



# Area and Perimeter

## Area

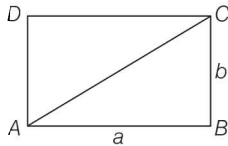
The area of a plane figure is the total space enclosed by its boundary. It is always expressed in square units.

## Perimeter

Sum of length of border around a plane figure is known as perimeter of that plane figure.

## Rectangle

It is a four sided closed figure with equal opposite sides. Each angle of it is  $90^\circ$ .



## Area of a Rectangle

Area of a rectangle = Length  $\times$  Breadth =  $ab$ ,

$$\text{Length} = \frac{\text{Area}}{\text{Breadth}} \text{ and}$$

$$\text{Breadth} = \frac{\text{Area}}{\text{Length}}$$

**Example 1** The length and breadth of a rectangular field are 500 m and 350 m, respectively. Find the area of the field.

- (a)  $175000 \text{ m}^2$                       (b)  $185000 \text{ m}^2$   
(c)  $165000 \text{ m}^2$                       (d)  $195000 \text{ m}^2$

**Sol. (a)** Area = Length  $\times$  Breadth

$$= 500 \times 350 = 175000 \text{ m}^2$$

## Perimeter of a Rectangle

$$\begin{aligned} \text{Perimeter of the rectangle} &= 2 (\text{Length} + \text{Breadth}) \\ &= 2(a + b) \end{aligned}$$

**Example 2** The length and breadth of a rectangle are 24 m and 18 m, respectively. Find the perimeter of the rectangle.

- (a) 75 m                                      (b) 50 m  
(c) 84 m                                      (d) 90 m

**Sol. (c)** Perimeter =  $2 (\text{Length} + \text{Breadth})$

$$= 2 (24 + 18) = 2 \times 42 = 84 \text{ m}$$

## Diagonal of a Rectangle

Line segment joining the contrast corner of rectangle are known as diagonal of rectangle. In adjacent figure AC is the diagonal of rectangle.

i.e. Diagonal of a rectangle

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

**Example 3** The length and breadth of a rectangular ground are 40 m and 30 m, respectively. Find the diagonal of the ground.

- (a) 100 m                                      (b) 50 m  
(c) 60 m                                      (d) 80 m

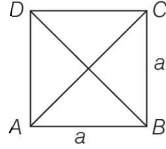
**Sol. (b)** Diagonal =  $\sqrt{(\text{Length})^2 + (\text{Breadth})^2}$

$$= \sqrt{(40)^2 + (30)^2}$$

$$= \sqrt{1600 + 900} = \sqrt{2500} = 50 \text{ m}$$

## Square

It is a four sided closed figure with all sides equal.



### Area of a Square

Area of a square = (Side)<sup>2</sup> = a<sup>2</sup>

Side of a square =  $\sqrt{\text{Area}}$

**Example 4** One side of a square is 50 m. Find the area of the square.

- (a) 2600 m<sup>2</sup>                      (b) 2401 m<sup>2</sup>  
(c) 1225 m<sup>2</sup>                      (d) 2500 m<sup>2</sup>

**Sol.** (d) Area = (Side)<sup>2</sup> = Side × Side  
= 50 × 50 = 2500 m<sup>2</sup>

### Perimeter of a Square

Perimeter of a square = 4 × Side = 4a

**Example 5** The side of square field is 51 m. Find the perimeter of the field.

- (a) 204 m                      (b) 200 m  
(c) 112 m                      (d) 116 m

**Sol.** (a) Perimeter of square = 4 × side  
= 4 × 51 = 204 m

### Diagonal of a Square

Line segment joining the contrast corner of square are known as diagonal of square. In above figure, AC and BD are the diagonal of square ABCD.

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

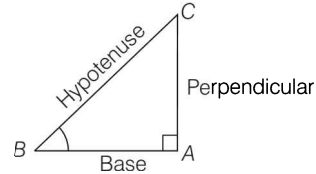
**Example 6** The side of a square field is 20 m. Find the diagonal of the field.

- (a)  $20\sqrt{2}$  m                      (b) 40 m  
(c)  $20\sqrt{3}$  m                      (d)  $40\sqrt{3}$  m

**Sol.** (a) Diagonal = Side $\sqrt{2}$  = 20 ×  $\sqrt{2}$  =  $20\sqrt{2}$  m

## Right Angled Triangle

It is a figure enclosed by three sides and one angle of it is 90°.



