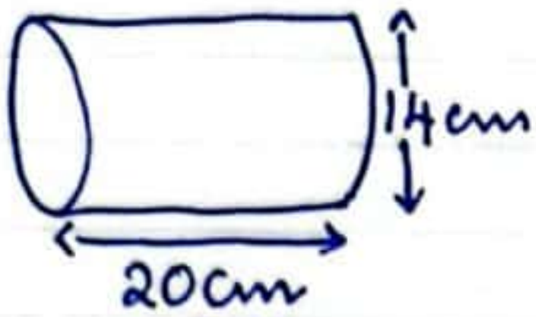
Homework - 19th Feb (Surface area and volume)

1) The side of a cube whose surface area is 600 sq.cm is
(a) 12cm (b) 10cm (c) 8cm (d) 14cm

2) The volume of a cube having side 1.5m is —
(a) $2.5m^3$ (b) $3.75m^3$ (c) $3.375m^3$ (d) $3.25m^3$

3) 

The volume of the cylinder is —
(a) $5600 cm^3$ (b) $3800 cm^3$
(c) $4200 cm^3$ (d) $3080 cm^3$

4) If each edge of a cube is doubled, its surface area will increase
(a) 2 times (b) 3 times (c) 4 times (d) 6 times.

5) If each edge of a cube is doubled, its volume will increase
(a) 6 times (b) 8 times (c) 4 times (d) remain same

6) The maximum length of a rod that can be kept in a box of dimensions 12cm x 9cm x 8cm is
(a) 14cm (b) 18cm (c) 17cm (d) 29.3cm

7) Total surface area of a cube is 294 sq.cm ; then its volume is
(a) $243 cm^3$ (b) $343 cm^3$ (c) $294 cm^3$ (d) $512 cm^3$

8) Volume of a cube is $125 cm^3$, its total surface area is (a) $120 cm^2$ (b) $175 cm^2$ (c) $150 cm^2$ (d) $100 cm^2$

9) The volume of a box having length and height as 4cm and 3cm respectively is $48 cm^3$, its breadth is
(a) 4cm (b) 6cm (c) 5cm (d) 8cm

10) One cubic centimetre of iron weighs 10g, then the weight of solid rectangular iron piece of size 40cm x 30cm x 20cm is
(a) 200kg (b) 260kg (c) 240kg (d) 284kg.

fill in the blanks

1) The dimensions of a hall are 80m, 40m and 20m respectively. _____ persons can sit in the hall, if each person requires $160 m^3$ of air.

2) The edge of a cube is 3cm, its surface area is ___ cm^2.

3) The longest pole that can be put in a room of dimension 10m × 10m × 5m is ____

4) _____ cubes each of 10cm edge can be put in a cubical box of edge 1 metre.

5) The volume of a cuboid whose base area is 28 sq.m and height 6m is ____

6) Three cubes each of sides 3cm, 4cm and 5cm are melted to form a new cube. The side of the new cube is ___

7) Two cubes have their volumes in the ratio 1:8, the ratio of their surface areas is ___

Answer the following

1) How many litres of water flow out of a pipe having an area of cross-section of 6 sq.cm in one minute, if the speed of water in the pipe is 42cm/sec?

2) A rectangular strip of dimensions 21cm × 7cm is rolled along the longer side. find the volume of the solid thus generated.

3) The curved surface area of a right circular cylinder of height 28cm is $880 cm^2$. Find the radius of the base of the cylinder.

4) The surface area of a cube is $1350 cm^2$. find its volume.

5) A cuboid has a square base of side 6m and its height is 9m. find its (i) lateral surface area (ii) total surface area.

6) A circular swimming pool has a diameter of 15m and an even depth of 2m. find
(i) the volume of water in cubic metres
(ii) the capacity of swimming pool in litres ($\pi = 3.14$)

7) The volume and curved surface area of a cylinder is $2310 cm^3$ and $660 cm^2$ respectively. find its base radius and height.

8) A rectangular piece of paper, 22cm × 14cm is folded without overlapping to make a cylinder of height 14cm. find the volume of the cylinder.

