Name : ____________________________

Grade : VIII

Subject : Mathematics

Chapter : 11. Mensuration

Objective Type Questions

1 Marks

I. Multiple choice questions

1. A cube of side 5 cm is painted on all its faces. If it is sliced into 1 cubic cm cubes, how many 1 cubic cm cubes will have exactly one of their faces painted? [NCERT Exemplar]

   a. 27 b. 42 c. 54 d. 142

2. A cube of side 4 cm is cut into 1 cm cubes. What is the ratio of the surface areas of the original cubes and cut-out cubes? [NCERT Exemplar]

   a. 1 : 2 b. 1 : 3 c. 1 : 4 d. 6 : 1

3. The surface area of the three coterminous faces of a cuboid are 6, 15 and 10 cm^2 respectively. The volume of the cuboid is : [NCERT Exemplar]

   a. 30 cm^3 b. 40 cm^3 c. 20 cm^3 d. 35 cm^3

4. A regular hexagon is inscribed in a circle of radius r. The perimeter of the regular hexagon is [NCERT Exemplar]

   a. 3r b. 6r c. 9r d. 12r

5. The dimension of a godown are 40 m, 25 m and 10 m. If it is filled with the cuboidal boxes each of dimension 2 m x 1.25 m x 1 m, then the number of boxes will be : [NCERT Exemplar]

   a. 1800 b. 2000 c. 4000 d. 8000

6. The volume of the cube is 64 cm^3. Its lateral surface area is : [NCERT Exemplar]

   a. 16 cm^2 b. 64 cm^2 c. 96 cm^2 d. 128 cm^2

7. If the radius of the cylinder is tripled but its curved surface area is unchanged, then its height will be [NCERT Exemplar]

   a. tripled b. constant c. one sixth d. one third

8. How many small cubes with edge of 20 cm each can be just accommodated in a cuboidal box of 2 m edge? [NCERT Exemplar]

   a. 10 b. 100 c. 1000 d. 10000

9. The volume of a cylinder whose radius r is equal to its height is : [NCERT Exemplar]

   a. $\frac{1}{4}\pi r^3$ b. $\pi r^3/ 32$ c. πr^3 d. $\pi r^3/ 8$

10. The volume of the cube whose edge is 3x is: [NCERT Exemplar]

a. $27x^3$ b. $9x^3$ c. $6x^3$ d. $3x^3$

11. The area of a parallogram is 60 sq. cm and one of its altitude is 5 cm. The length of its corresponding side is [NCERT Exemplar]

a. 12 cm b. 6 cm c. 4 cm d. 2 cm

12. The perimeter of the trapezium is 52 cm and its each non parallel sides are equal to 10 cm with its height 8 cm. Its area is [NCERT Exemplar]

a.124 sq. cm b. 118 sq. cm c. 128 sq. cm d. 112 sq. cm

13. Area of the quadrilateral ABCD is 20 sq. cm and perpendicular on BD from opposite vertices are 1 cm and 1.5 cm. The length of BD is [NCERT Exemplar]

a. 4 cm b. 15 cm c. 16 cm d. 18 cm

14. A metal sheet 27 cm long, 8 cm broad and 1 cm thick is melted into cube. The side of the cube is [NCERT Exemplar]

a. 6 cm b. 8 cm c. 12 cm d. 24 cm

15. Three cubes of metal whose edges are 6 cm, 8 cm and 10 cm respectively are melted to form a single cube. The edge of the new cube is [NCERT Exemplar]

a. 12 cm b. 24 cm c. 18 cm d. 20 cm

16. A covered wooden box has the inner measures as 115 cm, 75 cm and 35 cm and thickness of wood as 2.5 cm. The volume of the wood is : [NCERT Exemplar]

a. 85000 cu. cm b. 80000 cu. cm c. 82125 cu. cm d. 84000 cu. cm

17. The ratio of radii of two cylinder is 1 : 2 and the height are in the ratio 2 : 3. The ratio of their volume is : [NCERT Exemplar]

a. 1 : 6 b. 1 : 9 c. 1 : 3 d. 2 : 9

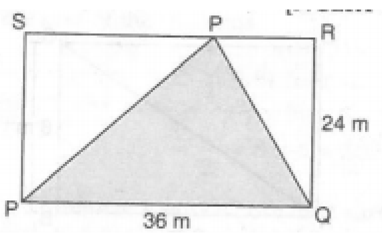
18. Two cubes have volumes in the ratio 1 : 64. The ratio of the area of a face of first cube to the other is: [NCERT Exemplar]

a. 1 : 4 b. 1 : 8 c. 1 : 16 d. 1 : 32

19. The surface area of the six faces of a rectangular solid are 16, 16, 32, 32, 72 and 72 sq. cm. The volume the solid, in cu. cm is [NCERT Exemplar]

a. 192 b. 384 c. 480 d. 2592

20. If R is the radius of the base of the hat, then the total outer surface area of the hat is:



[NCERT Exemplar]

a. $\pi r(2h+R)$ b. $2\pi r(h+R)$ c. $2\pi rh + \pi R^2$ d. None of these

1. c	2. d	3. a	4. b	5. c	6. b	7. d	8. c	9. c	10. a
11. a	12. c	13. c	14. a	15. a	16. c	17. a	18. c	19. a	20. c

II. Multiple choice questions

1. What will be the change in the volume of a cube when its side becomes 10 times theoriginal side? [NCERT Exemplar]

   (a) Volume becomes 1080 times (b) Volume becomes 10 times
   (c) Volume become 100 times (d) Volume becomes $\frac{1}{1000}$ times

2. A cube of side 4 cm is cut into 1 cm cubes. What is the ratio of the surface area of the cut-out cubes and original cube? [NCERT Exemplar]

   (a) 1 :2 (b) 1 :3 (c) 1 :4 (d) I :6

3. What is the area of the largest triangle that can be fitted into a rectangle of length l units and width w units? [NCERT Exemplar]

   (a) $lw/2$ (b) $lw/3$ (c) $lw/6$ (d) $lw/4$

4. If the height of a cylinder becomes $\frac{1}{4}$of the original height and the radius is doubled, then which of the following will be true? [NCERT Exemplar]

   (a) Volume of cite cylinder will be doubled.
   (b) Volume of the cylinder will remain unchanged.
   (c) Volume of the cylinder will be halved
   (d) Volume of the cylinder will be $\frac{1}{4}$ of the original volume.

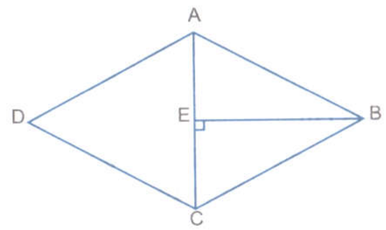
5. The dimensions of a godown are 40 m, 25 m and 10 m. If it is filled with cuboidal boxes each of dimensions 2 m x 1.25 m x 1 m, then the number of boxes will be [NCERT Exemplar]

   (a) 1800 (b) 2000 (c)4000 (d) 8000

6. The volume of a cylinder whose radius r is equal to its height is INCERT Exemplar]

   (a) $\frac{1}{4}\ \pi r^3$ (b) $\frac{\pi r^3}{32}$ (c)πr^3 (d) $\frac{\pi r^3}{8}$

7. What is the area of the rhombus ABCD, if AC = 6 cm, and BE = 4 cm? [NCERT Exemplar]



   (a) 36 cm² (b) 16 cm² (c) 24 cm² (d) 13 cm²

8. The area of a parallelogram is 60 cm2 and one of its altitude is 5 cm. The length of its corresponding side is [NCERT Exemplar]

   (a) 12 cm (b) 6 cm (c) 4 cm (d) 2 cm

9. The perimeter of a trapezium is 52 cm and its each non-parallel side equal to 10 cm with its height 8 cm. Its area is

(a) 124 cm^2 (b) 118 cm^2 (c) 128 cm^2 (d) 112 cm^2

10. The ratio of radii of two cylinders is 1 : 2 and heights are in the ratio 2 : 3. The ratio of their volumes is [NCERT Exemplar]

(a) become half (b) become one-fourth

(c) become one-eighth (d) remain unchanged

12. A rectangular water tank is 2 m 50 cm by 1 m 60 cm by 1 m 40 cm. How many litres of water does it hold when filled to the brim?

