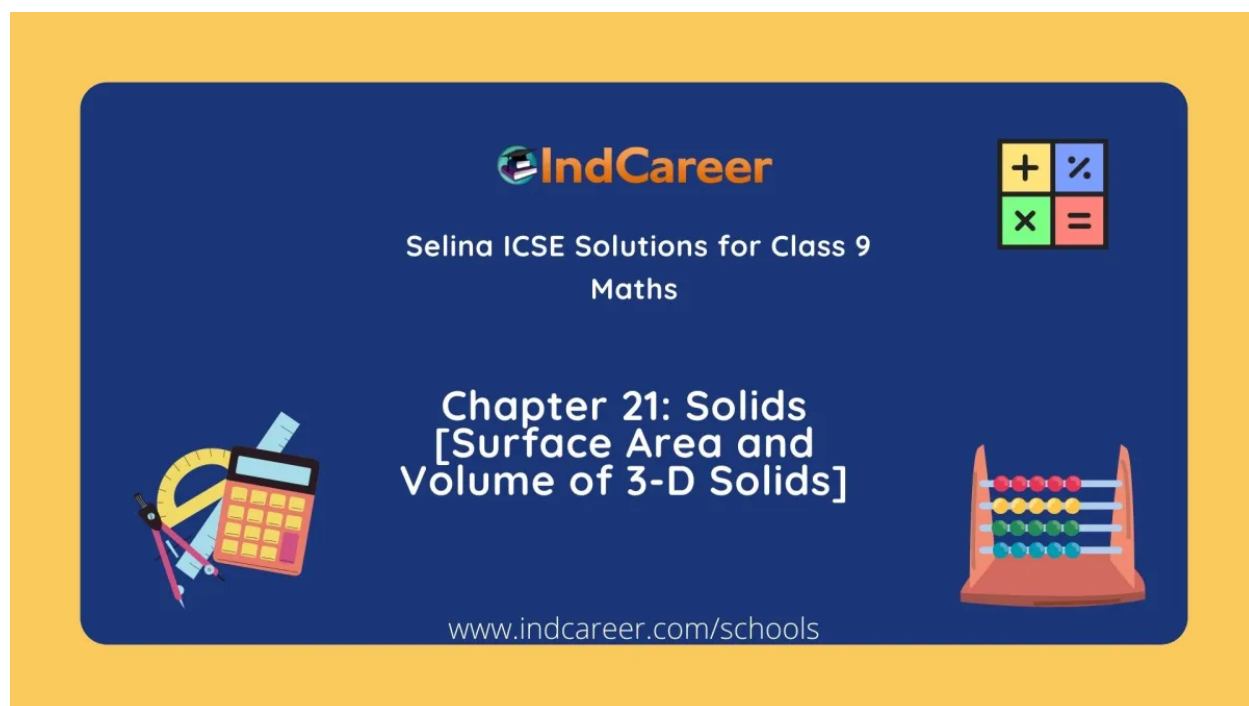


Selina Class 9 ICSE Solutions Mathematics :

Chapter 21- Solids [Surface Area and Volume of 3-D Solids]



For any clarifications or questions you can write to **info@indcareer.com**

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Selina Class 9 ICSE Solutions Mathematics :

Chapter 21- Solids [Surface Area and Volume of 3-D Solids]

Class 9: Maths Chapter 21 solutions. Complete Class 9 Maths Chapter 21 Notes.

Selina Class 9 ICSE Solutions Mathematics : Chapter 21- Solids [Surface Area and Volume of 3-D Solids]

Selina 9th Maths Chapter 21, Class 9 Maths Chapter 21 solutions

Exercise 21(A)

Solution 1:

Let the length, breadth and height of rectangular solid are $5x, 4x, 2x$.

$$\text{Total surface area} = 1216 \text{ cm}^2$$

$$2(5x \cdot 4x + 4x \cdot 2x + 2x \cdot 5x) = 1216$$

$$20x^2 + 8x^2 + 10x^2 = 608$$

$$38x^2 = 608$$

$$x^2 = \frac{608}{38} = 16$$

$$x = 4$$

Therefore, the length, breadth and height of rectangular solid are

$$5 \times 4 = 20 \text{ cm}, 4 \times 4 = 16 \text{ cm}, 2 \times 4 = 8 \text{ cm}.$$

Solution 2:

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Let a be the one edge of a cube.

$$\text{Volume} = a^3$$

$$729 = a^3$$

$$9^3 = a^3$$

$$9 = a$$

$$a = 9 \text{ cm}$$

$$\text{Total surface area} = 6a^2 = 6 \times 9^2 = 486 \text{ cm}^2$$

Solution 3:

$$\text{Volume of cinema hall} = 100 \times 60 \times 15 = 90000 \text{ m}^3$$

$$150 \text{ m}^3 \text{ requires} = 1 \text{ person}$$

$$90000 \text{ m}^3 \text{ requires} = \frac{1}{150} \times 90000 = 600 \text{ persons}$$

Therefore, 600 persons can sit in the hall.

