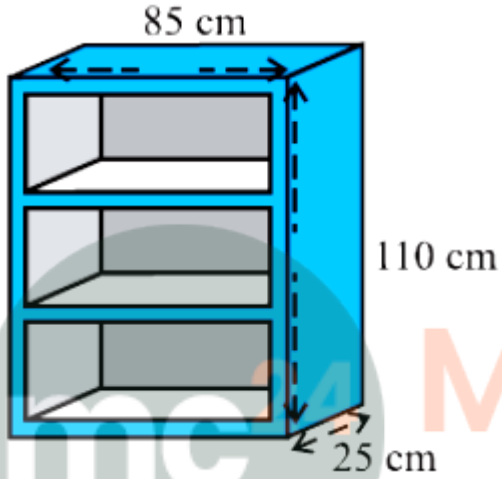
NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes Ex 11.9

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 percm^2 and the rate of painting is 10 paise per cm^2, find the total expenses required for polishing and painting the surface of the bookshelf



Solution.

External height (l) of book self = 85 cm

External breadth (b) of book self = 25 cm

External height (h) of book self = 110 cm

External surface area of 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

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

= 1850 + 750

= 2600 cm^2

Area to be polished = (19100 + 2600) = 21700 cm^2

Cost of polishing 1 cm^2 area = Rs 0.20

Cost of polishing 21700 cm^2 area Rs (21700 × 0.20) = Rs 4340

It can be observed that length (l), breadth (b), and height (h) of each row of the book shelf 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 cm^2

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

= 19350 cm^2

Cost of painting 1 cm^2 area = Rs 0.10

Cost of painting 19350 cm^2 area = Rs (19350 × 0.1)

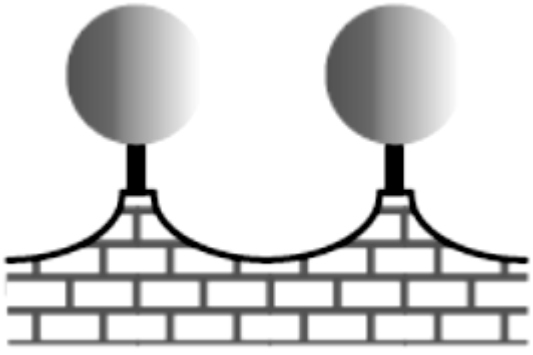
= Rs 1935

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 cm2 and black paint costs 5 paise per cm^2



Solution.

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

Surface area = 4 πr^2

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

= 1386 cm^2

Radius of circular end (r1) = 1.5 cm

Height (h) = 7 cm

CSA = 2 πrh

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

= 66 cm^2

Area of the circular end of cylindrical support = πr^2

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

= 7.07 cm^2

Area to be painted silver = [8 × (1386 − 7.07)]

= (8 × 1378.93)

= 11031.44 cm^2

Cost of painting silver color = Rs (11031.44 × 0.25) = Rs 2757.86

Area to be painted black = (8 × 66)

= 528 cm^2

Cost for painting with black color = Rs (528 × 0.05) = Rs 26.40

Total cost in painting = Rs (2757.86 + 26.40)

= Rs 2784.26

Question 3.

The diameter of a sphere is decreased by 25%. By what per cent does it's curved surface area decrease?

Solution.

Let the diameter be d

Radius (r1) = $\frac{d}{2}$

New radius (r2) = $\frac{d}{2}$ (1 - $\frac{25}{100}$)

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

CSA (S1) = $4\pi r1^2$

= 4π $(\frac{d}{2})^2$

= πd^2

CSA (S2) = $4\pi r2^2$

= 4π $(\frac{3d}{8})^2$

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

Decrease in surface area = S1 – S2

= πd^2 - $\frac{9}{16}\pi d^2$

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

Now,

Percentage decrease = $\frac{S1-S2}{S1}$ * 100

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

= $\frac{700}{16}$

= 43.75 %