(a) 5,600 L (b) 56,000 L (c) 5,60,000 L (d) 560 L

13. The height of a cylinder whose radius is 7 cm and the total surface area is 968 cm^2 is

(a) 10 cm (b) 12 cm (c) 15 cm (d) 20 cm

14. The circumference of the base of a cylinder is 176 cm and otsjeogjtos 40 cm. The lateral surface area of the cylinder is

(a) 7,040 cm^2 (b) 98,560 cm^2 (c) 11,440 cm^2 (d) 14080 cm

15. The perimeter of a semi-circle of radius 10.5 cm is

(a) 33 cm (b) 43.5 cm (c) 54 cm (d) 60 cm

1. a	2. c	3. a	4. b	5. c	6. C	7. C	8. a
9. c	10. a	11. c	12. a	13. c	14. a	15. c	

I. Fill in the blanks

1. A cube of side 5 cm is cut into 1 m cubes. The percentage increases in volume after such cutting is ________________.

2. The surface area of a cuboid formed by joining two cubes of side a face is ________________. [NCERT Exemplar]

3. The volume of the cylinder becomes ______ the original volume if its radius become half of the original radius. [NCERT Exemplar]

4. Area of a rhombus = $\frac{1}{2}$ x product of _____.

1. None	2. $10a^2$	3. $\frac{1}{4}$	4. Diagonals

I. True or False

1. Two cuboids with equal volumes will always have equal surface areas. [NCERT Exemplar]

2. The area of a trapezium become 4 times if its height gets doubled. [NCERT Exemplar]

3. A cube of side 3 cm painted on all its faces, when sliced into 1 cu. cm, will have exactly 1 cube with none of its faces painted. [NCERT Exemplar]

4. Two cylinders with equal volume will always have equal surface areas. [NCERT Exemplar]

5. Ratio of area of a circle to the area of the square whose side equal radius of circle is 1 : π.

[NCERT Exemplar]

1. False	2. False	3. True	4. False	5. False

I. Very Short Answer Type Questions.

1. The area of two circles are in the ratio 49 : 64. Find the ratio of their circumference.

[NCERT Exemplar]

Sol. Given, $\pi r_1^2 : \pi r_2^2 = 49 : 64$

$$\frac{\pi r_1{}^2}{\pi r_2{}^2} = \frac{49}{64}$$

$$\frac{r_1{}^2}{r_2{}^2} = \frac{49}{64}$$

$$\frac{r_1}{r_2} = \frac{7}{8}$$

$$r_1 : r_2 = 7 : 8$$

Now, ratio of the circumference

$= 2\pi r_1 : 2\pi r_2$

$= r_1 : r_2 = 7 : 8$

2. A bicycle wheel makes 500 revolutions in moving 1 km. Find the diameter of the wheel.

[NCERT Exemplar]

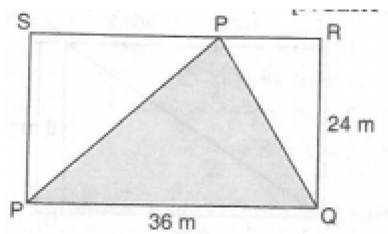
Sol. 500 revolution = 1 km = 1000 m

1 revolution $= \frac{1000}{500} = 2$

$\pi d = 2$

$$d = \frac{2}{\pi} = \frac{2 \times 7}{22} = 0.636 \text{ m}$$

3. Find the area of the shaded portion in the following figure. **[NCERT Exemplar]**



Sol. Shaded area is triangle $= \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times 36 \times 24$

$= 432$ sq. m.

4. How many cubic meters of earth much be dug to constant a well 7 m deep and of diameter 2.8 m?

[NCERT Exemplar]

Sol. Here, d = 2.8 m

$r = \frac{2.8}{2} = 1.4$ m

$h = 7$ m

$\therefore$ Volume of well (cylinder) $= \pi r^2 h$ cu. units

$= \frac{22}{7} \times 1.4 \times 1.4 \times 7$

$= 43.12$ cu. m

5. Find the area of rhombus whose diagonals are 12 cm and 9.2 cm.

Sol. Let d_1 and d_2 be the diagonals of rhombus.

$\therefore$ $d_1 = 12$ cm and $d_2 = 9.2$ cm

Since Area of rhombus $= ½ \times d_1 \times d_2$

$\therefore$ Area of given rhombus $= \frac{1}{2} \times 12 \times 9.2$ cm^2

$= 6 \times 9.2$ cm^2

$= 55.2$ cm^2

6. If the length of each edge of a cube is tripled, what will be the change in its volume?

[NCERT Exemplar]

Sol. Volume of cube $= a^3$

Let edge of new cube $= 3a$

Then, Volume of new cube $= (3a)^3$

$= 27 a^3$

$=$ 27 times the original volume

7. How many cubes each of side 0.5 cm are required to build a cube of volume 8 cm^3?

[NCERT Exemplar]

Sol. Side of cube $= 0.5$ cm

Volume $= (0.5)^3 = 0.125$ cm^3

No. of cubes $= \frac{8}{0.125} = 64$ cubes

8. Find the length of the longest pole that can be put in a room of dimensions 10 m by 10 m by 5 m.

Sol. Science, $l = 10$ m, $b = 10$ m and $h = 5$ m

Since length of the longest pole = length of the diagonal

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

$= \sqrt{10^2 + 10^2 + 5^2}$

$= \sqrt{100 + 100 + 25}$

$= \sqrt{225}$

$= 15$ m

9. A carpenter makes a box which has the volume of 134000 cu. cm. the base has an area of 670 sq. cm. what is the height of the box?

Sol. Volume of the box $= 134000$ cu. cm

Area of the base $= 670$ sq. cm

Height of the box $= \frac{volume}{area} = \frac{13400}{670}$ =20 cm.

10. Find the lateral surface area of cube, if the length of each edge of the cube is 7 cm.

Sol. Let each edge of the cube a = 7 cm,

Then, lateral surface area of the cube = 4 a^2

$= 4 \times 7^2$

$= 4 \times 49 = 196$ sq. cm

II. Very Short Answer Type Questions.

1. A carpenter makes a box which has a volume of 13,400 cm^3. The base has an area of 670 cm^2. What is the height of the box? [NCERT Exemplar]

Sol. Height of box $= \frac{Volume\ of\ box}{Basearea\ of\ box} = \frac{13,400}{670} = 20$

Hence the height of box = 20 cm.

2. What is the surface area of cuboid formed by joining two cubes of side a?

Sol. Length = 2a Breadth = a Height = a

T.S.A. $= 2\ (l1, + bb\ +\ hl)$

$= 2(2a \times a + a \times a + a \times 2a)$

$= 2 \times 5a^2 = 10a^2$

3. Find the volume of cube whose edge is $3x$.

Sol. Volume of cube = $(\text{edge})^3 = (3x)^3 = 27x^3$

4. What is the side of cube if a cuboidal sheet 27 cm long, 8 cm broad and 1 cm thick, is melted into a cube?

Sol. Volume of cuboid $= I \times b \times h$

$= 27 \times 8 \times cm^3$

$= 216\ cm^3$ = Volume of cube

Edge of cube = $\sqrt[3]{216}$=6cm.

5. What is the height of cylinder if the radius of a cylinder is tripled but its curved surface area is unchanged?

Sol. Let the height of new cylinder be h_1.

According to question

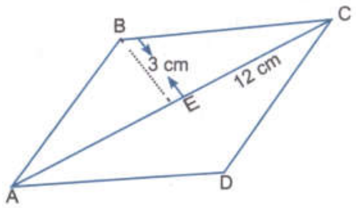
C.S.A. of old cylinder = C.S.A. of new cylinder

$27\pi rh = 2 \times \pi \times 3r \times h_1$

Hence, height will become $\frac{1^{rd}}{3}$ of the old cylinder.