Solution 4:

Let h be height of the room.

$$1 \text{ person requires } 16 \text{ m}^3$$

$$75 \text{ person requires } 75 \times 16 \text{ m}^3 = 1200 \text{ m}^3$$

$$\text{Volume of room is } 1200 \text{ m}^3$$

$$1200 = 25 \times 9.6 \times h$$

$$h = \frac{1200}{25 \times 9.6}$$

$$h = 5 \text{ m}$$

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Solution 5:

$$\text{Volume of melted single cube} = 3^3 + 4^3 + 5^3 \text{ cm}^3$$

$$= 27 + 64 + 125 \text{ cm}^3$$

$$= 216 \text{ cm}^3$$

Let a be the edge of the new cube.

$$\text{Volume} = 216 \text{ cm}^3$$

$$a^3 = 216$$

$$a^3 = 6^3$$

$$a = 6 \text{ cm}$$

Therefore, 6 cm is the edge of cube.

Solution 6:

$$\text{Volume of melted single cube} = x^3 + 8^3 + 10^3 \text{ cm}^3$$

$$= x^3 + 512 + 1000 \text{ cm}^3$$

$$= x^3 + 1512 \text{ cm}^3$$

Given that 12 cm is edge of the single cube.

$$12^3 = x^3 + 1512 \text{ cm}^3$$

$$x^3 = 12^3 - 1512$$

$$x^3 = 1728 - 1512$$

$$x^3 = 216$$

$$x^3 = 6^3$$

$$x = 6 \text{ cm}$$

Solution 7:

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Let the side of a cube be 'a' units.

$$\text{Total surface area of one cube} = 6a^2$$

$$\text{Total surface area of 3 cubes} = 3 \times 6a^2 = 18a^2$$

After joining 3 cubes in a row, length of Cuboid = 3a

Breadth and height of cuboid = a

$$\text{Total surface area of cuboid} = 2(3a^2 + a^2 + 3a^2) = 14a^2$$

$$\text{Ratio of total surface area of cuboid to the total surface area of 3 cubes} = \frac{14a^2}{18a^2} = \frac{7}{9}$$

Solution 8:

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Let the length and breadth of the room is $5x$ and $3x$ respectively.

Given that the four walls of a room at 75 paise per square met Rs. 240.

Thus,

$$240 = \text{Area} \times 0.75$$

$$\text{Area} = \frac{240}{0.75}$$

$$\text{Area} = \frac{24000}{75}$$

$$\text{Area} = 320\text{m}$$

$$\text{Area} = 2 \times \text{Height} (\text{Length} + \text{Breadth})$$

$$320 = 2 \times 5 (5x + 3x)$$

$$320 = 10 \times 8x$$

$$32 = 8x$$

$$x = 4$$

$$\text{Length} = 5x$$

$$= 5(4)\text{m}$$

$$= 20\text{m}$$

$$\text{Breadth} = 3x$$

$$= 3(4)\text{m}$$

$$= 12\text{m}$$

Solution 9:

The area of the playground is 3650 m^2 and the gravels are 1.2 cm deep. Therefore the total volume to be covered will be:

$$3650 \times 0.012 = 43.8 \text{ m}^3.$$

Since the cost of per cubic meter is Rs. 6.40, therefore the total cost will be:

$$43.8 \times \text{Rs.} 6.40 = \text{Rs.} 280.32$$

Solution 10:

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We know that

$$1 \text{ mm} = \frac{1}{10} \text{ cm}$$

$$8 \text{ mm} = \frac{8}{10} \text{ cm}$$

Volume = Base area $\times$ Height

$$\Rightarrow 2880 \text{ cm}^3 = x \times x \times \frac{8}{10}$$

$$\Rightarrow 2880 \times \frac{10}{8} = x^2$$

$$\Rightarrow x^2 = 3600$$

$$\Rightarrow x = 60 \text{ cm}$$

Solution 11:

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$$\text{External volume of the box} = 27 \times 19 \times 11 \text{ cm}^3 = 5643 \text{ cm}^3$$

Since, external dimensions are 27 cm, 19 cm, 11 cm; thickness of the wood is 1.5 cm.