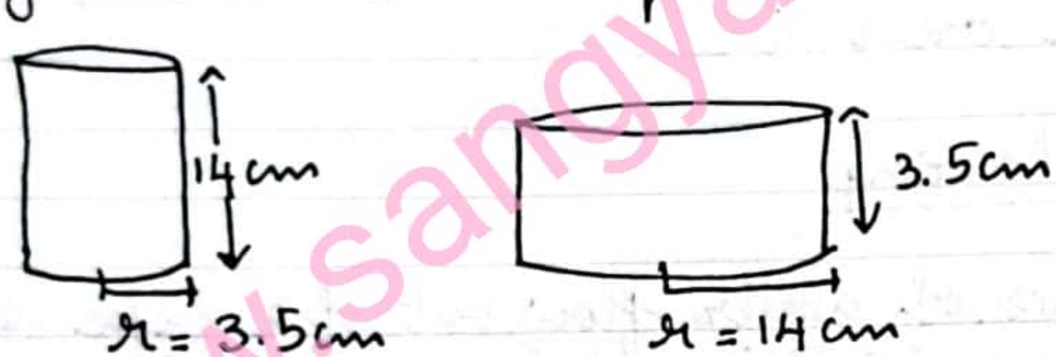
9) The internal measures of a cuboidal room are

10m × 8m × 4m. find the total cost of whitewashing all four walls of the room, if the cost of whitewashing is ₹10 per sq.m. What will be the cost of whitewashing, if the ceiling of the room is also whitewashed?

10) The curved surface area and the volume of a cylindrical pillar is 550 sq.cm and 1375 cm^3. find its diameter and height.

11) The edges of a cuboid are in the ratio 1:2:3 and its surface area is 198 sq.cm. find the volume of the cuboid.

12)



Which of the two cylinders will have a greater volume? Whose curved surface area is greater? Check whether the cylinder with greater volume also has greater surface area?

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VIII Homework - 19th Feb (Answers)

1) Surface area of a cube = $6a^2 = 600 cm^2$

$a^2 = 100$

$a = \sqrt{100} = 10cm$ (b)

2) $a = 1.5m$

volume of a cube = $a^3 = (1.5)^3 = 3.375 m^3$ (c)

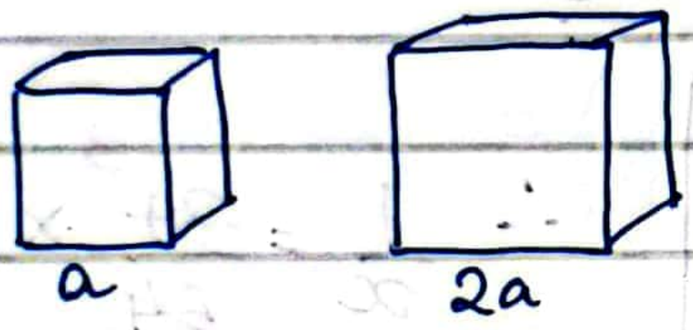
3) $r = \frac{14}{2} = 7cm$

$h = 20cm$

Volume of the cylinder = $\pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times 20 = 3080 cm^3$ (d)

4)



Original surface area = $6a^2$

new surface area = $6(2a)^2 = 6 \times 4a^2$

$= 4(6a^2)$

ie, 4 times (c)

5) Original volume = a^3

new volume = $(2a)^3 = 8(a^3)$

ie, 8 times (b)

6) Maximum length of rod = diagonal of box

$= \sqrt{l^2 + b^2 + h^2}$

$= \sqrt{12^2 + 9^2 + 8^2}$

$= \sqrt{144 + 81 + 64} = \sqrt{289}$

$= 17cm$ (c)

7) Total surface area of a cube = $6a^2 = 294 cm^2$

$a^2 = 49$

$a = \sqrt{49} = 7cm$

$\therefore$ volume = $a^3 = 7^3 = 343 cm^3$ (b)

8) volume of a cube = $a^3 = 125 cm^3$

$a = \sqrt[3]{125} = 5cm$

$\therefore$ T.S.A = $6a^2 = 6 \times 5^2 = 6 \times 25$

$= 150 cm^2$ (c)

9) $l = 4cm$
$h = 3\ cm$
volume $= l \times b \times h = 48 cm^3$
$\therefore b = \frac{48}{4 \times 3} = 4cm$ (a)

10) density of iron $= 10 g/cm^3$
volume of rectangular iron piece $= l \times b \times h$
$= 40 \times 30 \times 20$
$= 24000\ cm^3$
$\therefore$ weight $=$ density $\times$ volume $= 10 \times 24000 = 240000 g$
$= 240 kg$ (c)

Fill in the blankes

1) volume of cuboidal hall $= l \times b \times h = 80 \times 40 \times 20$
$= 64000 m^3$
volume of air required for 1 person $= 160 m^3$
$\therefore$ No. of persons $= \frac{64000}{160} = \underline{\underline{400}}$

2) $a = 3cm$
T.S.A of Cube $= 6a^2 = 6 \times 3 \times 3 = \underline{\underline{54 cm^2}}$

3) length of longest pole $= \sqrt{l^2 + b^2 + h^2} = \sqrt{10^2 + 10^2 + 5^2}$
$= \sqrt{100 + 100 + 25} = \sqrt{225} = \underline{\underline{15m}}$

