# Exercise 13.9

Question :1 A wooden bookshelf has external dimensions as follows: Height = 110 cm, Depth = 25 cm, Breadth = 85 cm. The thickness of the plank 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.
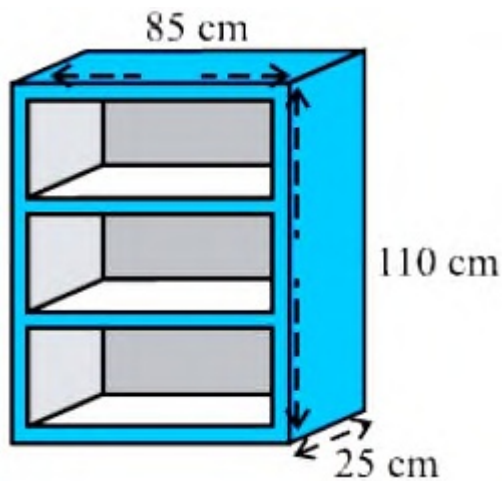
Ans.: External height (l) of book self = 85 cm
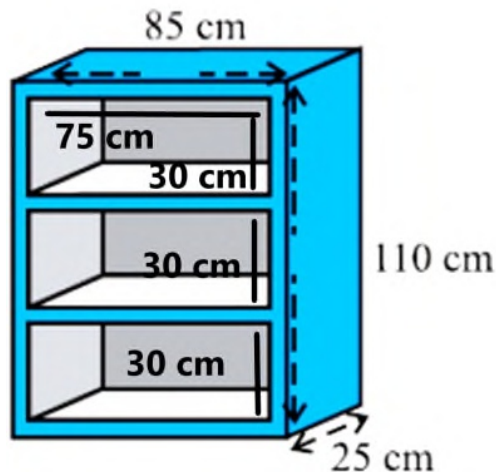
External breadth (b) of book self = 25 cm

External height (h) of book self = 110 cm

The external surface area of the shelf while leaving out the front face of the shelf = lh + 2 (lb + bh)

= [85 × 110 + 2 (85 × 25 + 25 × 110)]

= (9350 + 9750)

= 19100 cm^2

we know each stripe on the front surface is also to be polished. which is 5 cm stretch.

Area of front face = [85 × 110 − 75 × 100 + 2 (75 × 5)]

= 1850 + 750

= 2600 cm²

Area to be polished = (19100 + 2600) = 21700 cm²

Cost of polishing 1 cm² area = Rs 0.20

Cost of polishing 21700 cm² area Rs (21700 × 0.20) = Rs 4340

It can be observed that length (l), breadth (b), and height (h) of each row of the bookshelf is 75 cm, 20 cm, and 30 cm respectively

Area to be painted in 1 row = 2 (l + h) b + lh

= [2 (75 + 30) × 20 + 75 × 30]

 (4200 + 2250)

= 6450 cm²

Area to be painted in 3 rows = (3 × 6450)

= 19350 cm²

Cost of painting 1 cm² area = Rs 0.10

Cost of painting 19350 cm2 area = Rs (19350 × 0.1)

= Rs 1935

Total expense required for polishing and painting = Rs (4340 + 1935)

= Rs, 6275

Question :2 The front compound wall of a house is decorated by wooden spheres of diameter 21cm, placed on small supports. 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 height7 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.
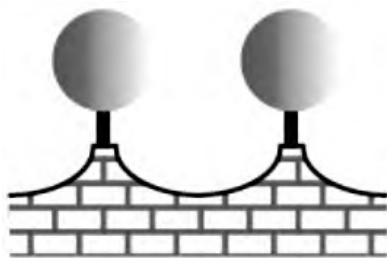
Ans.:

Radius (r) of wooden sphere $22\left(1\frac{21}{2}\right)$ = 10.5 cm

Surface area = $4\,\pi r^2$

$= 4 \times \frac{22}{7} \times 10.5 \times 10.5$

$= 1386\ cm^2$

Radius of circular end (r1) = 1.5 cm

Height (h) = 7 cm

CSA = $2\,\pi rh$

$= 2 \times \frac{22}{7} \times 1.5 \times 7$

$= 66 \text{ cm}^2$

Area of the circular end of cylindrical support $= \pi r^2$

$= \frac{22}{7} \times 1.5 \times 1.5$

$= 7.07 \text{ cm}^2$

Area to be painted silver $= [8 \times (1386 - 7.07)]$

$= (8 \times 1378.93)$

$= 11031.44 \text{ cm}^2$

Cost of painting silver color $= \text{Rs } (11031.44 \times 0.25) = \text{Rs } 2757.86$

Area to be painted black $= (8 \times 66)$

$= 528 \text{ cm}^2$

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

Total cost in painting $= \text{Rs } (2757.86 + 26.40)$

$= \text{Rs } 2784.26$

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

Ans.:

Let the diameter be d

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

New radius $(r_2) = \frac{d}{2} (1 - \frac{25}{100})$

$= \frac{3}{8}$ d

CSA (S$_1$) = 4r1^2

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

$= \pi d^2$

CSA (S$_2$) = $4\pi r2^2$

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

$= \frac{9}{6}\pi d^2$

Decrease in surface area = S$_1$ – S$_2$

$= \pi d^2$ - d^2

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

Now,

Percentage decrease $= \frac{S_{1-} S_2}{S_1}$ * 100

$= \frac{7\pi d * d}{16\pi d * d}$ * 100

$= \frac{700}{16}$

= 43.75 %