∴ Internal dimensions

$$\begin{aligned} &= (27 - 2 \times 1.5) \text{ cm}, (19 - 2 \times 1.5) \text{ cm}, (11 - 2 \times 1.5) \text{ cm} \\ &= 24 \text{ cm}, 16 \text{ cm}, 8 \text{ cm} \end{aligned}$$

$$\text{Hence, internal volume of box} = (24 \times 16 \times 8) \text{ cm}^3 = 3072 \text{ cm}^3$$

(i)

$$\text{Volume of wood in the box} = 5643 \text{ cm}^3 - 3072 \text{ cm}^3 = 2571 \text{ cm}^3$$

(ii)

$$\text{Cost of wood} = \text{Rs } 1.20 \times 2571 = \text{Rs } 3085.2$$

(iii)

$$\text{Vol. of 4 cm cube} = 4^3 = 64 \text{ cm}^3$$

Number of 4 cm cubes that could be placed into the box

$$= \frac{3072}{64} = 48$$

Solution 12:

Area of sheet = Surface area of the tank

$$\Rightarrow \text{Length of the sheet} \times \text{its width} = \text{Area of 4 walls of the tank} + \text{Area of its base}$$

$$\Rightarrow \text{Length of the sheet} \times 2.5 \text{ m} = 2(20 + 12) \times 8 \text{ m}^2 + 20 \times 12 \text{ m}^2$$

$$\Rightarrow \text{Length of the sheet} = 300.8 \text{ m}$$

$$\text{Cost of the sheet} = 300.8 \times \text{Rs } 12.50 = \text{Rs } 3760$$

Solution 13:

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Let exterior height is h cm. Then interior dimensions are $78-3=75$, $19-3=16$ and $h-3$ (subtract two thicknesses of wood). Interior volume = $75 \times 16 \times (h-3)$ which must = 15 cu dm

$$= 15000 \text{ cm}^3$$

$$(1 \text{ dm} = 10 \text{ cm}, 1 \text{ cu dm} = 10^3 \text{ cm}^3).$$

$$15000 \text{ cm}^3 = 75 \times 16 \times (h-3)$$

$$\Rightarrow h-3 = 15000/(75 \times 16) = 12.5 \text{ cm} \Rightarrow h = 15.5 \text{ cm}.$$

Solution 14:

(i)

If the side of the cube = a cm

The length of its diagonal = $a\sqrt{3}$ cm

And,

$$\begin{aligned}(a\sqrt{3})^2 &= 1875 \\ a &= 25 \text{ cm}\end{aligned}$$

(ii)

Total surface area of the cube = $6a^2$

$$= 6(25)^2 = 3750 \text{ cm}^2$$

Solution 15:

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Given that the volume of the iron in the tube 192 cm^3

Let the thickness of the tube = $x \text{ cm}$

$\therefore$ Side of the external square = $(5 + 2x) \text{ cm}$

$\therefore$ Ext. vol. of the tube - its internal vol. = volume of iron in the tube, we have,

$$(5 + 2x)(5 + 2x) \times 8 - 5 \times 5 \times 8 = 192$$

$$(25 + 4x^2 + 20x) \times 8 - 200 = 192$$

$$200 + 32x^2 + 160x - 200 = 192$$

$$32x^2 + 160x - 192 = 0$$

$$x^2 + 5x - 6 = 0$$

$$x^2 + 6x - x - 6 = 0$$

$$x(x + 6) - (x + 6) = 0$$

$$(x + 6)(x - 1) = 0$$

$$x - 1 = 0$$

$$x = 1$$

Therefore, thickness is 1 cm .

Solution 16:

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Let l be the length of the edge of each cube.

