200}{20} m^2 = 110 m^2$

(ii) We have, $2\pi rh = 110$

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

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

$= r = \frac{5 \times 7}{2 \times 10}$

$= r = \frac{1.75}{1}$

radius of base = 1.75 cm

(iii) Capacity of the vessel.

→ $\pi r^2 h = \frac{22}{7} \times 1.75 \times 1.75 \times 10$

$= \frac{22}{7} \times \frac{175}{100} \times \frac{175}{100} \times 10$

$= \frac{22 \times 25 \times 175}{100 \times 10}$

$= \frac{11 \times 5 \times 175}{100}$

$= 385$

$= \frac{11 \times 5 \times 7}{4}$

$= \frac{55 \times 7}{4}$

$= \frac{385}{4} = 96.25$

$= 96.25 \text{ m}^3$

$= 96.25 \text{ kl}$ $(1 \text{m}^3 = 1 \text{kl})$

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

→ Here, $h = 1\text{m}$, volume $= 15.4$ litres.

$= \frac{15.4}{1000} \text{ m}^3 = 0.0154 \text{ m}^3$

Also, volume of the cylindrical vessel $= \pi r^2 h$

$0.0154 = \frac{22}{7} \times r^2 \times 1$

$r^2 = \frac{0.0154 \times 7}{22}$

Sulekha

$= r^2 = \frac{0.0154 \times 7}{22}$

$= r^2 = 0.0049$

$\therefore r = 0.07m$

∴ Total surface area of the cylinder

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

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

$= 44 \times 0.01 \times 1.07\ m^2$

$= 0.4708\ m^2$

Hence, $0.4708\ m^2$ of metal sheet would be needed.

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

Here, $r = \frac{7}{2}$ cm $h = 4$ cm

Capacity of 1 cylindrical bowl $= \pi r^2 h$

$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 4^2$

$= 11 \times 7 \times 2$

$= 77 \times 2$

$= 154 \text{ cm}^3$

Hence, Soup consumed by 250 patients per day

$= 250 \times 154 \text{ cm}^3 = 38500 \text{ cm}^3$

$= 38.5$ litres.