Ex - 13.1

Q1. A plastic box 1.5 m long, 1.25 m wide and 65 cm deep is to be made. It is opened at the top. Ignoring the thickness of the plastic sheet, determine:

(i) The area of the sheet required for making the box.

(ii) The cost of sheet for it, if a sheet measuring 1 m^2 costs Rs 20.

Sol. (i) ℓ = 1.5 m, b = 1.25 m, h = 0.65

Area of sheet required for making box which is open at the top

$= \ell \times b + 2(\ell + b)\, h$

$= 1.5 \times 1.25 + 2(1.5 + 1.25) \times 0.65\ m^2$

$= (1.875 + 3.575)\ m^2 = 5.45\ m^2$

(ii) Cost = Rs. 20×5.45 = Rs. 109.

Q2. The length, breadth and height of a room are 5 m, 4 m and 3 m respectively. Find the cost of white washing the walls of the room and the ceiling at the rate of Rs 7.50 per m^2.

Sol. Length = 5 m, breadth = 4 m, height = 3m.

$\therefore$ Area for white washing

= [Lateral surface area] + [Area of the ceiling]

$= [2(\ell + b)\, h] + [\ell \times b]$

$= [2(5 + 4) \times 3] + [5 \times 4]m^2$

$= 54\ m^2 + 20\ m^2 = 74\ m^2$

Cost of white washing for 1 m^2 = Rs. 7.50

$\therefore$ Cost of white washing for 74 m^2 = Rs. 7.50×74

$$= \frac{750}{100} \times 74 = \text{Rs. } 555$$

$\therefore$ The required cost of white washing = Rs. 555

Q3. The floor of a rectangular hall has a perimeter 250 m. If the cost of painting the four walls at the rate of Rs. 10 per m^2 is Rs. 15000, find the height of the hall.

Sol. Let the height of the hall be h m.

Area of 4 walls = $2(\ell + b)\, h$ = perimeter $\times$ h

Then, $250 \times h \times 10 = 15000 \Rightarrow h = 6$ m.

Q4. The paint in a certain container is sufficient to paint an area equal to 9.375 m^2. How many bricks of dimensions 22.5 cm $\times$ 10 cm $\times$ 7.5 cm can be painted out of this container?

Sol. For a brick length, ℓ = 22.5 cm, breadth, b = 10 cm, height, h = 7.5 cm

$\therefore$ Total surface area of a brick = $2(\ell b + bh + h\ell)$

$= 2(22.5 \times 10 + 10 \times 7.5 + 7.5 \times 22.5)$

$= 2(225 + 75 + 168.75)$

$= 2(468.75) = 937.5 \text{ cm}^2 = .09375 \text{ m}^2$

$\therefore$ Number of bricks that can be painted out

$= \frac{9.375}{.09375} = 100$

Hence, 100 bricks can be painted out of the given container.

Q5. A cubical box has each edge 10 cm and another cuboidal box is 12.5 cm long, 10 cm wide and 8 cm high.

(i) Which box has the greater lateral surface area and by how much?

(ii) Which box has the smaller total surface area and by how much?

Sol. For cubical box with edge = 10 cm

Lateral surface area = $4a^2 \Rightarrow 4 \times 10 \Rightarrow 400 \text{ cm}^2$

Total surface area = $6a^2 \Rightarrow 6 \times 100 \Rightarrow 600 \text{ cm}^2$

For the cubodial box with ℓ = 12.5 cm, b = 10 cm, h = 8 cm

$\therefore$ Lateral surface area = $2[\ell + b] \times h$

$= 2[12.5 + 10] \times 8$

$= 360 \text{ cm}^2$

$\therefore$ Total surface area = $2[\ell b + bh + h\ell]$

$= 2[(12.5 \times 10) + (10 \times 8) + (8 \times 12.5)]$

$= 2[125 + 80 + 100] = 610 \text{ cm}^2$

(i) Cubical box has the greater lateral surface area by 40 cm^2

(ii) Total surface area of cubical box is smaller than the cubodial box by 10 cm^2.

Q6. A small indoor greenhouse (herbarium) is made entirely of glass panes (including base) held together with tape. It is 30 cm long, 25 cm wide and 25 cm high.

(i) What is the area of the glass?

(ii) How much of tape is needed for all the 12 edges?

Sol. The herbarium is like a cuboid.

ℓ = 30 cm, b = 25 cm, h = 25 cm

(i) Area of a cuboid = $2[\ell b + bh + h\ell]$

$\therefore$ Surface area of the herbarium (glass)

$= 2[(30 \times 25) + (25 \times 25) + (25 \times 30)] \text{ cm}^2$

$= [750 + 625 + 750] \text{ cm}^2$

$= 2[2125] \text{ cm}^2 = 4250 \text{ cm}^2$

Thus, the required area of glass is 4250 cm^2

(ii) Total length of 12 edges = $4\ell + 4b + 4h$

$= 4(\ell + b + h)$

$= 4 \times 80 = 320$ cm.

Thus, the length of tape needed = 320 cm.

Q7. Shanti Sweets Stall was placing an order for making carboard boxes for packing their sweets. Two sizes of boxes were required. The bigger of dimensions 25 cm × 20 cm × 5 cm and the smaller of dimensions 15 cm × 12 cm × 5 cm. For all the overlaps, 5% of the total surface area is required extra. If the cost of the card board is Rs. 4 for 1000 cm^2, find the cost of cardboard required for supplying 250 boxes of each kind.

Sol. Surface area of one box of size 25 cm × 20 cm × 5 cm

$= 2\ [25 \times 20 + 20 \times 5 + 5 \times 25)\ cm^2 = 1450\ cm^2$

Surface area of 250 such boxes

$= 250 \times 1450\ cm^2 = 362500\ cm^2$

Surface area of one box of size 15 cm × 12 cm × 5 cm

$= 2\ [15 \times 12 + 12 \times 5 + 5 \times 15)\ cm^2 = 630\ cm^2$

Surface area of 250 such boxes

$= 250 \times 630\ cm^2 = 157500\ cm^2$

Total surface area of the boxes of two types

$= 362500\ cm^2 + 157500\ cm^2 = 520000\ cm^2$

Area of sheet required for making 250 boxes of each including extra required area of 5% for overlaps etc.

$= \left(520000 + 520000 \times \frac{5}{100}\right) cm^2 = 546000\ cm^2$

Total cost of sheet at the rate of Rs. 4 for 1000 cm^2 = Rs. $\frac{4}{1000} \times 546000$ = Rs. 2184

Q8. Parveen wanted to make a temporary shelter for her car, by making a box-like structure with tarpaulin that covers all the four sides and the top of the car (with the front face as a flap which can be rolled up). Assuming that the stitching margins are very small, and therefore negligible, how much tarpaulin would be required to make the shelter of height 2.5 m, with base dimensions 4 m × 3 m ?

Sol. For shelter

length, $\ell = 4$ m, breadth, $b = 3$ m, height, $h = 2.5$ m

$\therefore$ Total surface area of the shelter

$= 2\ (\ell + b\ )\ h + \ell b$

$= 2\ (4 + 3)\ (2.5) + (4)\ (5)$

$= 2\ (7)\ (2.5) + 12 = 47\ m^2$

Hence, 47 m^2 of tarpaulin will be required.