The length of the resulting cuboid = $4 \times l = 4l$ cm

Let width (b) = l cm and its height (h) = l cm

$\therefore$ The total surface area of the resulting cuboid

$$= 2(l \times b + b \times h + h \times l)$$

$$648 = 2(4l \times l + l \times l + l \times 4l)$$

$$4l^2 + l^2 + 4l^2 = 324$$

$$9l^2 = 324$$

$$l^2 = 36$$

$$l = 6 \text{ cm}$$

Therefore, the length of each cube is 6 cm.

$$\frac{\text{Surface area of the resulting cuboid}}{\text{Surface area of cube}} = \frac{648}{6l^2}$$

$$\frac{\text{Surface area of the resulting cuboid}}{\text{Surface area of cube}} = \frac{648}{6(6)^2}$$

$$\frac{\text{Surface area of the resulting cuboid}}{\text{Surface area of cube}} = \frac{648}{216} = \frac{3}{1} = 3:1$$

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

$$= 9 \times 4 \times 3 + 6 \times 4 \times 3$$

$$= 108 + 72$$

$$= 180 \text{ cm}^3$$

Solution 2:

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

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

$$= 90 \text{ cm}^2$$

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

$$= 90 \times 15 \text{ cm}^3$$

$$= 1350 \text{ cm}^3$$

$$= 1350000 \text{ liters} \quad [\text{Since } 1 \text{ cm}^3 = 1000 \text{ lt}]$$

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.

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(i)

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

∴ In $\triangle ADM$,

$$\begin{aligned} AD^2 &= AM^2 + DM^2 && [\text{Using pythagoras theorem}] \\ &= 1^2 + (2.4)^2 \\ &= 1 + 5.76 \\ &= 6.76 \\ &= (2.6)^2 \\ AD &= 2.6 \text{ m} \end{aligned}$$

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

Length = 40 m

∴ Internal surface area of the tunnel (except floor)

$$\begin{aligned} &= (17.2 \times 40 - 40 \times 7) \text{ m}^2 \\ &= (688 - 280) \text{ m}^2 \\ &= 408 \text{ m}^2 \end{aligned}$$

Rate of painting = Rs 5 per m^2

Hence, total cost of painting = $\text{Rs } 5 \times 408 = \text{Rs } 2040$

(ii)

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

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

Total cost = $280 \times 18 = \text{Rs } 5040$

Solution 4:

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(i)

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

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

(ii)

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

$$\text{Since } 1000 \text{ cm}^3 = 1 \text{ lt}$$

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

Solution 5:

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

$$\text{Vol. of water flowing} = \text{area of cross section} \times \text{speed of water}$$

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

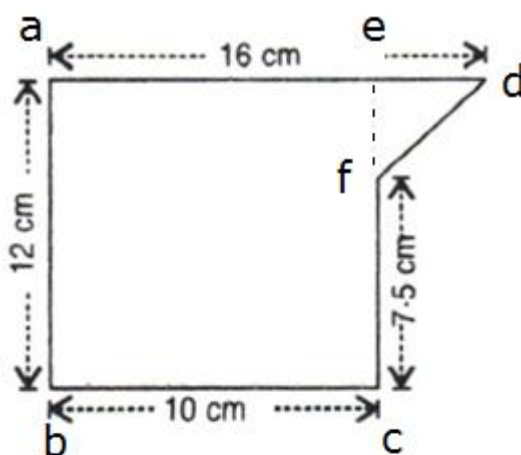
$$\Rightarrow \text{speed of water} = \frac{5000}{2} \frac{\text{cm}}{s}$$

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

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

Solution 6:

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(i)

Area of total cross section = Area of rectangle abce + area of $\triangle def$

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

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

$$= 120 + 13.5 \text{ cm}^2$$

$$= 133.5 \text{ cm}^2$$

(ii)

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

$$= 133.5 \text{ cm}^2 \times 400 \text{ cm} = 53400 \text{ cm}^3$$

1 cubic centimetre of the metal weighs 6.6 g

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

$$= 352.440 \text{ kg}$$

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

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Solution 7:

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

$$\text{One liter} = 1000 \text{ cm}^3$$

Vol. of water flowing in per sec =

$$\begin{aligned} 1.5 \text{ cm}^2 \times 3.2 \frac{\text{m}}{\text{s}} &= 1.5 \text{ cm}^2 \times \frac{(3.2 \times 100) \text{ cm}}{\text{s}} \\ &= 480 \frac{\text{cm}^3}{\text{s}} \end{aligned}$$

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

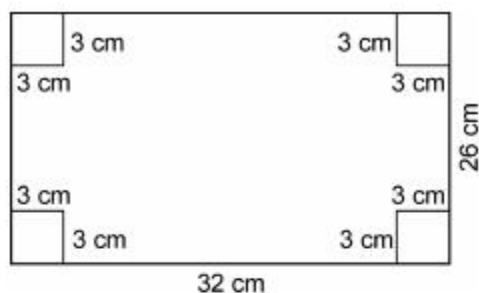
Hence,

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

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

Solution 8:

