Exercise 21(B)

Solution 1:

The given figure can be divided into two cuboids of dimensions 6 cm, 4 cm, 3 cm, and 9 cm respectively. Hence, volume of solid

$$= 9 \times 4 \times 3 + 6 \times 4 \times 3$$
$$= 108 + 72$$
$$= 180\,cm^3$$

Solution 2:

$$\text{Area of cross section of the solid} = \frac{1}{2}(1.5+3) \times (40)\,cm^2$$

$$= \frac{1}{2}(4.5) \times (40)\,cm^2$$
$$= 90\,cm^2$$

$$\text{Volume of solid} = \text{Area of cross section} \times \text{Length}$$

$$= 90 \times 15\,cm^3$$
$$= 1350\,cm^3$$
$$= 1350000\,\text{liters} \quad [\text{Since } 1\,cm^3 = 1000\,lt]$$

Solution 3:

The cross section of a tunnel is of the trapezium shaped ABCD in which AB = 7m, CD =

5m and AM = BN. The height is 2.4 m and its length is 40m.

(i)

$$AM = BN = \frac{7-5}{2} = \frac{2}{2} = 1\,m$$

$\therefore$ In ΔADM,

$AD^2 = AM^2 + DM^2$ [Using pythagoras theorem]

$= 1^2 + (2.4)^2$

$= 1 + 5.76$

$= 6.76$

$= (2.6)^2$

$AD = 2.6\,m$

Perimeter of the cross- section of the tunnel= $(7 + 2.6 + 2.6 + 5)m = 17.2\,m$

Length=40 m

$\therefore$ Internal surface area of the tunnel(except floor)

$= (17.2 \times 40 - 40 \times 7)m^2$

$= (688 - 280)m^2$

$= 408\,m^2$

Rate of painting=Rs 5 per m^2

Hence, total cost of painting=Rs 5×408=Rs 2040

(ii)

Area of floor of tunnel $l \times b = 40 \times 7 = 280\,m^2$

Rate of cost of paving= Rs 18 per m^2

Total cost= $280 \times 18 = Rs5040$

Solution 4:

(i)

The rate of speed $= 5\ \frac{m}{s} = 500 \frac{cm}{s}$

Volume of water flowing per sec $= 3.2 \times 500\ cm^3 = 1600\ cm^3$

(ii)

Vol. of water flowing per min $= 1600 \times 60\ cm^3 = 96000\ cm^3$

Since $1000\ cm^3 = 1$ lt

Therefore, Vol. of water flowing per min= $= \frac{96000}{1000} = 96\ litres$

Solution 5:

Vol. of water flowing in 1 sec= $= \frac{1500 \times 1000}{5 \times 60} = 5000\ cm^3$

Vol. of water flowing =area of cross section × speed of water

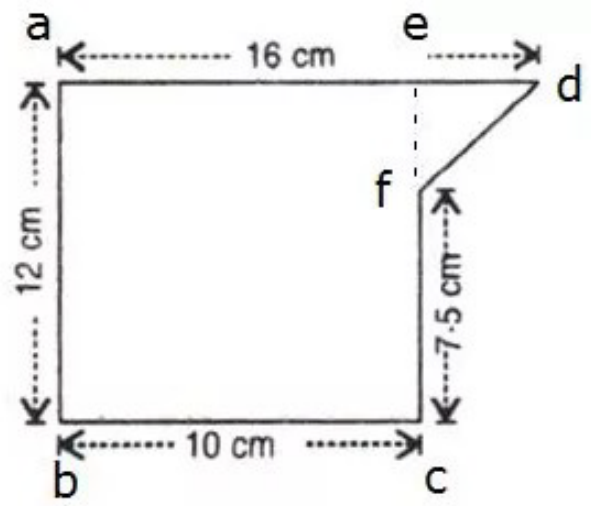
$$5000\ \frac{cm^3}{s} = 2\ cm^2 \times speed\ of\ water$$

$$\Rightarrow speed\ of\ water = \frac{5000}{2} \frac{cm}{s}$$

$$\Rightarrow speed\ of\ water = 2500 \frac{cm}{s}$$

$$\Rightarrow speed\ of\ water = 25\ \frac{m}{s}$$

Solution 6:



(i)

Area of total cross section= Area of rectangle abce+ area of Δdef

$$=(12\times10)+\frac{1}{2}(16-10)(12-7.5)$$

$$=120+\frac{1}{2}(6)(4.5)\,cm^2$$

$$=120+13.5\,cm^2$$

$$=133.5\,cm^2$$

(ii)

The volume of the piece of metal in cubic centimeters= Area of total cross section$\times$length

$$=133.5\,cm^2\times400\ cm=53400\,cm^3$$

1 cubic centimetre of the metal weighs 6.6 g

$53400\,cm^3$ of the metal weighs $6.6\times53400\ g=\frac{6.6\times53400}{1000}kg$

$$=352.440\,kg$$

The weight of the piece of metal to the nearest Kg is 352 Kg.

