CHAPTER

17

AREA, PERIMETER AND VOLUME

Area

It is the space enclosed by the boundary of a plane figure. It is measured in square unit *i.e.* the area of a room is equal to its floor.

Perimeter

The sum of all the sides of any enclosed plane figure is called the perimeter of that figure.

Area and Perimeter of Different Plane Figures

It is the measurement of shapes having length and breadth in nature *i.e.* rectangle, square, parallelogram etc.

Rectangle

The figure formed by joining four points, in which opposite sides are equal and parallel and each angle is a right angle *i.e.* 90°, is called rectangle.

In figure, $ABCD$ is a rectangle, in which

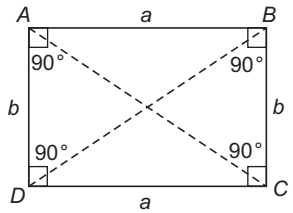
$AB = CD = a$ (say)

and $AD = BC = b$ (say)

and $\angle A = \angle B = \angle C = \angle D = 90°$

$AC = BD$,

where, AC and BD are diagonals.



(i) Area of rectangle = Length × Breadth = $a \times b$

(ii) Perimeter of rectanle

$= 2 \times (\text{Length} + \text{Breadth}) = 2 \times (a + b)$

(iii) Diagonal

$= \sqrt{(\text{Length})^2 + (\text{Breadth})^2} = \sqrt{a^2 + b^2}$

Example **1.** The length of a rectangular plot of land is twice the breadth. If the perimeter of the plot be 210 m. Find its area.

(1) 2450 m^2 (2) 2110 m^2

(3) 1520 m^2 (4) 1620 m^2

Sol. (1) Let the breadth of the plot be x m.

Then, its length = $2x$ m

$\because$ Its perimeter = 2 (Length + Breadth)

$= 2(2x + x) = 6x$ m

Given, Perimeter of the plot = 210

$\therefore \quad 6x = 210 \Rightarrow x = \frac{210}{6} = 35$ m

$\therefore$ Breadth = 35 m

and length = $2 \times 35 = 70$ m

$\therefore$ Area of the plot = $(70 \times 35) = 2450$ m^2

Example **2.** Find the area of a rectangle whose length is 8 m and diagonal 10 m.

(1) 24 m^2 (2) 48 m^2

(3) 56 m^2 (4) 36 m^2

Sol. (2) Breadth $= \sqrt{(\text{Diagonal})^2 - (\text{Length})^2}$

$= \sqrt{(10)^2 - (8)^2}$

$= \sqrt{36} = 6$ m

Area $= lb = 8 \times 6$

$= 48$ m^2

Square

The figure formed by joining four points, in which all four sides are equal and each angle is a right angle, *i.e.*, 90°, is called square.

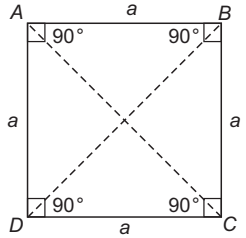
In figure, $ABCD$ is a square in which

$AB = BC = CD = AD = a$ (say)

and $\angle A = \angle B = \angle C = \angle D = 90°$

and $AC = BD$

where, AC and BD are diagonals.



(i) Perimeter of square $= 4 \times$ Side $= 4a$

Area of square $= (\text{Side})^2 = a^2$

Diagonal $= \sqrt{2} \times \text{Side} = \sqrt{2}a$

Example **3.** Find the least number of square tiles and their size needed for flooring a hall 20 m long and 16 m wide.

(1) 25 (2) 16

(3) 13 (4) 20

Sol. (4) For the number of tiles to be the least, their size must be largest square in shape.

Side of the largest possible square tile

= HCF of length and width of the hall

= HCF of 20 and 16 = 4 m

Area of each square tile $= 4 \times 4 = 16$ m^2

Area of the floor of the hall $= 20 \times 16 = 320$ m^2

$\therefore$ Number of tiles needed $= \dfrac{320}{16} = 20$

Volume and Surface Area

It is the study of three dimensional (3D) figures (solid figures). The main characteristic of three dimensional figure is that it have length, breadth and depth or height or thickness. The object in three dimension (3D) may be solid or hollow.

Volume

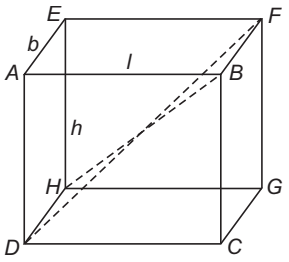
The amount of space occupied by the three dimensional object is called its volume. Its unit of measurement is m^3, cm^3, $inches^3$ etc.

It is the measurement of solid shapes having length, breadth and depth or height. Hence, these figures are known as three dimensional figures. Some of the popular three dimensional figures are as cube, cuboid, room and box etc.