6. Find the area of the quadrilateral in which

AB = CD and BC = AD.



Sol. Area of ABCD = 2(Area of &ΔABC)

$= 2(\frac{1}{2} \times AC \times BE)$

$= 12 \times 3 = 36\ cm^2$

7. What is the edge of new cube if three cubes of metal whose edges are 6 cm, 8 cm and 10 cm respectively are melted to form a single cube?

Sol. Volume of big cube = Volume of cube 1 + Volume of cube 2 + Volume of cube 3

$= (6)^3 + (8)^3 + (10)^3$

$= 216 + 512 + 1000$

$= 1728 \text{ cm}^3$

Edge of new cube $= \sqrt[3]{Volume}$ cm $= \sqrt[3]{1728} = 12$ cm

8. What is the ratio of area of circle to the area of a square whose side equals radius of a circle?

Sol. The side of square is equal to radius of the circle then a = r.

$$\frac{\text{Areaofcircle}}{\text{Areaofsquare}} = \frac{\pi r^2}{r \times r} = \frac{\pi r^2}{r^2} = \pi : 1$$

9. Write the expression to find area of 4 walls.

Sol. Area cif four walls $= 2(l + b)$

10. What is the ratio of their heights if two cylinder of same volume have their radii in the ratio 1 : 6?

Sol. Equating the volume of 2 cylinders

$\pi r^2 h = \pi (6r)^2 \times h_1$

$h_1 = \frac{\pi r^2 h}{r \times 36 r^2} \quad \Rightarrow \quad \frac{h}{h_1} = \frac{36}{1}$

Hence, the ratio of their height = 36 : 1.

11. Find the side of a cube whose surface area is 600 cm².

Sol. Surface area of cube $= 6a^2$

$6a^2 = 600$ [Given]

$a^2 = \frac{600}{6} = 100 \quad \Rightarrow \quad a = 10\ cm$

Hence, the side of a cube = 10 cm

12. A closed cylindrical tank of radius 7 m and height 3 m is made from a sheet of metal. How much sheet of metal is required?

Sol. T.S.A. of cylinder $= 2\pi(r + h)$

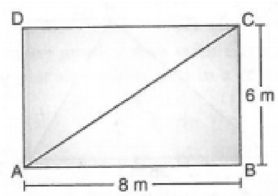
$= 2 \times \frac{27}{7} \times 7(7 + 3)$

$= 44 \times 10 = 440 \text{ m}^2$

Hence, 440 m² sheet will be required for tank.

I. Short Answer Type Questions.

1. The area of a rectangle field in 48 sq. m and one of its sides is 6 m. How long will a lady take to cross the field diagonally at the rate of 20 m/ min?



Sol. Area of rectangle field = 48 sq. m

One side = 6 m

Other side $= \frac{48}{6} = 8$ m

Diagonal of rectangle $= \sqrt{8^2 + 6^2}$

$= \sqrt{64 + 36}$

$= 10$ m

Lady covers 20 m in 1 minute

Lady covers 10 m in $\frac{1}{2}$ min or 30 sec

2. The walls and ceiling of a room are to be plastered. The length, breadth and height of the room are 4.5 m, 3 m, 350 cm respectively. Find the cost of plastering at the rate of Rs. 8 per sq. m.

Sol. Here l = 4.5 m, b = 3 m, h = 350 cm = 3.5 m

Total surface area of room (cuboid) = 2 [lb + bh + hl]

$= 2[4.5 \times 3 + 3 \times 3.5 + 3.5 \times 4.5]$

$= 2[13.5 + 10.5 + 15.75]$

$= 2[39.75]$

$= 79.5$ sq. m

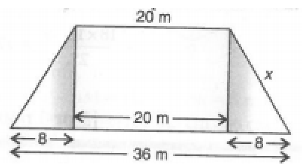
Required area for plastering = 79.5 – Ar. of base(surface)

$= 79.5 - 13.5 = 66$ sq. m

Cost of plastering $= 66 \times 8 =$ Rs. 528.

3. The area of a trapezium with equal non parallel sides is 168 sq. m. If the length of the parallel sides are 36 m and 20 m, find the length of non-parallel sides. **[NCERT Exemplar]**

Sol. Let the length of non-parallel side = x m



Draw perpendicular, then height of the trapezium h $= \sqrt{x^2 - 64}$

i.e., Ar. Of trapezium = 168 sq. m

$\Rightarrow \frac{1}{2}$ (sum of parallel sides) × height = 168 sq. m

$\Rightarrow \frac{1}{2}(36 + 20) \times \sqrt{x^2 - 64} = 168$

$\Rightarrow \sqrt{x^2 - 64} = 6$

$\Rightarrow x^2 - 64 = 36$

$\Rightarrow x^2 = 100$

$\Rightarrow x = 10$ m

4. Find the capacity of water tank, in litres, whose dimensions areb4.2 m, 3 m and 1.8m.

[NCERT Exemplar]

Sol. Volume of the water tank $= (4.2 \times 3 \times 1.8)$ cu. m

$= 22.68$ cu. m

Since, 1 cu. m = 1000 L

$\therefore$ 22.68 cu. m $= 22.68 \times 1000$

$= 22680$ litres

5. The ratio of the radius and height of a cylinder in 2 : 3. If its volume is 12,936 cu. cm. find the curved surface area of cylinder. **[NCERT Exemplar]**

Sol. Let r $= 2x$ and h $= 3x$

Volume of cylinder = 12936 cu. m

$$\pi r^2 h = 12936$$

$$\frac{22}{7} \times 4x^2 \times 3x = 12936$$

$$x^3 = \frac{12968 \times 7}{12 \times 22} = 343$$

$$x = \sqrt[3]{343} = 7$$

∴ r = 14 cm, h = 21 cm

Surface area of cylinder = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 14 \times 21 = 1848 \text{ sq. cm}^2$$

6. The ratio between the curved surface area and total surface area of a right circular cylinder is 1:2. Find the ratio between the height and radius of the cylinder. **[NCERT Exemplar]**

Sol. Give, $2\pi rh : 2\pi rh(r + h) = 1 : 2$

$\Rightarrow \quad \frac{2\pi rh}{2\pi r\,(r+h)} = \frac{1}{2}$

$\Rightarrow \quad \frac{h}{r+h} = \frac{1}{2}$

$\Rightarrow \quad 2h = r + h$

$\Rightarrow \quad h = r$

$\Rightarrow \quad \frac{h}{r} = \frac{1}{1}$

$\Rightarrow \quad h : r = 1 : 1$

7. 160 m³ of water is to be used to irrigate a rectangular field whose area is 800 m². What will be the height of the water level in the field? **[NCERT Exemplar]**

Sol. Volume of water = 160 m^3

Area of rectangular field = 800 m^2

Let h be the height of water level in the field.

Now, volume of water = volume of cuboid formed on the field by water.

160 = Area of base x height

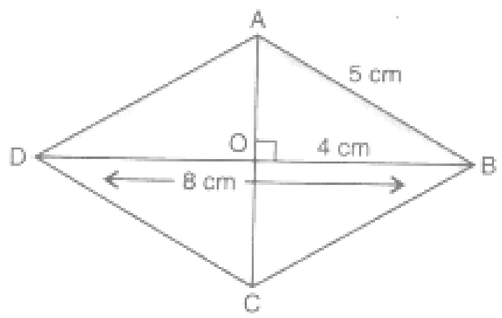
= 800 x h

$$h = \frac{160}{800} = 0.2$$

So, required height = 0.2 m.

8. Find the area of a rhombus whose one side measures 5 cm and one diagonal is 8 cm.

Sol. Let ABCD be the rhombus as shown below.