### Area of a Right Angled Triangle

Area =  $\frac{1}{2} \times \text{Base} \times \text{Height}$

**Example 7** Find the area of a right angled

triangle whose two sides (base and height) are 3 cm and 4 cm.

- (a) 10 cm<sup>2</sup>                      (b) 6 cm<sup>2</sup>  
(c) 7 cm<sup>2</sup>                      (d) 5 cm<sup>2</sup>

**Sol.** (b) Area of right angled triangle  
=  $\frac{1}{2} \times \text{Base} \times \text{Height}$   
=  $\frac{1}{2} \times 3 \times 4 = 6 \text{ cm}^2$

**Example 8** The hypotenuse of a right angled triangle is 5 m. If one of its side is 4 m. Find the length of the other side.

- (a) 8 cm                      (b) 6 cm  
(c) 5 cm                      (d) 3 cm

**Sol.** (d) In right angled  $\triangle ABC$ , hypotenuse  $BC = 5$  cm and side  $AB = 4$  cm.

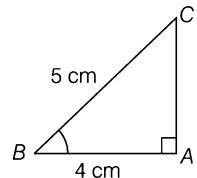
∴ By Pythagoras theorem,  
 $BC^2 = AB^2 + AC^2$

$$\Rightarrow (5)^2 = (4)^2 + AC^2$$

$$\Rightarrow 25 = 16 + AC^2$$

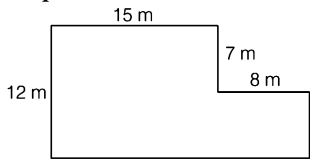
$$\therefore AC^2 = 25 - 16 = 9$$

$$AC = \sqrt{9} = 3 \text{ cm}$$





# Practice Exercise

1. Length of a rectangle = 400 m, breadth = 265 m, then find area.  
(a)  $106000 \text{ m}^2$  (b)  $115000 \text{ m}^2$   
(c)  $105000 \text{ m}^2$  (d)  $123000 \text{ m}^2$
2. Length of a rectangle = 20 m, breadth = 18 m, then find perimeter.  
(a) 75 m (b) 80 m (c) 76 m (d) 75 m
3. The length and breadth of a rectangular field are 400 m and 250 m, respectively. Find the area of the field.  
(a)  $100 \text{ m}^2$  (b)  $1000 \text{ m}^2$   
(c)  $100000 \text{ m}^2$  (d)  $10000 \text{ m}^2$
4. Find the perimeter of the rectangular field, whose length and breadth are 250 m and 200 m, respectively.  
(a) 925 m (b) 905 m (c) 800 m (d) 900 m
5. The side of a square is 24 m. Find the area of the square.  
(a)  $361 \text{ m}^2$  (b)  $841 \text{ m}^2$   
(c)  $784 \text{ m}^2$  (d)  $576 \text{ m}^2$
6. The side of a square is 25 m. Find the diagonal of the square.  
(a)  $24\sqrt{2} \text{ m}$  (b)  $25\sqrt{2} \text{ m}$   
(c)  $33\sqrt{2} \text{ m}$  (d)  $50\sqrt{2} \text{ m}$
7. The perimeter of a rectangular room is 200 m. If the breadth of the room is 40 m. Find the area of the room.  
(a)  $2500 \text{ m}^2$  (b)  $2400 \text{ m}^2$   
(c)  $2600 \text{ m}^2$  (d)  $2225 \text{ m}^2$
8. The area of a right angled triangle is 40 sq cm. If its base is equal to 28 cm, find its height.  
(a)  $3\frac{6}{7} \text{ cm}$  (b)  $4\frac{6}{7} \text{ cm}$   
(c)  $2\frac{6}{7} \text{ cm}$  (d)  $5\frac{6}{7} \text{ cm}$
9. Find the cost of carpeting a rectangular room at the rate of ₹ 2 per sq m, if the room is 20 m long and 30 m broad.  
(a) ₹ 1200 (b) ₹ 600  
(c) ₹ 300 (d) ₹ 900
10. The breadth of a rectangular room is two-third of its length. If the area of the room is  $2400 \text{ m}^2$ . Find the length of the room.  
(a) 50 m (b) 60 m (c) 80 m (d) 100 m
11. Dinesh wants to exchange his rectangular plot with a square plot of side 84 m. If the length of the rectangular plot is 144 m. Find the breadth of the rectangular plot.  
(a) 70 m (b) 60 m (c) 50 m (d) 49 m
12. The sides of a right angled triangle are equal to three consecutive numbers expressed in centimetres. What can be the area of such a triangle?  
(a)  $6 \text{ cm}^2$  (b)  $8 \text{ cm}^2$  (c)  $10 \text{ cm}^2$  (d)  $12 \text{ cm}^2$
13. The breadth of a rectangular plot is one-third of its length. If the perimeter of the plot is 240 m. Find the length of the plot.  
(a) 80 m (b) 90 m (c) 70 m (d) 100 m
14. The perimeter of a square field is  $(4x + 8)$ . Find the length of its diagonal.  
(a)  $(x + 6)\sqrt{3}$  (b)  $(x + 4)\sqrt{2}$   
(c)  $(x + 2)\sqrt{2}$  (d)  $(x + 5)\sqrt{3}$
15. The perimeter of a square and rectangle are each equal to 48 m and difference between area is  $4 \text{ m}^2$ . The breadth of the rectangle is:  
(a) 10 m (b) 12 m  
(c) 18 m (d) 20 m
16. Find the number of square tiles of side 12 cm, required for flooring a room of size  $4 \text{ m} \times 5 \text{ m}$ , will be  
(a) 1388 (b) 1400 (c) 1500 (d) 1600
17. Find the perimeter and area of figure  
  