4) $a = 10cm$
$A = 1m = 100cm$
no. of Cubes $= \frac{\text{volume of Cubical box}}{\text{volume of 1 cube}} = \frac{A^3}{a^3} = \frac{100 \times 100 \times 100}{10 \times 10 \times 10}$
$= \underline{\underline{1000 \text{ cubes}}}$

5) Base area of a cuboid $= l \times b = 28 m^2$
$h = 6m$
$\therefore$ volume $= l \times b \times h = 28 \times 6 = \underline{\underline{168 m^3}}$

6) $a_1^3 + a_2^3 + a_3^3 = A^3$
$3^3 + 4^3 + 5^3 = A^3$
$A^3 = 27 + 64 + 125 = 216$
$A = \sqrt[3]{216} = \underline{\underline{6cm}}$

7) $\frac{a_1^3}{a_2^3} = \frac{1}{8}$

$\left(\frac{a_1}{a_2}\right)^3 = \frac{1}{8}$

$\therefore \frac{a_1}{a_2} = \frac{1}{2}$ //

The ratio of Surface areas

$= \frac{6a_1^2}{6a_2^2} = \left(\frac{a_1}{a_2}\right)^2 = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$

$= 1:4$

Answer the following :-

1) distance of water flowing through the pipe in 1 second = 42cm

$\therefore$ distance covered in 60sec(1min) = 42×60

$= 2520$ cm

Area of cross section of pipe = $6cm^2$

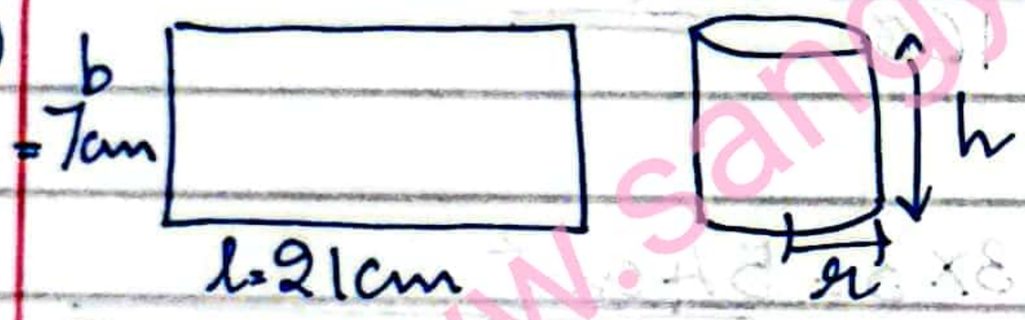
$\therefore$ volume of water flowing in 1minute

$= 2520 \times 6$

$= 15120\ cm^3$

$= \underline{15.12 \text{ litres}}$

2)



$2\pi r = 21$

$r = \frac{21}{2 \times 22} \times 7 = \frac{147}{44}$ cm

$h = 7$cm

$\therefore$ volume $= \pi r^2 h = \frac{\cancel{22}^{1} \times \frac{147}{\cancel{44}_{2}} \times \frac{147}{44} \times 7}{\cancel{7}_{1}}$

$= \underline{245.55\ cm^3}$

3) $h = 28$cm ; C.S.A of a cylinder $= 2\pi rh$

$2\pi rh = 880$

$r = \frac{880 \times 7}{2 \times 22 \times 28} = \underline{5cm}$

4) Hence, the radius of the base = 5cm

Surface area of a cube = $6a^2 = 1350$

$a^2 = \frac{1350}{6} = 225$

$\therefore a = \sqrt{225} = 15\,cm$

volume $= a^3 = 15 \times 15 \times 15 = \underline{\underline{3375\,cm^3}}$

5) $l = 6m$

$b = 6m$

$h = 9m$

(i) L.S.A of a Cuboid $= 2h(l+b) = 2 \times 9(6+6) = 18 \times 12$

$= \underline{\underline{216\,m^2}}$

* (ii) T.S.A of a Cuboid = LSA + base area $\times 2 = 216 + l \times b \times 2$

$= 216 + 2 \times 6 \times 6 = 216 + 36 \times 2 = \underline{\underline{288\,m^2}}$

6) $r = \frac{15}{2}\,m$

$h = 2m$

(i) volume of water $= \pi r^2 h = 3.14 \times \frac{15}{2} \times \frac{15}{2} \times 2 = \underline{\underline{353.25\,m^3}}$