Cuboid

The figure formed by joining 6 faces, in which each face is a rectangle and opposite faces are equal and parallel, is called cuboid.

In figure, AB is length, AE is breadth and AD is height of the cuboid and face $ABCD = EFGH$, $AEHD = BFGC$ and $AEFB = DHGC$, face $DHGC$ is called base and other faces are called lateral face. BH, DF, AG and EC are called diagonals.



If l is length, b is breadth and h is height, then

Volume of cuboid $=$ Length $\times$ Breadth $\times$ Height

$V = l \times b \times h$

Example **4.** Find the volume of cuboid whose length is 15 cm, breadth 10 cm and height 8 cm.

(1) 1100 cm^3 (2) 1500 cm^3

(3) 1200 cm^3 (4) 1100 cm^3

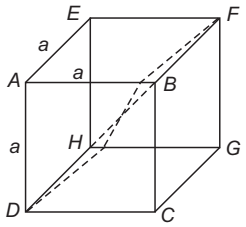
Sol. (3) Here, $l = 15$ cm, $b = 10$ cm, $h = 8$ cm

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

$= 15 \times 10 \times 8 = 1200$ cm^3

Cube

A cuboid, in which each face is a square and length, breadth and height are equal, is called cube.
In figure, all sides are equal, *i.e.*,



$AB = BC = CD = AD = EF = FG = GH = EH = AE = BF = CG = DH$

and all faces are equal, *i.e.*,
$ABCD = EFGH = AEHD = BFGC = AEFB = DHGC$
AG, EC, BH and *DF* are called diagonals.
If 'a' is a side of cube, then
Volume of cube = $(\text{Side})^3 = a^3$

Example **5.** The volume of cube is 1000 cm^3. Find its total surface area.

(1) 500 cm^2 (2) 600 cm^2
(3) 200 cm^2 (4) 300 cm^2

Sol. (2) Volume of cube = 1000 cm^3
$\therefore$ Edge = $\sqrt[3]{1000} = 10$ cm
Total surface area = 6 $(\text{Edge})^2$
$= 6\,(10)^2 = 6 \times 100 = 600\ cm^2$

Entrance Corner

1. Two solid cubes of side 10 cm each are joined end to end. What is the volume of the resulting cuboid? **[JNV 2019]**
(1) 500 cm^3 (2) 2000 cm^3
(3) 1000 cm^3 (4) 10000 cm^3

2. The length of a rectangular plot of land is twice its breadth. A square swimming pool of side 8 m, occupies one-eighth part of the plot. The length of the plot is **[JNV 2019]**
(1) 64 m (2) 32 m
(3) 16 m (4) 12 m

3. How many rectangular slabs of 10 cm × 8 cm are required to cover the floor of a hall of 12 m × 10 m? **[JNV 2019]**
(1) 12000 (2) 15000
(3) 10000 (4) 18000

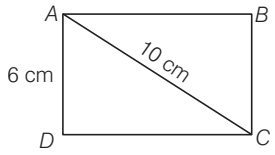
4. A rectangular plot has sides 100 m × 80 m. Find the length of wire to surround it three times. **[JNV 2018]**
(1) 180 m (2) 1080 m
(3) 360 m (4) 720 m

5. A fish tank length, breadth and height is 40cm , 60cm and 50cm, respectively. It contains 50 litre of water, How much water is needed to fill it completely. **[JNV 2018]**
(1) 50 L (2) 60 L
(3) 70 L (4) 120 L

6. The area of square, whose perimeter is 48 m, is **[JNV 2017, 2009, 2004]**
(1) 48 m^2 (2) 144 m^2
(3) 1152 m^2 (4) 2304 m^2

7. What is the volume of a box whose each edge measures 3 m in length? **[JNV 2017, 2009]**
(1) 54 cu m (2) 27 cu m (3) 18 cu m (4) 9 cu m

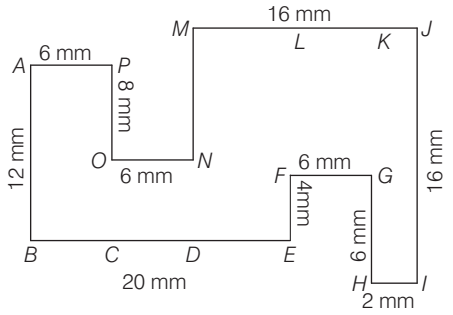
8. Find the length of *AB* in the given figure of a rectangle *ABCD*. **[JNV 2016]**



(1) 8 cm (2) 10 cm (3) 12 cm (4) 16 cm

9. The dimensions of a wall are 20 m × 12 m. How many square shaped tiles, with 4m side, will be required to cover the floor? **[JNV 2016]**
(1) 10 (2) 15 (3) 24 (4) 12