Since, diagonals of a rhombus are perpendicular bisectors of each other. Therefore, using Pythagoras theorem in DA08,

$$AO^2 + OB^2 = AB^2$$

$$AO = \sqrt{AB^2 - OB^2}$$

$$= \sqrt{5^2 - 4^2}$$

So, $AC = 2 \times 3 = 6$ cm

Thus, the area of the rhombus

$$= \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \text{x } 8\ 6 = 24 \text{ cm}^2$$

9. Find the volume of a cube whose total surface area is 486 cm².

Sol. Let the length of each edge of the cube = a

Then, its total surface area = $6a^2$

According to problem,

$$6a^2 = 486 \text{ or } a^2 = \frac{486}{6}$$

Or $a^2 = 81$ or $a^2 = \sqrt{81}$

Or a = 9 cm

Since, volume of the cube = a^3 cubic units

$$= 9^3$$

$$= 9 \text{ x } 9 \text{ x } 9$$

$$= 729 \text{ cm}^3$$

10. Now many 3 metre cubes can be cut from a cuboid measuring 18 m x 12 m x 9 m?

Sol. Let the edge of the each cube = a = 3 m

Then, volume of each cube = a^3

$$= 3^3 = 27 \text{ m}^3$$

and Volume of cuboid = $l \times b \times h$

$$= 18 \text{ x } 12\ 9 \text{ m}^3$$

Therefore,

$$\text{Number of cubes} = \frac{Volume\ (cuboid)}{Volume\ (cube)}$$

$$= \frac{18 \times 12 \times 9}{27} = 72$$

II. Short Answer Type Questions.

1. The area of a trapezium is 150 cm² and its height is 12 cm. 1f one of the parallel side is two-third the other side, find the two parallel sides.

Sol. Area of Trapezium = 150 cm².

Height = 12 cm

Let two parallel sides be x and $\frac{2x}{3}$

Area of trapezium $= \frac{1}{2} \times$ sum of parallel sides $\times$ height

$150 = \frac{1}{2}\left(x + \frac{2}{3}x\right) \times 12$

$150 \times 2 = \left(\frac{3x + 2x}{3}\right) \times 12$

$300 = \frac{5x}{3} \times 12 \quad \Rightarrow \quad 300 = 20x$

$\frac{300}{20} = x \quad \Rightarrow \quad x = 15\ cm$

$\therefore$ The parallel sides are 15 cm and $\frac{2}{3} \times 15 = 10$ cm

2. Find the height of the cylinder whose volume is 1.54 m³ and diameter of the base is 140 cm.

[NCERT Exemplar]

Sol. Radius = 70 cm = 0.7 m

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

$\frac{154}{100} = \frac{22}{7} \times \frac{7}{10} \times \frac{7}{10} \times h$

$\frac{154}{100} = \frac{7 \times 10 \times 10}{22 \times 7 \times 7} = h \quad \Rightarrow \quad h = 1$

Hence, the height of cylinder = 1 m = 100 cm.

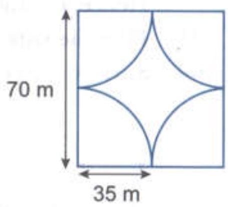
3. Four horses are tethered with equal ropes at 4 corners of a square field of side 70 metres so that they can just reach one another. Find the area left ungrazed by the horses. [NCERT Exemplar]

Sol. Unglazed area = Area of square - Area of circle

$= 70 \times 70 - \frac{22}{7} \times 35 \times 35$

$= 4{,}900 - 3{,}850 = 1050\ m^2$

$\therefore$ Area left ungrazed = 1.050 m^2.



4. The walls and ceiling of a room are to be plastered. The length, breadth and heigti of the room are 4.5 m, 3 m, and 350 cm respectively. Find the cost of plastering at the rate of Rs.8 per m².

[NCERT Exemplar]

Sol. Area to be plastered = (Area of 4 walls + Area of ceiling)

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

$= [2 \times (4.5 + 3) \times 3.5 + 4.5 \times 3]$

$= [7 \times 7.5 + 13.5]$

$= 52.5 + 13.3 = 66\ m^2$

$\therefore$ The cost of plastering $= 66 \times 8 =$ Rs.528

5. The areas of two circles are in the ratio 49 : 64. Find the ratio their circumferences.

Sol. Let the radius of first circle be r_1 and radius of second circle be r_2.

$\frac{\text{Area of first circle}}{\text{Area of second circle}} = \frac{49}{64}$

$\frac{\pi r_1^2}{\pi r_2^2} = \frac{49}{64} = \frac{r_1}{r_2} = \sqrt{\frac{49}{64}} = \frac{7}{8}$

Now, $\frac{\text{Circumference of first circle}}{\text{Circumference of second circle}} = \frac{2\pi r_1}{2\pi r_2} = \frac{7}{8}$

Hence, their circumferences are in the ratio 7 :8.

6. There is a circular pond and a footpath runs along its boundary. A person walks around it, exactly once keeping close to the edge. If his step is 66 cm long and he takes exactly 400 steps to go around the pond, find the diameter of the pond. **[NCERT Exemplar]**

Sol. Circumference of a circular pond = Distance covered in one revolution

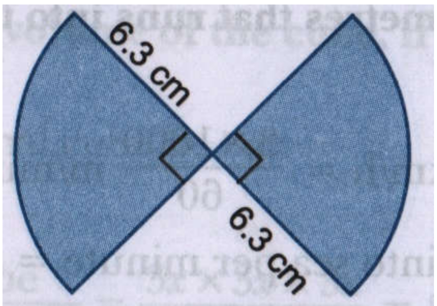
$\Rightarrow \quad 2\,\pi r = 66 \times 400$

$\Rightarrow \quad 2\times\frac{22}{7} \times r = 66 \times 400$

$r = \frac{66 \times 400 \times 7}{2 \times 22} = 4200 \text{ cm} = 42 \text{ m}.$

$\therefore$ Diameter of the pond = 2 × radius = 2 × 42 = 84 m

7. Find the perimeter of the given figure. **[NCERT Exemplar]**



Sol. Perimeter of the figure = Semi circumference + 2 × diameter

$= \pi r + 2d$

$= \frac{22}{7} \times 6.3 + 2 \times 12.6$

$= 19.8 + 25.2 = 45 \text{ cm}$

8. A bicycle wheel makes 500 revolutions in moving 1 km. Find they diameter of thewheel.

[NCERT Exemplar]

Sol. Circumference of wheel = rd= Distance covered in one revolution

Given, 1 km = 500 × distance covered in one revolution

$1{,}000 \text{ m} = 500 \times n \times d$

$1{,}000 = 500 \times \frac{22}{7} \times d$

$d = \frac{1000 \times 7}{500 \times 22} = 0.636\, m$

9. How many cubic metres of earth must be dug to construct a well 7 m deep and of diameter 2.8 m?

[NCERT Exemplar]

Sol. Volume of earth dug out = Volume of cylinder = $\pi r^2 h$

$= \frac{22}{7} \times \frac{14}{10} \times \frac{14}{10} \times 7 = 43.12 \text{ m}^3$

10. The radius and height of a cylinder are in the ratio 3 : 2 and its volume is 19 ,4% cm3. Find its radius and height. **[NCERT Exemplar]**

Sol. Let the radius and height of cylinder be $3x$ *and* $2x$

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

$9{,}404 = \frac{22}{7} \times 3x \times 3x \times 2x$

$\Rightarrow \quad x^3 = \frac{19404 \times 7}{22 \times 9 \times 2} \quad \Rightarrow \quad x^3 = 49 \times 7 \quad \Rightarrow \quad x = 7$

Hence, the radius $= 3x = 3 \times 7 = 21$ cm and height $= 2x = 2 \times 7 = 14$ cm.

11. If the length of each edge of a cube is tripled, what will be the change in its volume?

[NCERT Exemplar]

Let the original edge $= x$ m

$\therefore$ The length of changed edge $= 3x\ m$

Now, $\frac{\text{Volume of cube with changed edge}}{\text{Volume of cube with original edge}} = \frac{(3x)^3}{x^3} = \frac{27}{1}$

Hence. volume of the changed cube becomes 27 times of the original cube.