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Length of sheet=32 cm

Breadth of sheet=26 cm

Side of each square=3cm

$$\therefore \text{Inner length}=32-2 \times 3=32-6=26 \text{ cm}$$

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

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

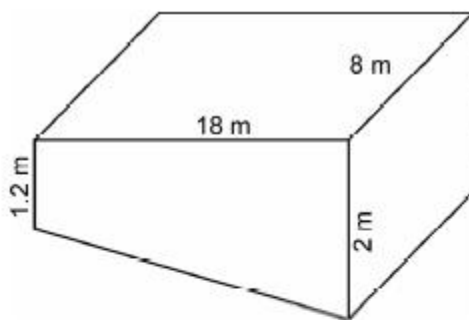
Breadth of the container= 20 cm and height of the container= 3 cm

$$\therefore \text{Vol. of the container}=l \times b \times h$$

$$=26\text{cm} \times 20\text{cm} \times 3\text{cm}=1560 \text{ cm}^3$$

Solution 9:

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Length of pool= 18 m

Breadth of pool= 8 m

Height of one side= 2m

Height on second side=1.2 m

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

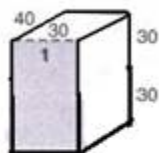
$$= \frac{18 \times 8 \times 3.2}{2}$$

$$= 230.4 \text{ m}^3$$

Solution 10:

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Consider the box 1



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

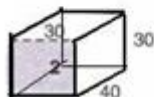
Therefore, the volume of box1 = $60 \times 40 \times 30 = 72000 \text{ cm}^3$

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,

$$\begin{aligned}\text{Surface area of box 1} &= 40 \times 40 + 40 \times 30 + 40 \times 30 + 2(60 \times 30) \\ &= 1600 + 1200 + 1200 + 3600 \\ &= 7600 \text{ cm}^2\end{aligned}$$

Consider the box 2



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

Therefore, the volume of box 2 = $40 \times 30 \times 30 = 36000 \text{ cm}^3$

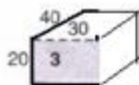
Surface area of box 2 = $2(\ell b + bh + \ell h)$

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

$$\begin{aligned}\text{Surface area of box 2} &= 40 \times 30 + 40 \times 30 + 2(30 \times 30) \\ &= 1200 + 1200 + 1800 \\ &= 4200 \text{ cm}^2\end{aligned}$$

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Consider the box 3



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

Therefore, the volume of box 3 = $40 \times 30 \times 20 = 24000 \text{ cm}^3$

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

$$\begin{aligned}\text{Surface area of box 3} &= 40 \times 30 + 40 \times 20 + 2(30 \times 20) \\ &= 1200 + 800 + 1200 \\ &= 3200 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Total volume of the box} &= \text{volume of box 1} + \text{volume of box 2} \\ &\quad + \text{volume of box 3} \\ &= 72000 + 36000 + 24000 \\ &= 132000 \text{ cm}^3\end{aligned}$$

Similarly, total surface area of the box

$$\begin{aligned}&= \text{surface area of box 1} \\ &\quad + \text{surface area of box 2} \\ &\quad + \text{surface area of box 3} \\ &= 7600 + 4200 + 3200 \\ &= 15000 \text{ cm}^2\end{aligned}$$

Exercise 21(C)

Solution 1:

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The perimeter of a cube formula is, Perimeter = $4a$ where (a = length)

Given that perimeter of the face of the cube is 32 cm

$$\Rightarrow 4a = 32 \text{ cm}$$

$$\Rightarrow a = \frac{32}{4}$$

$$\Rightarrow a = 8 \text{ cm}$$

We know that surface area of a cube with side ' a ' = $6a^2$

$$\text{Thus, Surface area} = 6 \times 8^2 = 6 \times 64 = 384 \text{ cm}^2$$

We know that the volume of a cube with side ' a ' = a^3

$$\text{Thus, volume} = 8^3 = 512 \text{ cm}^3$$

Solution 2:

Given dimensions of the auditorium are: $40 \text{ m} \times 30 \text{ m} \times 12 \text{ m}$

The area of the floor = 40×30

Also given that each student requires 1.2 m^2 of the floor area.