10. Find the area of the given figure. **[JNV 2016]**



(1) 240 mm^2 (2) 280 mm^2
(3) 300 mm^2 (4) 440 mm^2

11. The dimensions of a wall is 4.8 m × 3.6 m, what is the number of tiles required to cover with size of 1.2 m^2 tiles? **[JNV 2015]**
(1) 26 (2) 12
(3) 40 (4) 20

12. The dimensions of a rectangular park is 100 m × 60 m. A 2 m width path made around the rectangular park. The area (in m^2) of the path is **[JNV 2015]**
(1) 324 (2) 656
(3) 675 (4) 780

13. The side of a square park is 100 m. The perimeter of the park is **[JNV 2015]**
(1) 1000 m (2) 400 m
(3) 200 m (4) 800 m

14. If each side of square will be doubled, then its perimeter will be **[JNV 2014]**
(1) 2 times (2) 3 times
(3) 4 times (4) 8 times

15. The perimeter of a square park is 72 m, then the area of the square is **[JNV 2013]**
(1) 144 sq m (2) 2376 sq m
(3) 1296 sq m (4) 324 sq m

16. Find the breadth of a room whose floor area is 363 sq m and length is 33 m. **[JNV 2012]**
(1) 33 m (2) 24 m
(3) 11 m (4) 15 m

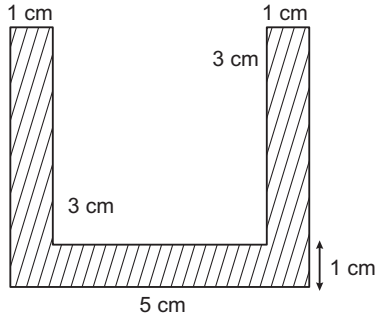
17. The breadth of a rectangle is 3/5 of the length. If length of the rectangle is 25 m, then find the perimeter of the rectangle. **[JNV 2012]**
(1) 100 m (2) 80 m
(3) 75 m (4) 150 m

18. Find the area of a rectangle whose length is 12 cm and breadth is 6.5 cm. **[JNV 2010]**
(1) 78 sq cm (2) 78 cu cm
(3) 37 sq cm (4) 38 cu cm

19. A rectangle is formed by 100 cm wire. Find out the maximum area of this rectangle. **[JNV 2010]**
(1) 100 sq cm (2) 400 sq cm
(3) 625 sq cm (4) 10000 sq cm

20. 60 cubes of 1 cm side Arun formed a cuboid. What is the volume of cuboid? **[JNV 2010]**
(1) 30 cu cm (2) 60 cu cm
(3) 75 cu cm (4) 90 cu cm

21. How much is the area of the shaded portion in the following figure? **[JNV 2005]**



(1) 11 sq cm (2) 9 sq cm
(3) 11 cu cm (4) 9 cu cm

22. A room floor is 192 sq m in area. If its length is 16 m. Then, its perimeter is **[JNV 1993]**
(1) 12 m (2) 28 m (3) 56 m (4) 64 m

23. The number of 15 cm square tiles required to lay a floor of size 3.6 m × 4.5 m is **[JNV 2004]**
(1) 720 (2) 360
(3) 10800 (4) 5400

24. How many rectangular plots of dimensions 40 m multiply 60 m can be made from a rectangular field of dimensions 120 m multiply 160 m? **[JNV 2003]**
(1) 2 (2) 3
(3) 4 (4) 8

25. The perimeter of a square courtyard is 200 m, its area will be **[JNV 2001]**
(1) 800 m (2) 2500 m
(3) 800 sq m (4) 2500 sq m

26. The volumes of a cube and a cuboid are equal. If the dimensions of the cuboid are 18 cm, 12 cm and 8 cm the edge of the cube is **[JNV 2001]**
(1) 8 cm (2) 10 cm
(3) 12 cm (4) 16 cm

27. Area of a square kitchen garden is 729 sq m. Find its perimeter. **[JNV 2000]**
(1) 64 m (2) 27 m
(3) 108 m (4) 100 m

28. Perimeter of a square field is 36 m. Find its area. **[JNV 2000]**
(1) 81 sq m (2) 16 sq m
(3) 36 sq m (4) 100 sq m

29. Each side of a square is 26 m. Its area is **[JNV 2000]**
(1) 26 m (2) 26 m^2
(3) 676 m (4) 676 m^2

30. Area of a ground is 12500 m^2. Its length is 125 m. Its perimeter is **[JNV 1999]**
(1) 450 m (2) 100 m
(3) 900 m (4) 1250 m