(a) 42 m,  $270 \text{ m}^2$  (b) 70 m,  $220 \text{ m}^2$   
(c) 180 m,  $200 \text{ m}^2$  (d) 50 m,  $300 \text{ m}^2$

## Answers

1	(a)	2	(c)	3	(c)	4	(d)	5	(d)	6	(b)	7	(b)	8	(c)	9	(a)	10	(b)
11	(d)	12	(a)	13	(b)	14	(c)	15	(a)	16	(a)	17	(b)						

## Hints & Solutions

1. Area = Length  $\times$  Breadth  
 $= 400 \times 265 = 106000 \text{ m}^2$
2. Perimeter = 2 (Length + Breadth)  
 $= 2 (20 + 18) = 2 \times (38) = 76 \text{ m}$
3. Area = Length  $\times$  Breadth  
 $= 400 \times 250 = 100000 \text{ m}^2$
4. Perimeter = 2 (Length + Breadth)  
 $= 2 (250 + 200) = 2 \times 450 = 900 \text{ m}$
5. Area of the square = (Side)<sup>2</sup>  
 $= (24)^2 = 24 \times 24 = 576 \text{ m}^2$
6. Diagonal of the square  
 $= \sqrt{2} \times \text{Side} = \sqrt{2} \times 25 = 25\sqrt{2} \text{ m}$
7. Let length of the room be x m. Then,  
 Perimeter = 2 (Length + Breadth)  
 $\Rightarrow 200 = 2(x + 40) \Rightarrow 200 = 2x + 80$   
 $\Rightarrow 200 - 80 = 2x \Rightarrow 2x = 120$   
 $\therefore x = 60 \text{ m}$   
 So, area = Length  $\times$  Breadth =  $60 \times 40 = 2400 \text{ m}^2$
8. According to the question,  
 Area of triangle =  $\frac{1}{2} \times \text{Base} \times \text{Height}$   
 $\Rightarrow 40 = \frac{1}{2} \times 28 \times \text{Height}$   
 $\Rightarrow \text{Height} = \frac{40}{14} = \frac{20}{7}$   
 $\therefore \text{Height} = 2\frac{6}{7} \text{ cm}$
9. Area = Length  $\times$  Breadth  
 $= 20 \times 30$   
 $= 600 \text{ sq m}$   
 Now, cost of carpeting 1 sq m = ₹ 2  
 $\therefore$  Cost of carpeting 600 sq m =  $600 \times 2$   
 $= 1200$
10. Let length = x m. Then, breadth will be  $\frac{2x}{3} \text{ m}$ .  
 Area = Length  $\times$  Breadth  
 $2400 = x \times \frac{2x}{3}$   
 $\Rightarrow 2x^2 = 2400 \times 3$   
 $\Rightarrow x^2 = \frac{2400 \times 3}{2}$   
 $\Rightarrow x^2 = 3600$   
 $x = 60$   
 $\therefore$  Length = 60 m
11. Side of the square plot = 84 m  
 Length of the rectangular plot = 144 m  
 According to the question,  
 Area of the square plot  
 $= \text{Area of the rectangular plot}$   
 Side  $\times$  Side = Length  $\times$  Breadth  
 $\Rightarrow 84 \times 84 = 144 \times \text{Breadth}$   
 $\Rightarrow \text{Breadth} = \frac{84 \times 84}{144} = 49 \text{ m}$
12. Since, the triangle is right angled.  
 $\therefore$  All the three consecutive sides must satisfy Pythagoras theorem.  
 $\therefore 3, 4$  and  $5$  are the sides of triangle which satisfy Pythagoras theorem.  
 $\therefore (5^2 = 4^2 + 3^2)$   
 $\therefore \text{Area of triangle} = \frac{1}{2} \times 4 \times 3 = 6 \text{ cm}^2$
13. Suppose breadth of the rectangular plot = x m.  
 Then, length will be 3x m.  
 Perimeter = 2 (Length + Breadth)  
 $240 = 2(3x + x) \Rightarrow 240 = 2 \times 4x$   
 $240 = 8x \Rightarrow x = 30$   
 $\therefore \text{Length} = 3x = 3 \times 30 = 90 \text{ m}$
14. Side of the square field =  $\frac{\text{Perimeter}}{4}$   
 $= \frac{4x + 8}{4}$   
 $= \frac{4x}{4} + \frac{8}{4} = (x + 2)$   
 $\therefore \text{Length of diagonal} = \text{Side} \sqrt{2} = (x + 2)\sqrt{2}$