12. A river 2 m deep and 45 m wide is flowing at the rate of 3 km per hour. Find the amount of water in cubic metres that runs into the sea per minute. **[NCERT Exemplar]**

Sol. h $= 2$ m; b $= 45$ m; l $= 3$ km. h $= \frac{3 \times 1000}{60}\ m/minutes$

Volume of water running into sea per minute $= l \times b \times h$

$$= \frac{3 \times 1000}{60} \times 2 \times 45 = 4{,}500 \text{m}^3$$

13. A truck carrying 7.8 m³ concrete arrives at a job site. A platform of width 5 m and height 2 m is being constructed at the site. Find the length of the platform, constructed from the amount of concrete on the truck. **[NCERT Exemplar]**

Sol. Volume of truck $= 7.8$ m^3

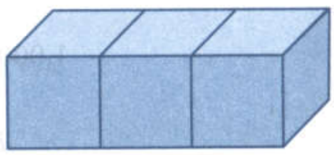
Volume of truck = Volume of platform $7.8 = L \times 5 \times 2$

$$\text{L} = \frac{7.8}{10} = 0.78\ m$$

14. Three cubes each of side 10 cm are joined end to end. Find the surface area of the resultant figure.

[NCERT Exemplar]

Sol. Side of cube = 10 cm



When 3 cubes are joined then the cuboid will be formed

Now $l = 10 + 10 + 10 = 30$ cm, b $= 10$ cm, h $= 10$ cm

Total surface area of cuboid $= 2lb + bit + hl)$

$$= 2(30 \times 10 + 10 \times 10 + 10 \times 30),$$

$$= 2(300 + 100 + 300) = \_L400 \text{ cm}^2$$

15. A swimming pool is 200 m by 50 m and has an average depth of 2 m. By the end of a summer day, the water level drops by 2 cm. How many cubic metres of water is lost on the day? [NCERT Exemplar]

Sol. Water capacity of swimming pool l $\times$ b $\times$ h

$$= 200 \times 50 \times 2$$

$$= 20{,}000 \text{ m}^3$$

During summer $h = 2 - 0.02 = 1.98\ m$

The water capacity $= 200 \times 50 \times 1.98 = 19{,}800$ m^2

Difference of volume = 20,000 − 19,800 = 200

Hence, volume of water lost is 200 m^3.

16. Metallic discs of radius 0.75 cm and thickness 0.2 cm are melted to obtain 508.68 cm^3 of metal. Find the number of discs melted (uses $\mathbf{r = 3.14}$). [NCERT Exemplar]

Sol. Let the number of discs melted be n

Given n(Volume of a disc) = Volume of metal

$n(\pi r^2 h) = 508.68$

$n(3.14 \times (0.75)^2 \times 0.2 = 508.68$

$n = \frac{50868}{3.14 \times 0.2 \times 0.5625} = 1{,}440\ discs.$

17. What will happen to the volume of the cube, if its edge is (i) tripled (ii) reduced to one-fourth? [NCERT Exemplar]

Sol. (i) Let the edge of original cube be xm

the new edge $= 3x\ m$

$$\frac{\text{Volume of new cube}}{\text{Volume of original cube}} \frac{3x \times 3x\ x\ 3x}{x \times x \times\ x} = 27$$

(ii) Let original edge of cube be x m

the new edge $= \left(\frac{x}{4}\right) m$

$$\frac{\text{Volume of new cube}}{\text{Volume of original cub}} = \frac{\frac{x}{4} \times \frac{x}{4} \times \frac{x}{4}}{x^3} = \frac{1}{64}$$

Hence, in first case the volume will become 27 times and in second ear will become $\frac{1}{64}$times of the original.

18. From a pipe of inner radius 0.75 col, water flows at the rate of 7 m per second. Find the volume in litres of water delivered by the pipe in 1 hour. [NCERT Exemplar]

Volume of pipe (water deliver in 1 second) $= \pi r^2 h$

$= \frac{22}{7} \times 0.75 \times 0.75 \times 700$

$= 12.375 \times 100$

$= 1237.5\ cm^3 = 1.2375$ L

Hence, water deliver in 1 hour = 1.2375 × 3600 = 4455 L

19. Water flows from a tank with a rectangular base measuring 80 cm by 70 cm into another tank with a square base of side 60 cm. If the water m the first tank 45 cm deep, how deep will it be in the second tank? [NCERT Exemplar]

Sol. Let the height in the square base tank be h m

Volume of rectangular base tank = volume of square basetaml

80 x 70 x 45 = 60 x 60 x h.

$h = \frac{80 \text{ x } 70 \text{ x } 4}{60 \text{ x } 60}\ \ 70\ cm$

Hence, the height of the square base tank will be 70 cm.

I. Long Answer Type Questions.

1. Radius of a cylinder is *r* and the height is *h*. Find the change in the volume if the

(a) height is doubled

(b) height is doubled and the radius is halved

(c) height remains same and the radius is halved. **[NCERT Exemplar]**

Sol. Volume of cylinder = $\pi r^2 h$

(a) Height is doubled i.e., h' = 2h

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

$= nr^2 (2h)$

$= 2\pi r^2 h$ (Double of the original)

(b) h' = 25 and r' = $\frac{r}{2}$

Then volume of cylinder = $\pi r^2 h$

$= \pi \left(\frac{r}{2}\right)^2 \text{ x } 2h$

$= \pi \times \frac{r^2}{4} \times 2h$

(Half of the original)

(c) $r' = \frac{r}{2}$

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

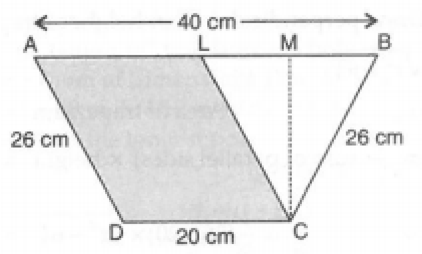
$= \pi \left(\frac{r}{2}\right)^2 h$

$\frac{1}{4}\pi r^2 h$

(One fourth of the original)

2. The parallel sides of a trapezium are 40 cm and 20 cm. If its non-parallel sides are equal, each being 26 cm, find the area of the trapezium. **[NCERT Exemplar]**

Sol. Let ABCD be the trapezium such that AB = 40 cm and CD = 20 cm and AD = BC = 26 cm.



Now, draw CL || AD

Then, ALCD is a parallelogram

So, AL = CD = 20 cm and CL = AD 26m.

In ΔCLB, we have

CL = CB = 26 cm

Therefore, ΔCLB is an isosceles triangle.

Draw altitude CM of ΔCLB.

Since, ΔCLB is an isosceles triangle.

So, CM is also the median.

Then, LM = MB = $\frac{1}{2}$BL = $\frac{1}{2}$ x 20 cm = 10 cm

[as BL = AB - AL = (40 - 20) cm = 20 cm].

Applying Pythagoras theorem in ΔCLM,

we have, $CL^2 = CM^2 + LW^2$

$26^2 = CM^2 + 10^2$

$CM^2 = 26^2 - 10^2$

= (26 -10) (26 + 10)

= 16 x 36 = 576

CM = $\sqrt{576}$ = 24 cm

Hence, the area of the trapezium

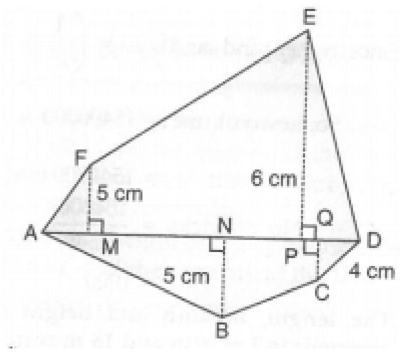
= $\frac{1}{2}$x (sum of parallel sides) x Height

= $\frac{1}{2}$ (20 + 40) x 24

= 30 x 24 = 720 cm^2

3. Find the area of polygon ABCDEF, if AD = 18 cm, AQ = 14 cm, AP = 12 cm, AN = 8 cm, AM = 4 cm, and FM, EP, QC and EN are perpendiculars diagonal AD. [NCERT Exemplar]

Sol.