31. The length of a rectangle is 1 cm more than its breadth and its perimeter is 14 cm. Area of the rectangle is **[JNV 1998]**
(1) 16 cm^2 (2) 14 cm^2 (3) 12 cm^2 (4) 10 cm^2

32. The floor of a room is rectangular in shape. Its length is 6 m and breadth 5 m. Height of the room is 4 m. Find the area of the 4 walls of the room. **[JNV 1998]**
(1) 87 m^2 (2) 88 m^2 (3) 89 m^2 (4) 90 m^2

33. The area of a rectangular region is 1053 m^2, its length is 39 m . Find its breadth. **[JNV 1997]**
(1) 26 m (2) 27 m (3) 28 m (4) 29 m

34. Length of a room is twice its width. If the length of the room is 40 m, find its area. **[JNV 1997]**
(1) 800 m^2 (2) 900 m^2 (3) 1000 m^2 (4) 1200 m^2

35. Find the area of a rectangular plot 20 m long and 16 m wide. **[JNV 1997]**
(1) 160 m^2 (2) 200 m^2 (3) 220 m^2 (4) 320 m^2

Answers

1. (2)	**2.** (3)	**3.** (2)	**4.** (2)	**5.** (3)	**6.** (2)	**7.** (2)	**8.** (1)	**9.** (2)	**10.** (3)
11. (2)	**12.** (1)	**13.** (2)	**14.** (1)	**15.** (4)	**16.** (3)	**17.** (2)	**18.** (1)	**19.** (3)	**20.** (2)
21. (1)	**22.** (3)	**23.** (1)	**24.** (4)	**25.** (4)	**26.** (3)	**27.** (3)	**28.** (1)	**29.** (4)	**30.** (1)
31. (3)	**32.** (2)	**33.** (2)	**34.** (1)	**35.** (4)					

Hints and Solutions

1. According to the question,
Side of a cube = 10 cm
When, two cubes are joined end to end
Length of a cuboid (l) = 20 cm, breadth (b) = 10 cm,
height (h) = 10 cm
By using, volume of a cuboid = $l \times b \times h$
$= 20 \times 10 \times 10 = 2000\ cm^3$

2. According to the question,
Let breadth of a rectangular plot = B
Length of a rectangular plot (l) = $2B$
∴A square swimming pool of side 8 m occupies one-eighth part of the plot.
∴Area of swimming pool
$= \frac{1}{8} \times$ area of a rectangular plot
or $(Side)^2 = \frac{1}{8} \times l \times b$
$(8)^2 = \frac{1}{8} \times 2B \times B$
$64 = \frac{1}{4} \times B^2$
$B^2 = 64 \times 4 = 256$
$B = 16$ m
Hence, length of the plot = $2 \times 16 = 32$ m

3. According to the question,
Size of a rectangular slab = Length × Breadth
= 10 cm × 8 cm
Size of a hall = Length × Breadth = 12 m × 10 m
= 1200 cm × 1000 cm [∵ 1 m = 100 cm]
Total number of slabs
$= \frac{\text{Size of a hall}}{\text{Size of a rectangular slab}}$
$= \frac{1200 \times 1000}{10 \times 8} = 15000$
∴Total number of rectangular slabs = 15000

4. Given,
length of rectangular plot = 100m
Breadth of rectangular plot = 80 m
As we know that,
perimeter of plot = 2 (length + Breadth)

Perimeter = 2(100+80)
= 2 × 180 = 360 m
length of wire to surround it three times
= 3 × 360 = 1080 m

5. Amount of water stored in the tank = Volume of the tank
∴ Volume of tank
= length × breadth × Height
∴ $V = 40 \times 60 \times 50$
$V = 120000\ \text{cm}^3$
As $1000\ \text{cm}^3$ 1 is equal to litre
∴ $V = 120\text{L}$
As tank already stored 50 liters of water.
∴ Amount of water to fill the tank completely
=120 − 50 = 70 L

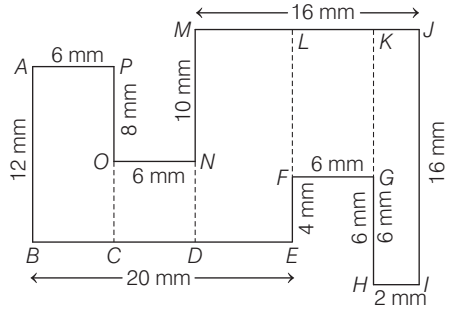
6. Side of the square $= \frac{\text{Perimeter}}{4} = \frac{48}{4} = 12$ m
∴ Area of the square = Side × Side
$= 12 \times 12 = 144\ \text{m}^2$

