



SpeedLabs

MATHS

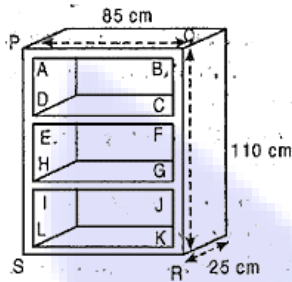
CBSE 9th

TEEVRA EDUTECH PVT. LTD.

SURFACE AREAS AND VOLUMES

Exercise- 13.9

Q.1 A wooden bookshelf has external dimensions as follows: Height = 110 cm, Depth = 25 cm, Breadth = 85 cm [See fig.]. The thickness of the planks is 5 cm everywhere. The external faces are to be polished and the inner faces are to be painted. If the rate of polishing is 20 paise per cm² and the rate of painting is 10 paise per cm², find the total expenses required for polishing and painting the surface of the bookshelf.



Ans - External faces to be polished

$$= \text{Area of six faces of cuboidal bookshelf} - 3 (\text{Area of open portion ABCD})$$

$$= 2 (110 \times 25 + 25 \times 85 + 85 \times 110) - 3 (75 \times 30)$$

$$[\because AB = 85 - 5 - 5 = 75 \text{ cm and AD}$$

$$= \frac{1}{3} \times 110 - 5 - 5 - 5 - 5 = 30 \text{ cm}]$$

$$= 2 (2750 + 2125 + 9350) - 3 \times 2250$$

$$= 2 \times 14225 - 6750$$

$$= 28450 - 6750$$

$$= 21700 \text{ cm}^2$$

Now, cost of painting outer faces of wooden bookshelf at the rate of 20 paise.

$$= \text{Rs. } 0.20 \text{ per cm}^2 = \text{Rs. } 0.20 \times 21700 = \text{Rs. } 4340$$

Here, three equal five sides inner faces.

Therefore total surface area

$$= 3 [2 (30 + 75) 20 + 30 \times 75] [\because \text{Depth} = 25 - 5 = 20 \text{ cm}]$$

$$= 3 [2 \times 105 \times 20 + 2250] = 3$$

$$[4200 + 2250]$$

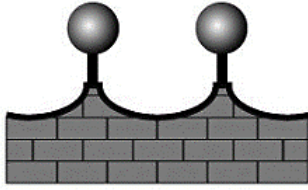
$$= 3 \times 6450 = 19350 \text{ cm}^2$$

Now, cost of painting inner faces at the rate of 10 paise i.e. Rs. 0.10 per cm².

$$= \text{Rs. } 0.10 \times 19350 = \text{Rs. } 1935$$

$$\text{Total expenses required} = \text{Rs. } 4340 + \text{Rs. } 1935 = \text{Rs. } 6275$$

Q.2 The front compound wall of a house is decorated by wooden spheres of diameter 21 cm, placed on small supports as shown in the given figure. Eight such spheres are used for this purpose, and are to be painted silver. Each support is a cylinder of radius 1.5 cm and height 7 cm and is to be painted black. Find the cost of paint required if silver paint costs 25 paise per cm^2 and black paint costs 5 paise per cm^2 .



Ans - Radius (r) of wooden sphere = $\left(\frac{21}{2}\right) \text{ cm} = 10.5 \text{ cm}$

Surface area of wooden sphere = $4\pi r^2$

$$= \left[4 \times \frac{22}{7} \times (10.5)^2\right] \text{ cm}^2 = 1386 \text{ cm}^2$$

Radius (r_1) of the circular end of cylindrical support = 1.5 cm

Height (h) of cylindrical support = 7 cm

CSA of cylindrical support = $2\pi r h$

$$= \left[2 \times \frac{22}{7} \times (1.5) \times 7\right] \text{ cm}^2 = 66 \text{ cm}^2$$

Area of the circular end of cylindrical support = $\pi r^2 = \left[\frac{22}{7} \times (1.5)^2\right] \text{ cm}^2$

$$= 7.07 \text{ cm}^2$$

Area to be painted silver = $[8 \times (1386 - 7.07)] \text{ cm}^2$

$$= (8 \times 1378.93) \text{ cm}^2 = 11031.44 \text{ cm}^2$$

Cost for painting with silver colour = Rs $(11031.44 \times 0.25) = \text{Rs } 2757.86$

Area to be painted black = $(8 \times 66) \text{ cm}^2 = 528 \text{ cm}^2$

Cost for painting with black colour = Rs $(528 \times 0.05) = \text{Rs } 26.40$

Total cost in painting = Rs $(2757.86 + 26.40)$

$$= \text{Rs } 2784.26$$

Therefore, it will cost Rs 2784.26 in painting in such a way.

Q.3 The diameter of a sphere is decreased by 25%. By what per cent does its curved surface area decrease?

Ans - Let the diameter of the sphere be d .

Radius (r_1) of sphere = $\frac{d}{2}$

New radius (r_2) of sphere = $\frac{d}{2} \left(1 - \frac{25}{100}\right) = \frac{3}{8}d$

CSA (S_1) of sphere = πr_1^2

$$= 4\pi \left(\frac{d}{2}\right)^2 = \pi d^2$$

CSA (S_2) of sphere when radius is decreased = πr_2^2

$$= 4\pi \left(\frac{3d}{8}\right)^2 = \frac{9}{16}\pi d^2$$

Decrease in surface area of sphere = $S_1 - S_2$

$$= \pi d^2 - \frac{9}{16}\pi d^2$$

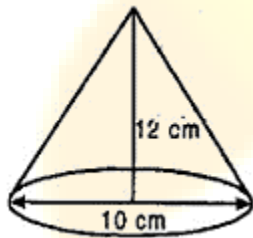
$$= \frac{7}{16}\pi d^2$$

Percentage decrease in surface area of sphere = $\frac{S_1 - S_2}{S_1} \times 100$

$$= \frac{7\pi d^2}{16\pi d^2} \times 100 = \frac{700}{16} = 43.75\%$$

Q.4 Sameera wants to celebrate the fifth birthday of her daughter with a party. She bought thick paper to make the conical party caps. Each cap is to have a base diameter of 10 cm and height 12 cm. A sheet of the paper is 25 cm by 40 cm and approximately 82% of the sheet can be effectively used for making the caps after cutting. What is the minimum number of sheets of paper that Sameera would need to buy, if there are to be 15 children at the party? (Use $\pi = 3.14$)

Ans - Diameter of base of conical cap
= 10 cm



\therefore Radius of conical cap (r) = 5 cm

Slant height of cone (l) = $\sqrt{r^2 + h^2}$

$$= \sqrt{(5)^2 + (12)^2} = \sqrt{25 + 144} = \sqrt{169} = 13 \text{ cm}$$

Curved surface area of a cap = $\pi r l = 3.14 \times 5 \times 13 = 204.1 \text{ cm}^2$

Curved surface area of 15 caps = $15 \times 204.1 = 3061.5 \text{ cm}^2$

Area of a sheet of paper used for making caps = $25 \times 40 = 1000 \text{ cm}^2$

82% of sheet is used after cutting = $82\% \text{ of } 1000 \text{ cm}^2 = \frac{82}{100} \times 1000 = 820 \text{ cm}^2$

Number of sheet = $\frac{3061.5}{820} = 3.73$

Hence 4 sheets area needed .