In the figure,

MP = AP - AM = (12 - 4) cm = 8m

PD = AD-AP = (18 - 12)cm = 6 cm

NQ = AQ - AN = (14 - 8)cm = 6 cm

QD AD - AQ (18 - 14) cm = 4 cm

Area of the polygon ABCDEF

= area of ΔAFM + area of trapezium FMPE + area of ΔEPD + area of ΔANB + area of trapezium NMCQ + area of ΔQCD.

= $\frac{1}{2}$ AM x FM x $\frac{1}{2}$ (FM + EP) x MP + $\frac{1}{2}$PD x EP + $\frac{1}{2}$(NB + CQ) x NQ + $\frac{1}{2}$QD x CQ

= $\frac{1}{2}$x 4 x 5 + $\frac{1}{2}$(5 + 6) x 8 + $\frac{1}{2}$ x 6 x 6 + $\frac{1}{2}$ x 8 x 5 + $\frac{1}{2}$ (5 + 4) x 6 + $\frac{1}{2}$ x 4 x 4

= 10 + 44 + 18 + 20 + 27 + 8 = 127 cm^2

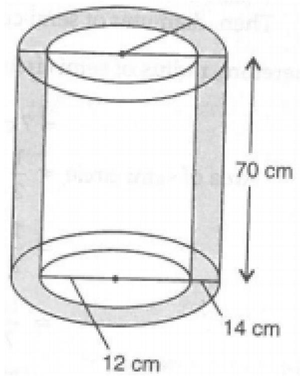
4. The thickness of a hollow metallic cylinder is 2cm. Its 70 cm long with outer radius of 14 cm. Find the volume of the metal used in making the cylinder, assuming that it is open at both the ends Also find its weight if the metal weight is 8 g per cm³. **[NCERT Exemplar]**

Sol. Let inner radius be r_1 and outer radius be r_2,

Then, $r_2 = 14$ cm

$r_1 = 14 - 2 = 12$ cm

$h = 70$ cm



Volume of metal (v) $= \pi\,(r_2^2 - \; r_1^2)h$

$= \frac{22}{7}(14^2 - 12^2) \times 70$

$v = \frac{22}{7}(196 - 144) \times 70$

$= 22 \times 52 \times 10$

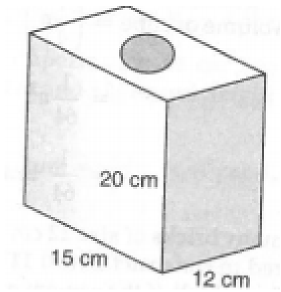
$v = 11440$ cm^3

Now, weight of 1 cm^3 metal = 8 g.

Weight of 11440 cm^3 metal = 11440 x 8

= 91520 g

5. Find the area to be painted in the following block with a cylindrical hole. Given that length is 150 cm, weight 12 cm, and radius of the hole 2.8 cm.



[NCERT Exemplar]

Sol. Here, $l = 15\ cm, b = 12\ cm,\ h = 20\ cm$

and $r = 2.8\ cm$

Surface area of cuboid

$= 2(lb + bh + hl)$

$= 2\,(15 \times 12 + 12 \times 20 + 20 \times 15)$

$= 2(180 + 240 + 300)$

$= 2 \times 720$

Area of two holes = $2\pi r^2$

$= 2 \times \frac{22}{7} \times 2.8 \times 2.8$

$= 49.28\ cm^2$

So, required area for paint

= S.A. of cuboid - area of holes

$= 1440 - 49.28$

$= 1390.72\ cm^2$

6. A swimming pool is 200 m x 50 m and has an average depth of 2 m. By the end of a summer day, the water level drops by 2 cm. How many cubic metres of water is lost on the day?

[NCERT Exemplar]

Sol. Dimensions of swimming pool are

$l = 200\ m, b = 50\ m, h = 2m$

Volume of swimming pool = $l \times b \times h$

$= 200 \times 50 \times 2$

$= 20000\ m^3$

Since, water drops 2 cm or 0.02 m

So now $h = 2 - 0.02 . 1.98\ m$

Now, volume of pool - $200 \times 50 \times 1.98$

$= 19800\ m^2$

So, the water in cubic meter, was lost on that day = $20000 - 19800$

$= 200\ m^3$

7. What will happen to the volume of the cube, if its edge is

(a) tripled

(b) reduced to one fourth. **[NCERT Exemplar]**

Sol. Let the edge of cube be a,

Volume of cube = a^3

(a) Edge trivial then new edge = 3a

Volume of cube = $(3a)^3$

$= 27\ a^3$

= 27 times

(b) Edge reduced to one fourth

So, new edge = $\frac{1}{4}a$

Volume of cube = $\left(\frac{1}{4}a\right)^3$

$= \frac{1}{64}a^3$

$= \frac{1}{64} times$

8. How many bricks of size 22 cm x 10 cm x 7 cm are required to construct a wall 11 m long, 3.5 m high and 40 cm thick, if the cement and sand used in the construction occupy $\left(\frac{1}{10}\right)^{th}$ part of the wall? [NCERT Exemplar]

Sol. Volume of a brick = 22 cm x 10 cm x 7 cm

= 1540 cm3

Dimensions of wall

l = 11 m, b= 3.5m,

h = 40 cm = 0.4 m

Volume of wall = 11 x 3.5 x 0.4

= 15.4 m^3

= 15.4 x 1000000 cm^3

= 15400000 cm^3

Since, cement and sand occupy $\left(\frac{1}{10}\right)^{th}$ part of the wall.

So, new volume = 15400000 x $\frac{1}{10}$

= 1540000 cm^3

No. of bricks = $\frac{1540000}{1540}$

= 1000

9. The length, breadth and Wed al reservoir is 7 m, 6 m and 15 m respectively. 8400L of water is pumped out from the reservoir. Find the fall in the water level in the reservoir.

[NCERT Exemplar]

Sol. Here, $l = \ 7m, b = 6\ m, h = 15\ m$

Volume of cuboid = $l\ \times b\ \times h$

= 7 x 6 x 15

= 630 m^3

Since, 1 m^2 = 1000 L

∴ Capacity of water in reservoir = 630 x 1000

= 630000 L

= 621.6 m^3

Water level = $\frac{\text{Volume}}{\text{Base Area}}$

$= \frac{621.6}{7 \times 6}$

= 14.8 m

Fall in water level = 15 – 14.8

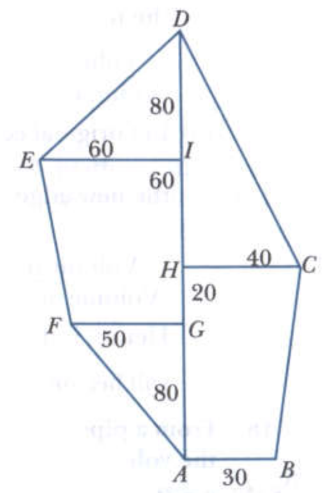
= 0.2 m or 20 cm.