7. Volume of the box = 3 × 3 × 3 = 27 cu m

8. Here, $AD = BC = 6$ cm
Now In ΔABC, AC(Diagonal) = 10 cm ,
BC (Breadth) = 6 cm
So, by Pythagoras Theorem,
$(\text{Length})^2 = \sqrt{(\text{Diagonal})^2 - (\text{Breadth})^2}$
$\Rightarrow \quad AB^2 = AC^2 - BC^2$
$AB = \sqrt{10^2 - 6^2} = \sqrt{100 - 36}$
$= \sqrt{64} = 8$ cm

9. The required number of tiles
$= \frac{\text{Area of Hall}}{\text{Area of one Tile}} = \frac{20 \times 12}{4 \times 4} = 15$

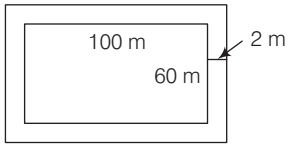
10. According to the condition and direction of question the diagram will be as follows



Area of figure = Area of ($ABCP$ + $OCDN$ + $DMLE$ + $FLKG$ + $KHIJ$)
$= AB \times AP + OC \times ON + DE \times DM + FG \times GK + HI \times JI$
$= 12 \times 6 + (12 - 8) \times 6 + (20 - 12) \times (10 + 12 - 8) + 6 \times (16 - 6) + 2 \times 16$
$\left\{ \begin{matrix} \because OC = AB - PO, \\ DE = BE - (AP + ON) \\ \text{and } GK = JI - HG \end{matrix} \right\}$
$= 72 + 4 \times 6 + 8 \times 14 + 6 \times 10 + 32$
$= 72 + 24 + 112 + 60 + 32 = 300\ \text{mm}^2$

11. Area of the hall = $(4.8 \times 3.6)\ \text{m}^2$
Area of the square tiles = $(1.2 \times 1.2)\ \text{m}^2$
∴ Required number of tiles $= \frac{4.8 \times 3.6}{1.2 \times 1.2} = 12$

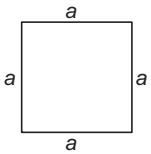
12.



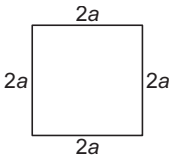
∵ Area of the rectangular park
$= 100 \times 60 = 6000\ \text{m}^2$
Area of the rectangular park with path width
$= (100 + 2 \times 2) \times (60 + 2 \times 2)$
$= 104 \times 64 = 6656\ \text{m}^2$
∴ Area of the path = $6656 - 6000 = 656\ \text{m}^2$

13. Given, side of the square park = 100 m
∴ Perimeter of the square park = 4 × Side
= 4 × 100 = 400 m

14.



Perimeter = $4a$
After doubled the side,



Perimeter = $4 \times 2a = 8a$
Hence, resultant perimeter $8a = 2 \times (4a)$
= 2 times × Original perimeter
Thus, the perimeter will be doubled.

15. Given, perimeter of the square park = 72 m

Suppose, side of the square park = x m
Then, $4x = 72 \Rightarrow x = 18$ m
Hence, area of the square park = $(18)^2 = 324$ m^2

16. Area of room = Length × Breadth
$363 = 33 \times$ Breadth
$\therefore$ Breadth = $\frac{363}{33} = 11$ m

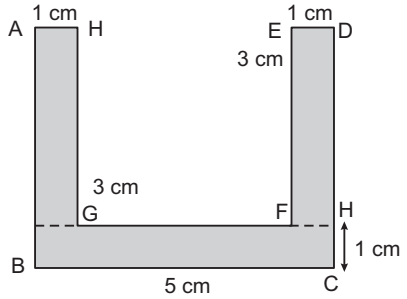
17. Given, length of the rectangle = 25 m
$\therefore$ Breadth of the rectangle = $25 \times \frac{3}{5} = 15$ m
$\therefore$ Perimeter of the rectangle = $2(l + b)$
$= 2(25 + 15) = 80$ m

18. Area of rectangle = Length × Breadth
$= 12 \times 6.5 = 78$ cm^2

19. Maximum a square is formed in a rectangle.
$\therefore$ Perimeter of square = 100 cm
$4 \times a = 100$ (a = Side) $\Rightarrow a = \frac{100}{4} = 25$ cm
$\therefore$ Area of rectangle = Area of square
$= 25 \times 25 = 625$ cm^2

20. When, 60 cubes in each row, then
Length of 60 cubes of 1 cm (l) = 20 cm
Breadth of 60 cubes of 1 cm (b) = 1 cm
Height of 60 cubes of 1 cm (h) = 3 cm
$\therefore$ Volume of cuboid = $l \times b \times h = 20 \times 1 \times 3$
$= 60$ cm^3