(ii) volume in litres $= \underline{\underline{353250\,l}}$

7) $\pi r^2 h = 2310\,cm^3 \longrightarrow (1)$

$2\pi r h = 660\,cm^3 \longrightarrow (2)$

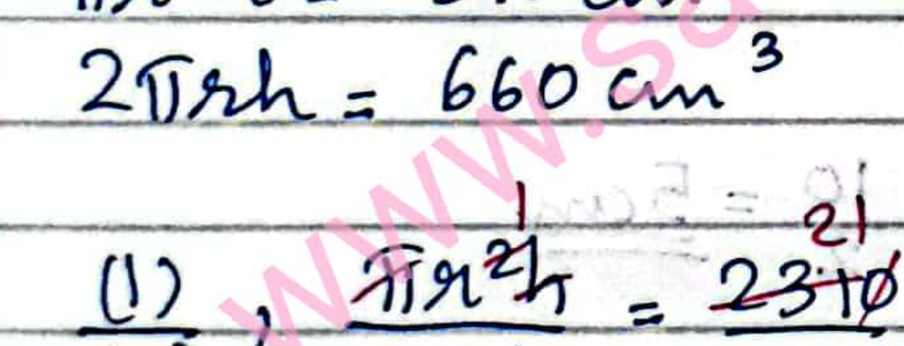
$\frac{(1)}{(2)}, \frac{\pi r^2 h}{2\pi r h} = \frac{2310}{660} \Rightarrow \frac{r}{2} = \frac{21}{6}$

$\therefore r = \frac{21 \times 2}{6} = \underline{\underline{7cm}}$

From eq: (2), $2 \times \frac{22}{7} \times 7 \times h = 660$

$h = \frac{660}{44} = \underline{\underline{15cm}}$

8)



$2\pi r = 22$

$r = \frac{22}{2 \times 22} \times 7 = \frac{7}{2}\,cm$

volume of cylinder

$= \pi r^2 h = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 14$

$= \underline{\underline{539\,cm^3}}$

9) $l = 10m$
$b = 8m$
$h = 4m$; Rate of white washing = ₹10/m^2
Area of four walls = $2h(l+b) = 2\times4(10+8) = 8\times18$
$= 144m^2$

∴ Cost of white washing = area × rate
four walls $= ₹1440$

area of ceiling $= l \times b$
$= 10 \times 8 = 80m^2$

∴ Total cost of white washing 4 fours and ceiling $= (144+80)\times10$
$= 224 \times 10 = ₹2240$

10) C.S.A of a cylinder $= 550cm^2$
$2\pi rh = 550 \longrightarrow (1)$
Volume of a cylinder $= 1375cm^3$
$\pi r^2 h = 1375 \longrightarrow (2)$

$\frac{(1)}{(2)}$, $\frac{2\pi rh}{\pi r^2 h} = \frac{550}{1375}$

$\frac{2}{r} = \frac{\cancel{550}^{110}}{\cancel{1375}_{275}}\ \cancel{22}\ 55$

$\frac{2}{r} = \frac{2}{5} \Rightarrow r = \frac{10}{2} = \underline{5cm}$

From eq: (1), $2\times\frac{22}{7}\times5\times h = 550$

$h = \frac{\cancel{550}^{110}\times7}{2\times22\times\cancel{5}1} = \frac{35}{2} = \underline{17.5cm}$

Hence, the diameter $= 2r = 10cm$
height $= 17.5cm$

11) Let $l = x$; $b = 2x$; $h = 3x$
Surface area of a cuboid $= 2(lb+bh+hl) = 198cm^2$
$\Rightarrow 2(2x^2+6x^2+3x^2) = 198$
$11x^2 = 99$
$x^2 = 9$
$x = \sqrt{9} = 3cm$

∴ $l = 3cm$, $b = 6cm$, $h = 9cm$
Volume of the cuboid $= l\times b\times h = \underline{162cm^3}$

12)

$r_1 = 3.5\text{cm}$

$h_1 = 14\text{cm}$

volume $= \pi r_1^2 h_1$

$= \frac{22}{7} \times 3.5 \times 3.5 \times 14^{2}$

$= 539\text{cm}^3$

$r_2 = 14\text{cm}$

$h_2 = 3.5\text{cm}$

volume $= \pi r_2^2 h_2$

$= \frac{22}{7} \times 14 \times 14 \times 3.5^{0.5}$

$= 2156\text{cm}^3$

Thus the second cylinder has greater volume

C.S.A $= 2\pi r_1 h_1$

$= 2 \times \frac{22}{7} \times 3.5 \times 14^{2}$

$= 308\text{cm}^2$

C.S.A $= 2\pi r_2 h_2$

$= 2 \times \frac{22}{7} \times 14^{2} \times 3.5$

$= 308\text{cm}^2$

Thus both the cylinders have same curved surface area.