II. Long Answer Type Questions.

1. Find the area of the field given in the adjoining figure. All the dimensions are in metres.

Sol. Area of field = Area of trapezium ABCH + Area of ΔCHD + Area of ΔDI

+ Area of trapezium EFGI + Area of AGFA



Area of trapezium ABCH = $\frac{1}{2}$x (AB + CH) x AH

= 12 x (30 + 40) x 100 = x 70 x 100 = 3500 m^2

Area of ΔCHD = $\frac{1}{2}$x CH x HD = $\frac{1}{2}$ x 40 x 140 = 2800 m^2

Area of ΔDEI = $\frac{1}{2}$ x El x ID = $\frac{1}{2}$x 60 x 80 = 2400 m^2

Area of trapezium EFGI = $\frac{1}{2}$x (El + FG) x IG

= $\frac{1}{2}$x (60 + 50) x 80 = $\frac{1}{2}$x 110 x 80 = 4400 m^2

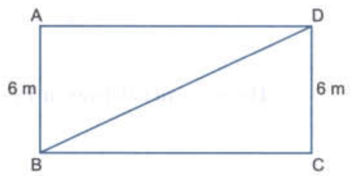
Area of ΔGFA = $\frac{1}{2}$x FG x GA = $\frac{1}{2}$x 50 x 80 = 2000 m^2

∴ Area of the given field = 3500 m^2 + 2800 m^2 + 2400 m^2

+ 4400 m^2 + 2000 m^2 = 15100 m^2

2. The area of a rectangular field is 48 m^2 and one of its sides is 6 m. How long lady take to cross the field diagonally at the rate of 20 m/minute? **[NCERT Exemplar]**

Sol. Area = 48 m^2; Length = 6 m



Area = l x b

48 = 6 x b

b = $\frac{48}{6}$ = 8 m

The length of diagonal BD = $\sqrt{BC^2 + CD^2}$ (By Pythagoras Theorem)

$= \sqrt{(6)^2 + (8)^2} = \sqrt{36 + 64} = \sqrt{100} = 10m$

The time required by lady to cross the field diagonally at the rate of 20 m/min = $\frac{10}{20}$

= $\frac{1}{2}$Minute or 30 seconds.

3. Mukesh walks around a circular track of radius 14 m with a speed of 4 km/h. If he takes 20 rounds of the track, for how long does he walk? **[NCERT Exemplar]**

Sol. Radius = 14 m

Speed = 4 km/h

Change the speed in m/sec then

4 km/h = $\frac{4 \times 1000}{3600} = \frac{10}{9}\ m/sec$

Now circumference of circular track = $2\pi r$

= 22 x$\frac{22}{7}$ x 14 = 88 m

Distance covered in 20 rounds = 20 x 88 = 1,760 m

Time taken= $\frac{Distance}{Speed}$

$= \frac{1760}{\frac{10}{9}} = \frac{1760 \times 9}{10} =$ 1584 seconds

Hence, the time taken = 1584 seconds = 26 minutes 24 seconds.

4. A running track has 2 semicircular ends of radius 63 m and two straight lengths. The perimeter of the track is 1000 m. Find each straight length. [NCERT Exemplar]

Sol. Let the straight length be xm

The perimeter of the track = circumference of circle + 2 x straight length

$1,000 = 2\pi r + 2\frac{22}{7} \times x$

$1,000 = 2 \times \frac{22}{7} \times 63 + 2x$

$2x = 1,000 - 396 = 604$

$x = \frac{604}{2} = 302$ m

Hence, the length of each straight line = 302 m

5. A cube of side 5 cm is cut into as many 1 cm cubes as possible. What is the ratio of the surface area of the original cube to that of the sum of the surface areas of the smaller cubes? [NCERT Exemplar]

Sol. Edge of original cube = 5 cm

Edge of small cubes = I cm

Surface area of the original cube = $6a^2 = 6x(5)^2 = 6 \times 25 = 150$ cm^2

Now number of small cubes = $\frac{Volume\ of\ original\ cube}{Volume\ of\ small\ cube}$

Surface area of a small cube = $6a^2 = 6 \times (1)^2 = 6$ cm^2

∴ Surface area of 125 small cubes = 6 x 125 = 750 cm^2.

Now, $\frac{\text{Surface Area of original cube}}{\text{Sum of the surface area of smaller cubes}} = \frac{150}{750} = \frac{1}{5}$

Required ratio is I 5

6. The thickness of a hollow metallic cylinder is 2 cm. It is 70 cm long with outer radius of 14 cm. Find the volume of the metal used in making the cylinder, assuming that it is open at both the ends. Also find its weight if the metal weighs 8 g per cm. [NCERT Exemplar]

Sol. h = 70 cm

Outer radius = 14 cm

Inner radius = (14 - 2) cm = 12 cm

The volume of metal used = $\pi(R^2 - r^2) \times h$

$= \frac{22}{7}(14^2 - 12^2) \times 70$

= 220 x 26 x 2

= 11,440 cm^3

Weight of metal = 11,440 x 8 = 91,520 gm

=91 kg 520 gm

7. A cuboidal tin box opened at the top has dimensions 20 cm x 16 cm x 14 cm. What is the total area of metal sheet required to make 10 such boxes? [NCERT Exemplar]

Sol. Total surface area of cuboidal box = $2(lb + bh + hl)$

$= 2(20 \text{ x } 16 + 16 \text{ x } 14 \text{ x } 14 \text{ x } 20)$

$= 2(320 + 224 + 280) = 1{,}648 \text{ cm}^2$

Since it is open at the top

∴ The area of top must be subtracted

Remaining area = 1,648 - 20 x 16 = 1,328 cm^2

Now Area of 10 such boxes = 1,328 x 10 = 13,280 cm^2

8. A housing society consisting of 5,500 people needs 100 L of water per person per day. The cylindrical supply tank is 7 m high and has a diameter 10 m. For how many days will the water in the tank last for the society? [NCERT Exemplar]

Sol. Requirement of water in the society per day = 5500 x 100 = 550000 L

= 550 m

Volume of cylindrical tank $= \pi r^2 h$

$= \frac{22}{7} \text{ x } 5 \text{ x } 5 \text{ x } 7 = 550 \text{ m}^3$

Required number of days $= \frac{\text{Volume of cylindrical tank}}{\textit{Volume of water required per day}}$

$= \frac{550}{550} = 1$

Hence, the water will be sufficient for 1 day.

9. The ratio of the radius and height of a cylinder is 2 : 3. If its volume is 12936 cm³ find the total surface area of the cylinder. [NCERT Exemplar]

Sol. Let the radius and height of cylinder be $2x$ *and* $3x$

Volume $= \pi r^2 h$

$12936 = \frac{22}{7} \times (2x)^2 \times 3x$

$c = \frac{12936 \times 7}{22 \times 4 \times 3} \quad \Rightarrow \quad x^3 = 49 \times 7$

$x = 7$

∴ The radius $= 2x = 2 \times 7 = 14\ cm\ and\ the\ height = 3x = 3 \times 7 = 21\ cm$

Now total surface area of cylinder = 2πr (r + h)

$= 2 \times \frac{22}{7} \times 14\ (14 + 21)$

$= 88 \times 35 = 3080 \text{ cm}^2$

10. External dimensions of a closed wooden box are in the ratio 5 : 4 : 3. If the cost of painting its outer surface at the rate of Rs.5 per dm² is Rs.11,750, find the dimensions [NCERT Exemplar]

Sol. Let dimension of cuboid be $5x, 4x$ *and* $3x$

Total area of the wooden box $= \frac{11750}{5} = 2350 \text{ dm}^2$

$2(lb + bh + hl) = 2350$

$2(5x \times 4x \times 4x \times 3x \times 3x \times 5x) = 2350$

$2(47x^2) = 2350$

$94x^2 = 2350 \quad \Rightarrow \quad x^2 = \frac{2350}{94} = 25$

$x = \sqrt{25} = 5$

Hence, the dimensions will be 5 x 5, 4 x 5 and 3 x 5, i.e., 25 dm, 20 dm and 15 dm.

11. The length, breadth and height of a cuboidal reservoir is 7 m, 6 m and 15 in respectively. 8400 L of water is pumped out from the reservoir. Find the fall in the water level in the reservoir.

[NCERT Exemplar]

Sol. Volume of cuboidal reservoir = l x b x h

= 7 x 6 x 15 = 630 m^3

= 630 x 1000 L = 6,30,000 L

Remaining water after pumping out 8400 :

$= 6.30{,}000 - 8{,}400 = 6{,}21{,}600 \text{ L} = \frac{621600}{1000} \text{m}^2$

We know, Volume of cuboid = l x b x h 6

$$\frac{621600}{1000} = 7 \times 6 \times h$$

$$h = \frac{621600}{1000 \times 7 \times 6} = 14.8\, m$$

∴ Fall in water level = Initial height – Current height

= 15 – 14.8 = 0.2 m= 20 cm

12. How many bricks of sire 22 CM x 10 cm x 7 cm are required to construct a wall 11 m long, 3.5 m high and 40 cm thick, if the cement and sand used in the construction occupy (1/10)th part of the wall?