21. Area of the shaded portion
$= FE \times ED + BC \times CH + GH \times AH$
$= 3 \times 1 + 5 \times 1 + 3 \times 1 = 3 + 5 + 3 = 11$ cm^2



22. Area of the floor = 192 m^2
Length = 16 m
Breadth = $\frac{192}{16} = 12$ m
$\therefore$ Perimeter = $2(l + b) = 2(16 + 12)$
$= 2(28) = 56$ m

23. Number of tiles required = $\frac{\text{Area of floor}}{\text{Area of 1 tile}}$
$= \frac{3.6 \times 4.5}{0.15 \times 0.15} = \frac{36}{10} \times \frac{45}{10} \times \frac{100}{15} \times \frac{100}{15} = 720$

24. The area of rectangular field = 120×160
$= 19200$ sq m
The area of 1 rectangular plot = 40×60
$= 2400$ sq m
$\therefore$ Number of rectangular plots = $\frac{19200}{2400} = 8$

25. The side of square = $\frac{\text{Perimeter}}{4}$
$\therefore$ The side of the given square = $\frac{200}{4} = 50$ m
$\therefore$ Area = Side × Side
$= 50 \times 50 = 2500$ sq m

26. Volume of cuboid = $l \times b \times h$
$= 18 \times 12 \times 8$ cu cm
Volume of cube = Volume of cuboid
Given, $= 18 \times 12 \times 8$
$\therefore$ Edge of cube = $\sqrt[3]{18 \times 12 \times 8} = 12$ cm

27. Side of a square = $\sqrt{\text{Area of the square}}$
$\therefore$ Side of the square = $\sqrt{729} = 27$ m
$\because$ Perimeter of a square = 4 × Side
$\therefore$ Perimeter of a square = $4 \times 27 = 108$ m

28. Perimeter of square = 4 × Side
$36 = 4 \times x \Rightarrow x = 9$
$\therefore$ Area = $(9)^2 = 81$ sq m

29. Area = $(26)^2 = 676$ m^2

30. Area of the ground = 12500 m^2
Length = 125 m
Breadth = $\frac{\text{Area}}{\text{Length}} = \frac{12500}{125} = 100$ m
$\therefore$ Perimeter = $2(l + b) = 2(125 + 100)$
$= 2(225) = 450$ m

31. Let length and breadth be $(x + 1)$cm and x cm.
Perimeter = $2(l + b) = 2(x + 1 + x) = 4x + 2$
$4x + 2 = 14 \Rightarrow 4x = 12 \Rightarrow x = 3$
Length = 3 + 1 = 4 cm, Breadth = 3 cm
$\therefore$ Area of the rectangle = $l \times b = 4 \times 3 = 12$ cm^2

32. Area of 4 walls = $2(l + b) \times h = 2(6 + 5) \times 4$
$= 2(11) \times 4$
$= 22 \times 4 = 88$ m^2

33. Breadth = $\frac{\text{Area}}{\text{Length}} = \frac{1053}{39} = 27$ m

34. According to the question, Length = 40 m
Breadth = 20 m
Then, area = $40 \times 20 = 800$ m^2

35. Area of a rectangular = Long × Wide
$= 20 \times 16 = 320$ m^2

Practice Exercise

1. If side of a square is doubled, how many times its area will be increased?
(1) 5 (2) 2 (3) 4 (4) 3

2. The total cost of flooring a room at ₹ 12.50 per sq m is ₹ 400. If the length of the room is 8 m, its breadth is
(1) 6 m (2) 8 m
(3) 4 m (4) 9 m

3. The perimeter of the floor of a room is 18 m. What is the area of the walls of the room, if the height of the room is 3 m?
(1) 21 m^2 (2) 42 m^2 (3) 54 m^2 (4) 108 m^2

4. Find the number of bricks each of dimensions 25 cm × 12.5 cm × 7.5 cm to make a wall of dimensions 5 m × 3 m × 20 m.
(1) 1200 (2) 1350 (3) 128000 (4) 1400

5. What would be the diagonal of a square whose area is 25 sq cm?
(1) 7 cm (2) $\sqrt{60}$ cm
(3) 9 cm (4) 5 cm

6. The ratio between length and breadth of a rectangular plot is 5 : 3, respectively and its perimeter is 48 m. What will be its area (in sq m)?
(1) 120 (2) 116 (3) 115 (4) 135

7. A table measures 2 m long and 1.5 m broad. What is the length of tape required once to engirdle the table?
(1) 3.0 m (2) 3.5 m
(3) 6.0 m (4) 7.0 m