$$\text{Thus, Maximum number of students} = \frac{40 \times 30}{1.2} = 1000$$

Volume of the auditorium

$$= 40 \times 30 \times 12 \text{ m}^3$$

= Volume of air available for 1000 students

$$\text{Therefore, Air available for each student} = \frac{40 \times 30 \times 12}{1000} \text{ m}^3 = 14.4 \text{ m}^3$$

Solution 3:

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Length of longest rod = Length of the diagonal of the box

$$17 = \sqrt{12^2 + x^2 + 9^2}$$

$$17^2 = 12^2 + x^2 + 9^2$$

$$x^2 = 17^2 - 12^2 - 9^2$$

$$x^2 = 289 - 144 - 81$$

$$x^2 = 64$$

$$x = 8 \text{ cm}$$

Solution 4:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-21-solids-surface-area-and-volume-of-3-d-solids/>

(i)

$$\text{No. of cube which can be placed along length} = \frac{30}{3} = 10.$$

$$\text{No. of cube along the breadth} = \frac{24}{3} = 8$$

$$\text{No. of cubes along the height} = \frac{15}{3} = 5.$$

$$\therefore \text{The total no. of cubes placed} = 10 \times 8 \times 5 = 400$$

(ii)

$$\text{Cubes along length} = \frac{30}{4} = 7.5 = 7$$

$$\text{Cubes along width} = \frac{24}{4} = 6 \text{ and cubes along height} = \frac{15}{4} = 3.75 = 3$$

$$\therefore \text{The total no. of cubes placed} = 7 \times 6 \times 3 = 126$$

(iii)

$$\text{Cubes along length} = \frac{30}{5} = 6$$

$$\text{Cubes along width} = \frac{24}{5} = 4.8 = 4 \text{ and cubes along height} = \frac{15}{5} = 3$$

$$\therefore \text{The total no. of cubes placed} = 6 \times 4 \times 3 = 72$$

Solution 5:

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Vol. of the tank = vol. of earth spread

$$4 \times 6^3 \text{ m}^3 = (112 \times 62 - 4 \times 6^2) \text{ m}^2 \times \text{Rise in level}$$

$$\begin{aligned} \text{Rise in level} &= \frac{4 \times 6^3}{112 \times 62 - 4 \times 6^2} \\ &= \frac{864}{6800} \\ &= 0.127 \text{ m} \\ &= 12.7 \text{ cm} \end{aligned}$$

Solution 6:

Let a be the side of the cube.

Side of the new cube = $a+3$

Volume of the new cube = $a^3 + 2457$

That is, $(a+3)^3 = a^3 + 2457$

$$\Rightarrow a^3 + 3 \times a \times 3(a+3) + 3^3 = a^3 + 2457$$

$$\Rightarrow 9a^2 + 27a + 27 = 2457$$

$$\Rightarrow 9a^2 + 27a - 2430 = 0$$

$$\Rightarrow a^2 + 3a - 270 = 0$$

$$\Rightarrow a^2 + 18a - 15a - 270 = 0$$

$$\Rightarrow a(a+18) - 15(a+18) = 0$$

$$\Rightarrow (a-15)(a+18) = 0$$

$$\Rightarrow a - 15 = 0 \text{ or } a + 18 = 0$$

$$\Rightarrow a = 15 \text{ or } a = -18$$

$$\Rightarrow a = 15 \text{ cm [since side cannot be negative]}$$

Volume of the cube whose side is 15 cm = $15^3 = 3375 \text{ cm}^3$

Suppose the length of the given cube is reduced by 20%.

$$\begin{aligned} \text{Thus new side } a_{\text{new}} &= a - \frac{20}{100} \times a \\ &= a \left(1 - \frac{1}{5} \right) \\ &= \frac{4}{5} \times 15 \\ &= 12 \text{ cm} \end{aligned}$$

Volume of the new cube whose side is 12 cm = $12^3 = 1728 \text{ cm}^3$

Decrease in volume = $3375 - 1728 = 1647 \text{ cm}^3$

Solution 7:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-21-solids-surface-area-and-volume-of-3-d-solids/>

The dimensions of rectangular tank: $30\text{ cm} \times 20\text{ cm} \times 12\text{ cm}$

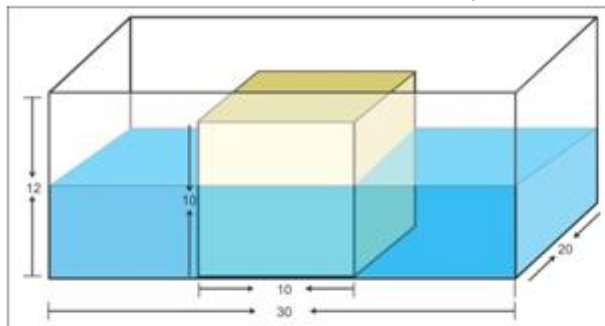
Side of the cube = 10 cm

Volume of the cube = $10^3 = 1000\text{ cm}^3$

The height of the water in the tank is 6 cm .