Solution 7:

Vol. of rectangular tank= $80 \times 60 \times 60\ cm^3 = 288000\ cm^3$

One liter= $1000\ cm^3$

Vol. of water flowing in per sec=

$$1.5\ cm^2 \times 3.2\frac{m}{s} = 1.5\ cm^2 \times \frac{(3.2 \times 100)\ cm}{s}$$

$$= 480\frac{cm^3}{s}$$

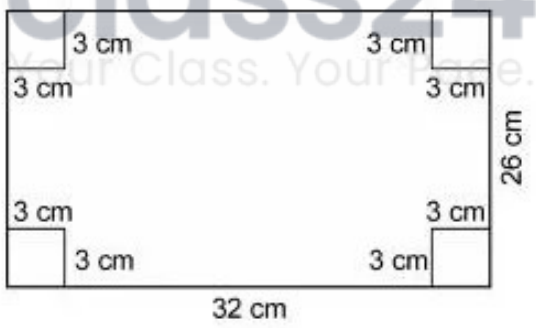
Vol. of water flowing in 1 min= $480 \times 60 = 28800\ cm^3$

Hence,

$28800\ cm^3$ can be filled = 1 min

$$288000\ cm^3 \text{ can be filled} = \left(\frac{1}{28800} \times 288000\right) min = 10\ min$$

Solution 8:



Length of sheet=32 cm

Breadth of sheet=26 cm

Side of each square=3cm

∴ Inner length=32-2× 3=32-6=26 cm

Inner breadth= $26 - 2 \times 3 = 26 - 6 = 20$ cm

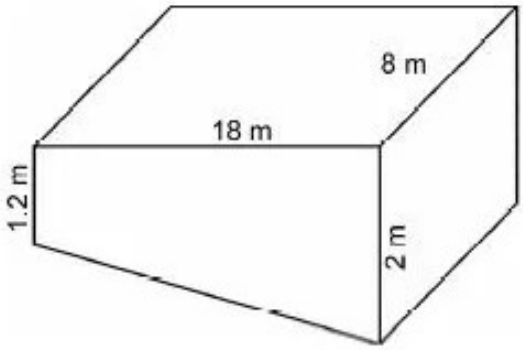
By folding the sheet, the length of the container=26 cm

Breadth of the container= 20 cm and height of the container= 3 cm

∴ Vol. of the container= $l \times b \times h$

$= 26cm \times 20cm \times 3cm = 1560\ \ cm^3$

Solution 9:



Length of pool= 18 m

Breadth of pool= 8 m

Height of one side= 2m

Height on second side=1.2 m

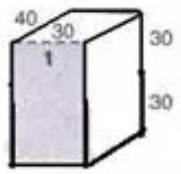
$\therefore$ Volume of pool= $18 \times 8 \times \frac{(2+1.2)}{2} m^3$

$= \frac{18 \times 8 \times 3.2}{2}$

$= 230.4 m^3$

Solution 10:

Consider the box 1



Thus, the dimensions of box 1 are: 60 cm, 40 cm and 30 cm.

Therefore, the volume of box1$=60\times40\times30=72000\ cm^3$

Surface area of box 1$=2(\ell b+bh+\ell h)$

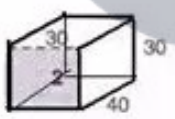
Since the box is open at the bottom and
from the give figure, we have,

Surface area of box 1$=40\times40+40\times30+40\times30+2(60\times30)$

$=1600+1200+1200+3600$

$=7600\ cm^2$

Consider the box 2



Thus, the dimensions of box 2 are: 40 cm, 30 cm and 30 cm.

Therefore, the volume of box2$=40\times30\times30=36000\ cm^3$

Surface area of box 2$=2(\ell b+bh+\ell h)$

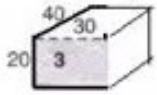
Since the box is open at the bottom and
from the give figure, we have,

Surface area of box 2$=40\times30+40\times30+2(30\times30)$

$=1200+1200+1800$

$=4200\ cm^2$

Consider the box 3



Thus, the dimensions of box 2 are: 40 cm, 30 cm and 20 cm.

Therefore, the volume of box3 = $40 \times 30 \times 20 = 24000\ cm^3$

Surface area of box 3 = $2(\ell b + bh + \ell h)$

Since the box is open at the bottom
and from the given figure, we have

Surface area of box 3 = $40 \times 30 + 40 \times 20 + 2(30 \times 20)$

$= 1200 + 800 + 1200$

$= 3200\ cm^2$

Total volume of the box=volume of box 1+volume of box 2
+volume of box 3

$=72000+36000+24000$

$=132000\ cm^3$

Similarly, total surface area of the box

=surface area of box 1
+surface area of box 2
+surface area of box 3

$=7600+4200+3200$

$=15000\ cm^2$