8. The perimeter of a square is 144 m. Its area is
(1) 12 sq m (2) 72 sq m (3) 1296 sq m (4) 1728 sq m

9. What is the area of a rectangle whose breadth is 5 m and its length is double to its breadth?
(1) 10 m^2 (2) 15 m^2
(3) 30 m^2 (4) 50 m^2

10. Area of a rectangle measuring 6 m long is 30 m^2. Its width is
(1) 5 m (2) 6 m (3) 24 m (4) 180 m

11. The area of a square is equal to the area of rectangle measuring 16 cm length and 9 cm breadth. The perimeter of the square will be
(1) 24 cm (2) 25 cm (3) 48 cm (4) 50 cm

12. A floor of room measures (5 m × 4 m). How many tiles will be required to cover the floor if each tiles measures 80 cm × 50 cm?
(1) 20 (2) 40
(3) 50 (4) 200

13. What is the volume of a box whose length is 3 m, breadth is 2 m and height is 2 m?
(1) 12 m^2 (2) 10 m^3 (3) 12 m^3 (4) 10 m^2

14. A 20 m long and 10 m wide rectangular tank contains water upto the depth of 2 m. The water was transferred to another rectangular tank measuring 10 m long and 5 m wide. In the new tank the water will measure upto a depth of
(1) 8 m (2) 6 m
(3) 4 m (4) 2 m

15. A tank is 6 m long, 4 m wide and $1\frac{1}{2}$ m high. The volume of water in the tank is
(1) 24 cu m (2) 36 cu m
(3) $11\frac{1}{2}$ cu m (4) 16 cu m

16. If the volume of a cube is 729 cm^3, what is the length of its diagonal?
(1) $9\sqrt{2}$ cm (2) $9\sqrt{3}$ cm
(3) 18 cm (4) $18\sqrt{3}$ cm

17. The capacity of a cuboid tank of water is 50000 L. Find the breadth of the tank, if its length and depth are 2.5 m and 10 m, respectively.
(1) 2 m (2) 4 m (3) 9 m (4) 6 m

Answers

1. (3)	**2.** (3)	**3.** (3)	**4.** (3)	**5.** (4)	**6.** (4)	**7.** (4)	**8.** (3)	**9.** (4)	**10.** (1)
11. (3)	**12.** (3)	**13.** (3)	**14.** (1)	**15.** (2)	**16.** (2)	**17.** (1)			

Hints and Solutions

1. Let original side of the square be a.
Then, original area $= a^2$
New side $= 2a$
New area $= (2a)^2 = 4a^2$
Thus, area will be 4 times the original area.

2. $\text{Area} = \dfrac{\text{Total cost}}{\text{Rate}} = \left(\dfrac{400}{12.50}\right) = 32 \text{ m}^2$

Area $= 32 \text{ m}^2$, Length $= 8$ m

$\therefore \text{Breadth} = \dfrac{\text{Area}}{\text{Length}} = \left(\dfrac{32}{8}\right) = 4 \text{ m}$

3. Area of 4 walls of a room
$= 2$ (Length + Breadth) $\times$ Height
$=$ Perimeter of floor $\times$ Height $= 18 \times 3 = 54 \text{ m}^2$

4. $\text{Number of bricks} = \dfrac{\text{Volume of wall}}{\text{Volume of a brick}}$
$= \dfrac{500 \times 300 \times 2000}{2.5 \times 12.5 \times 7.5} = 128000$

5. Diagonal of square $= \sqrt{\text{Area}} = \sqrt{25} = 5$ cm

6. Perimeter $= 2$(Length + Breadth)
$48 = 2(5x + 3x) \Rightarrow x = \dfrac{48}{16} = 3$
$\therefore$ Area $= (5 \times 3) \times (3 \times 3) = 15 \times 9 = 135 \text{ m}^2$

7. Length of the table $= 2$ m
Breadth of the table $= 1.5$ m
Length of the tape required to engirdle the table
$= 2\,(2 + 1.5) = 2 \times 3.5 = 7$ m

8. Perimeter of square $= 144$ m
$\therefore$ One side of the square $= \dfrac{144}{4} = 36$ m
$\therefore$ Area of the square $= 36 \times 36 = 1296$ sq m

9. $\because$ Breadth of rectangle $= 5$ m
Length (double the breadth) $= 2 \times 5 = 10$ m
$\therefore$ Area $=$ Length $\times$ Breadth $= 10 \times 5 = 50 \text{ m}^2$

10. $\text{Width} = \dfrac{\text{Area}}{\text{Length}} = \dfrac{30}{6} = 5$ m

11. Area of the rectangle $= 16 \times 9$ sq cm
Area of the square $= 16 \times 9$ sq cm
$\therefore$ One side of the square $= \sqrt{16 \times 9}$
$= 4 \times 3 = 12$ cm
$\therefore$ Perimeter of the square $= 4 \times 12 = 48$ cm