[NCERT Exemplar]

Sol. Volume of wall = 1100 x 350 x 40 cm^3

Volume of one brick = 22 x 10 x 7 cm^3

The space occupied by bricks $= 1 - \frac{1}{10} = \left(\frac{9}{10}\right)^{th}\ part$

∴ Number of bricks required $= \frac{Volume\ of\ wall}{Volume\ of\ one\ brick} \times \frac{9}{10}$ = 9000 bricks

$$\frac{1100 \times 350 \times 40}{22 \times 10 \times 7} \times \frac{9}{10} = 9000 \text{ bricks.}$$

13. A rectangular examination hall having seats for 500 candidates has to be buildso as to allow 4 cubic metres of air and 0.5 square metres of floor area per candidate. If the length of hall be 25 m, find the height and breadth of the hall.

Sol. Volume of air required by a candidate = 4m^3

Volume of air required by 500 candidates = 500 x 4 = 2000 m^3

Let the breadth and height be x and y meter respectively

The volume of hall = Ixbx h

2,000 = 25 $xxxy$

$$xy = \frac{2000}{2225} = 80$$

xy = 80 ... (i)

Area of floor =$l$xb

0.5 x 500 = 25 x x

$$250 = 25x \qquad \Rightarrow \qquad x = \frac{250}{25} = 10\ m$$

From (1), we get

$$y = \frac{80}{x} = \frac{80}{10} = 8\ m$$

Hence, the breadth of hall = 10 m

and height of hall = 8 m

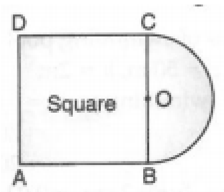
Hence, the breadth of hall = 10

and height of hall = 8 m

I. High Order Thinking Skills [HOTS] Question

1. a) A cylindrical Link has a capacity of 5632 m^2. It the diameter of its base is 16 m. Find its depth.

b) If side of square is 14 cm, then find the area of semi-circle as shown in the figure.



Sol. a) Let the depth of the cylindrical tank = h

and Radius of its base (r) = 8 m

Then, the capacity of the tank = Volume of the tank

$$= \pi r^2 h$$

$$= \frac{22}{7} \times 8 \times 8h$$

Thus, $\frac{22}{7} \times 8 \times 8 \times h = 5632$

or $$h = \frac{5632 \times 7}{22 \times 8 \times 8}$$

or $$h = 28\ m$$

Hence, the depth of the cylindrical tank = 28 m

b) Since side of square = 14 cm

Then, diameter of semi circle = 14 cm

Therefore, radius of semi circle (r) = $\frac{14}{2}$

= 7 cm

Thus, Area of semi circle = $\frac{1}{2} \times \pi r^2$

$$= \frac{1}{2} \times \frac{22}{7} \times 7^2$$

$$= \frac{11}{7} \times 7 \times 7$$

$$= 77\ cm^2$$

II. High Order Thinking Skills [HOTS] Question

1. The circumference of the front wheel of a cart is 3 m long and that of the back wheel is 4 m long. What is the distance travelled by the cart, when the front wheel makes five more revolutions than the rear wheel?

Sol. Front wheels circumference = 3 m

back wheels circumference = 4 m

Let the number of revolution made by back wheel be x

the number of revolution made by front wheel = $x + 5$

Now the distance covered by front wheel = distance covered by back wheel

$\Rightarrow \quad 3(x + 5) = 4(x)$

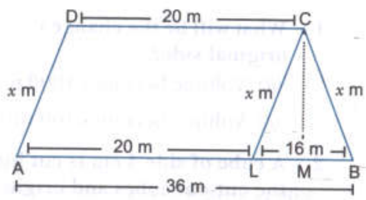
$\Rightarrow \quad 3x + 15 = 4x \qquad \Rightarrow \quad 15 = x$

Distance travelled by the cart

= Number of revolution x Circumference of back wheel

= 15 x 4 = 60 m

2. A rectangular sheet of dimensions 25 cm x 7 cm is rotated about its longer side. Find the volume and the whole surface area of the solid thus generated. [NCERT Exemplar]



Sol. Here, the solid formed is a cylinder in which radius = 7 cm

and height = 25 cm

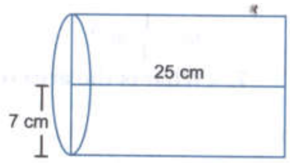
Volume of cylinder = $\pi r^2 h$

$= \frac{22}{7}$ x 7 x 7 x 25 = 3,850 cm^3

Total surface Area = $2\pi r$ (r + h) = 2 x $\frac{22}{7}$ x 7 x (7 + 25)

= 1,408 cm^2

3. Four times the area of the curved surface of a cylinder is equal to 6 times the sum of the areas of its bases. If its height is 12 cm, find its curved surface area.



Sol. According to question

4 x C.S.A. of cylinder = 6 x sum of area of its bases

4 x $2\pi rh$ = 6 x $2\pi rh$ $\quad \Rightarrow \quad$ 4 x h = 6e

4 x 12 = 6r $\quad \Rightarrow \quad$ $r = \frac{12}{6}$ x 4 = 8 cm

Now the C.S.A. of cylinder = $2\pi rh = 2 \times \frac{22}{7} \times 8 \times 12$ = 603.429 cm^2

I. Value Based Questions.

1. (a) Water is poured into a cuboidal reservoir at the rate of 60 litres per minute. If the volume of reservoir is 108 m^3, find the number of hours it will take to fill the reservoir.

(b) If the radius and height of the cylindrical tank are 7 m and 10 m, find the capacity of the tank.

Sol. (a) $\because$ Volume of the reservoir = 108 m^3

$$1\ m^3 = 1000 \text{ litres}$$

$\therefore$ Capacity of the reservoir= 108 x 1000 litres = 108000 litres

Amount of water poured in 1 minute = 60 litres

$\therefore$ Amount of water to be poured in 1 hour

$$= 60 \times 60 \text{ litres}$$

Thus, number of hours required to fill the reservoir

$$= \frac{108000}{60 \times 60} = 30$$

$\therefore$ The required number of hours = 30

(b) Let the radius of cylindrical tank (r) = 7 cm and height (h) = 10 m

Then, the capacity of the tank i.e.,

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

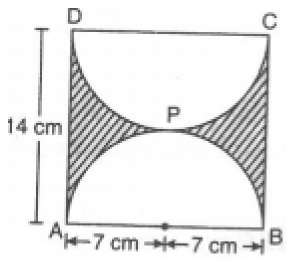
$$= \frac{22}{7} \times 7^2 \times 10$$

$$= \frac{22}{7} \times 7 \times 7 \times 10\ m^3$$

$$= 22 \times 7 \times 10\ m^3$$

$$= 1540\ m^3$$

2. (a) If ABCD is a square of side 14 cm and APB and DPC are semi-circles, then find the area of shaded region as shown in the figure.



(b) If area of a trapezium is 44 cm^2, whose parallel sides are 10 cm and 12 cm and height is 4 cm, then verify that

Area of trapezium = $\frac{1}{2}$ [sum of parallel sides] x height.

Sol. (a) Area of the shaded region = Area of square ABCD – Area of 2 semi cirlces

$$= 14^2 - 2 \times \frac{1}{2} \times \pi \times 7^2$$

$$= 14 \times 14 - \frac{22}{7} \times 7 \times$$

$$= (196 - 154) = 42\ cm^2$$

(b) Since, area of a trapezium = 44 cm^2

Parallel sides = 10 cm and 12 cm

and h = 4 cm

Then, L.H.S. $= 44 \text{ cm}^2$

and R.H.S. $= \frac{1}{2}(10 + 12) \times 4$

$= \frac{1}{2} \times 22 \times 4$

$= 44 \text{ cm}^2$

Hence, L.H.S. $=$ R.H.S. $= 44 \text{ cm}^2$