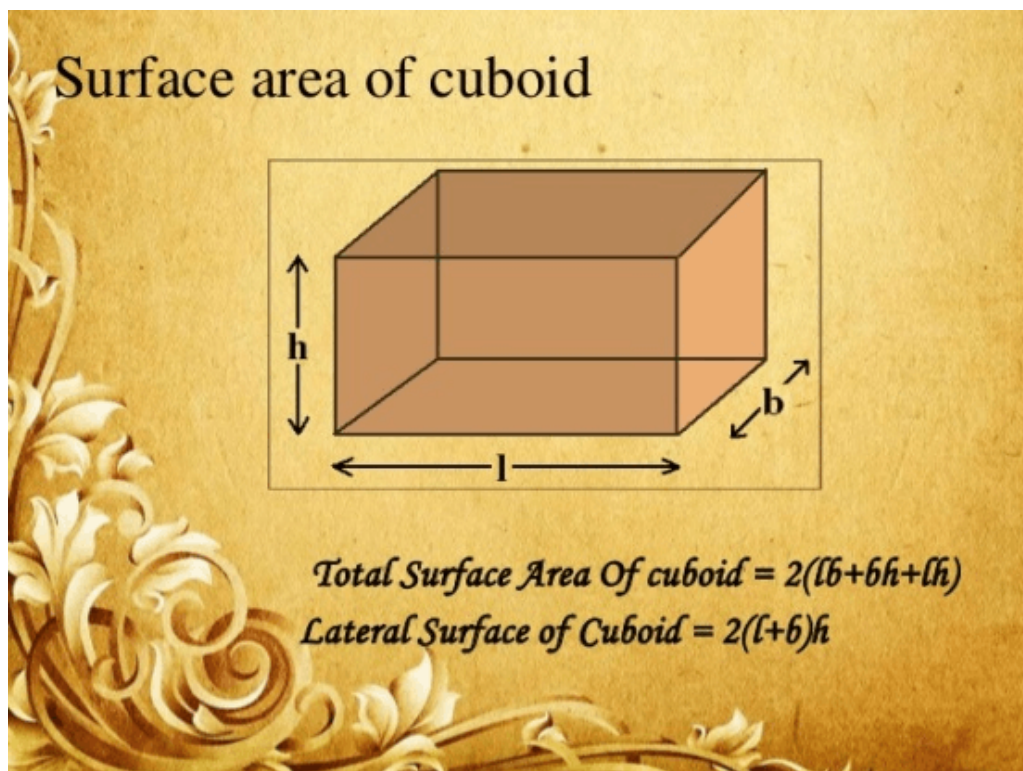


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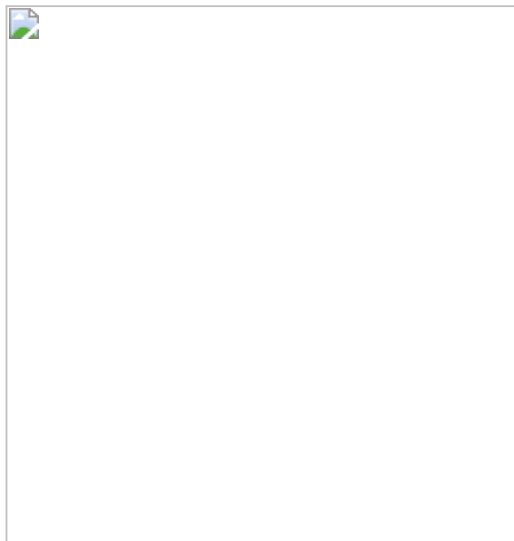
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NCERT Class 9 Solutions: Surface Areas and Volumes (Chapter 13) Exercise 13.9 – Part 1

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Q-1 A wooden bookshelf has external dimensions as follows: Height = 110 cm , depth = 25 cm , breadth = 85 cm (see figure) . 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 cm^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:

Given

- Height = 110 cm
- Depth = 25 cm
- Breadth = 85 cm
- Plank Thickness = 5 cm
- Rate of polishing is 20 paise/cm^2
- Rate of painting is 10 paise/cm^2

First let's calculate the outer area to be polished.

Now the shelf is open from the front, therefore there is only one face with sides of height and length.

Hence, external surface area of the shelf = $lh + 2(lb + bh)$

- $= [85 \times 110 + 2(85 \times 25 + 25 \times 110)] \text{ cm}^2$
- $= (9350 + 9750) \text{ cm}^2$
- $= 19100 \text{ cm}^2$

Now front face has some area, due to the thickness of the planks.



The area inside the outer edge of front face is 85×110 , the area inside the inner edge of front face = 75×100 . Therefore the area of front face occupied due to thick planks = Outside area – Inside area

- $= [85 \times 110 - 75 \times 100] \text{ cm}^2$

- $= 9350 - 7500\text{cm}^2$
- $= 1850\text{cm}^2$

Therefore, total area to be polished = Outer area + Wooden area on the front face

- $= (19100 + 1850)\text{cm}^2$
- $= 20950\text{cm}^2$

Since cost of polishing $1\text{cm}^2\text{ area} = ₹0.02$, therefore, cost of polishing 20950cm^2 area
 $₹(20950 \times 0.02)\text{cm}^2 = ₹4190$

Now let's calculate the inner area to be painted.

Internal depth, breadth and height are calculated by subtracting the length so planks.

- Inner breadth = Outer breadth – width of right plank – width of left plank =
 $(85 - 5 - 5)\text{cm} = 75\text{cm}$.
- Similarly, External height = Outer height – width of top plank – width of bottom plank =
 $(110 - 5 - 5)\text{cm} = 100\text{cm}$.
- Since the bookshelf is open from the front, therefore the inner depth = outer depth – width of plank on the back = $(25 - 5)\text{cm} = 20\text{cm}$

Therefore the inner surface are (since there is no front face) $= 2(l + h)b + lh$

- $= 2 \times (75 + 100) \times 20 + 75 \times 100\text{cm}^2$
- $= (7000 + 7500)\text{cm}^2$
- $= 14500\text{cm}^2$

Now, cost of painting $1\text{cm}^2\text{ area} = ₹0.01$

Therefore, cost of painting $14500\text{cm}^2\text{ area} = ₹1450$

Thus, total expense required for polishing and painting = $₹(4190 + 1450) = ₹5640$

So, it would take ₹.5640 for polishing and painting the surface of the bookshelf.