Volume of the cube till $6\text{ cm} = 10 \times 10 \times 6 = 600\text{ cm}^3$

Hence when the cube is placed in the tank,
then the volume of the water increases by 600 cm^3 .



The surface area of the water level

is $30\text{ cm} \times 20\text{ cm} = 600\text{ cm}^2$

Out of this area, let us subtract the
surface area of the cube.

Thus, the surface area of the

shaded part in the above figure is 500 cm^2

The displaced water is spreaded out

in 500 cm^2 to a height of 'h' cm.

And hence the volume of the water

displaced is equal to the volume
of the part of the cube in water.

Thus, we have,

$$500 \times h = 600\text{ cm}^3$$

$$\Rightarrow h = \frac{600}{500}\text{ cm}$$

$$\Rightarrow h = 1.2\text{ cm}$$

Thus, now the level of the water in the tank

is $= 6 + 1.2 = 7.2\text{ cm}$

Remaining height of the water level,

so that the metal cube is just

submerged in the water $= 10 - 7.2 = 2.8\text{ cm}$

Thus the volume of the water that must be

poured in the tank so that the metal

cube is just submerged in the water $= 2.8 \times 500 = 1400\text{ cm}^3$

We know that $1000\text{ cc} = 1\text{ litre}$

Thus, the required volume of water $= \frac{1400}{1000} = 1.4\text{ litres}$.

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Solution 8:

The dimensions of a solid cuboid are: 72 cm, 30 cm, 75 cm

Volume of the cuboid = $72 \text{ cm} \times 30 \text{ cm} \times 75 \text{ cm} = 162000 \text{ cm}^3$

Side of a cube = 6 cm

Volume of a cube = $6^3 = 216 \text{ cm}^3$

The number of cubes = $\frac{162000}{216} = 750$

The surface area of a cube = $6a^2 = 6 \times 6^2 = 216 \text{ cm}^2$

Total surface area of 750 cubes = $750 \times 216 = 162000 \text{ cm}^2$

Total surface area in square metres = $\frac{162000}{10000}$
= 16.2 square metres

Rate of polishing the surface per square metre = Rs. 150

Total cost of polishing the surfaces = $150 \times 16.2 = \text{Rs. } 2430$

Solution 9:

The dimensions of a car petrol tank are: 50 cm $\times$ 32 cm $\times$ 24 cm

Volume of the tank = 38400 cm^3

We know that $1000 \text{ cm}^3 = 1 \text{ litre}$

Thus volume of the tank = $\frac{38400}{1000} = 38.4 \text{ litres}$

The average consumption of the car = 15 Km/litre

Thus, the total distance that can be covered by the car = $38.4 \times 15 = 576 \text{ Km}$

Solution 10:

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Given dimensions of a rectangular box are in the ratio 4:2:3

Therefore, the total surface area of the box = $2[4x \times 2x + 2x \times 3x + 4x \times 3x]$
 $= 2(8x^2 + 6x^2 + 12x^2) \text{ m}^2$

Difference between cost of covering the box with paper at Rs.12 per m^2 and with paper at Rs.13.50 per m^2 = Rs.1,248

$$\Rightarrow 52x^2[13.5 - 12] = 1248$$

$$\Rightarrow 52 \times x^2 \times 1.5 = 1248$$

$$\Rightarrow 78 \times x^2 = 1248$$

$$\Rightarrow x^2 = \frac{1248}{78}$$

$$\Rightarrow x^2 = 16$$

$$\Rightarrow x = 4 \text{ [Length, width and height cannot be negative]}$$

Thus, the dimensions of the rectangular box are: $4 \times 4 \text{ m}$, $2 \times 4 \text{ m}$, $3 \times 4 \text{ m}$

Thus, the dimensions are 16 m, 8 m and 12 m.



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