12. Area of the floor $= 5 \times 4$ sq m
$= 500 \times 400$ sq cm $= 200000$ sq cm
Area of 1 tile $= 80 \times 50 = 4000$ sq cm
$\therefore$ The number of tiles required
$= \dfrac{\text{Area of the floor}}{\text{Area of 1 tile}}$
$= \dfrac{200000}{4000} = 50$ tiles

13. Volume of the box $=$ Length $\times$ Breadth $\times$ Height
$= 3 \times 2 \times 2 = 12 \text{ m}^3$

14. $\because$ Volume of water in the first tank
$= 20 \times 10 \times 2 = 400$ m
Given, volume of water in the first tank
$=$ Volume of water in the second tank
$\therefore$ $400 =$ Length $\times$ Width $\times$ Depth
$\therefore$ Depth of other tank $= \dfrac{400}{\text{Length} \times \text{Width}}$
$= \dfrac{400}{10 \times 5} = 8$ m

15. Volume of water in the tank
$=$ Length $\times$ Breadth $\times$ Height
$= 6 \times 4 \times \dfrac{3}{2} = 36$ cu m

16. Volume of cube $= (\text{Side})^3$
$\therefore$ $729 = a^3$
$\Rightarrow$ $a = 9$ cm
$\therefore$ Diagonal of cube $=$ Side $\times \sqrt{3}$
$= 9 \times \sqrt{3} = 9\sqrt{3}$ cm

17. Capacity of tank $= 50000$ L $= 50 \text{ m}^3$
$\left[\because 1 \text{ L} = \dfrac{1}{1000} \text{ m}^3\right]$
$\therefore \text{Breadth} = \dfrac{50}{2.5 \times 10} = 2$ m

Self Practice

1. Area of rectangular ground is 12500 m^2. Its length is 125 m. Its perimeter is
(1) 450 m (2) 100 m (3) 900 m (4) 1250 m

2. The ratio of length and breadth of a room is 3 : 2. If the sum of length and breadth is 40 m, then its breadth is
(1) 24 m (2) 18 m (3) 16 m (4) 14 m

3. A rectangular solid measuring 8 cm × 4 cm × 2 cm is melted and cast in the form of a cube. The side of the cube formed is
(1) 64 m (2) 32 m (3) 8 cm (4) 4 cm

4. How many 5 cm cubes can be cut from a cube whose edge is 20 cm?
(1) 100 (2) 64 (3) 32 (4) 4

5. The perimeter of a square is 48 m. Its area is
(1) 121 sq m (2) 148 sq m (3) 144 sq m (4) 192 sq m

6. The ratio of length and breadth of a rectangle is 5 : 4. If the length is 25 m, the breadth is
(1) 15 m (2) 20 m (3) 10 m (4) 12 m

7. The length of a room is 11 m, breadth is 8 m and height is 2 m. What will be the area of the walls of the room?
(1) 88 sq m (2) 176 sq m (3) 38 sq m (4) 76 sq m

8. The length and breadth of a rectangle is 80 m and 40 m, respectively. If the length increases by 5% and the breadth decreases by 5%. What will be the difference in perimeter?
(1) 20 m (2) 12 m (3) 15 m (4) 4 m

9. The perimeter of a rectangle is equal to the perimeter of a square. If the length and breadth of rectangle is 20 m and 10 m, respectively. Find the area of the squar.
(1) 300 sq m (2) 225 sq m (3) 250 sq m (4) 325 sq m

10. The area of a square is 100 sq m. Its perimeter is
(1) 40 m (2) 100 m (3) 140 m (4) 400 m

11. The length of a rectangular field is double its width. If the width is 100 m, what will be its area?
(1) 200 sq m (2) 20000 sq m (3) 200000 sq m (4) 2000 sq m

12. The area of a square court is 196 sq m. The perimeter is
(1) 40 m (2) 60 m (3) 50 m (4) 56 m

13. What will be the cost of fencing a square park of side 210 m, if the cost of fencing is ₹ 5.50 per m?
(1) ₹ 4620 (2) ₹ 4000 (3) ₹ 4680 (4) ₹ 840

14. The height of a cuboid is 2 m. Its breadth and length are 2 times and 3 times its height, respectively. The volume of the cuboid is
(1) 48 m^3 (2) 7 m^3 (3) 12 m^3 (4) 24 m^3

Answers

1. (2)	**2.** (3)	**3.** (4)	**4.** (2)	**5.** (3)	**6.** (2)	**7.** (4)	**8.** (4)	**9.** (2)	**10.** (1)
11. (2)	**12.** (4)	**13.** (1)	**14.** (1)						