15. According to question,

$$2(l + b) = 4a = 48$$

$$\therefore l + b = 24 \quad \dots(i)$$

$$\therefore a = 12$$

$$\begin{aligned} \text{Area of square} &= a^2 = (12)^2 \\ &= 144 \text{ m}^2 \end{aligned}$$

$$\therefore \text{Area of square} - \text{Area of rectangle} = 4$$

$$144 - l \times b = 4$$

$$l \times b = 140 \quad \dots(ii)$$

From Eqs. (i) and (ii),  $l = 14 \text{ m}$ ,  $b = 10 \text{ m}$

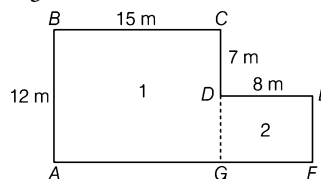
16. Required number of tiles =  $\frac{\text{area of room}}{\text{area of square tiles}}$

$$= \frac{4 \times 5 \text{ m}^2}{144 \text{ cm}^2}$$

$$= \frac{20 \times 100 \times 100 \text{ cm}^2}{144 \text{ cm}^2}$$

$$\approx 1388 \text{ tiles}$$

17. Given figure can be labelled as follows



$$\therefore DG = EF = AB - CD$$

$$= 12 - 7 = 5 \text{ m}$$

$$\therefore BC = AG \text{ and } DE = GF$$

$$\begin{aligned} \text{Area of figure '1' (ABCG)} &= \text{length} \times \text{breadth} \\ &= 15 \times 12 = 180 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of figure '2' (DEFG)} &= \text{length} \times \text{breadth} \\ &= 8 \times 5 = 40 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{So, area of complete figure (ABCDEF)} \\ &= 180 + 40 = 220 \text{ m}^2 \end{aligned}$$

$$\therefore \text{Perimeter of figure (ABCDEF)}$$

$$= AB + BC + CD + DE + EF + AF$$

$$= 12 + 15 + 7 + 8 + 5 + (15 + 8) = 70 \text{ m}$$

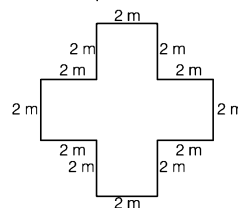


## Try Yourself

- Length of rectangle = 300 m, breadth = 50 m, then find area.  
(a) 15002 m<sup>2</sup> (b) 14002 m<sup>2</sup>  
(c) 15500 m<sup>2</sup> (d) 15000 m<sup>2</sup>
- Length of rectangle = 50 m, breadth = 25 m, then find perimeter.  
(a) 150 m (b) 155 m (c) 149 m (d) 144 m
- Side of square = 32 m, then find area.  
(a) 1028 m<sup>2</sup> (b) 1025 m<sup>2</sup>  
(c) 1024 m<sup>2</sup> (d) 1029 m<sup>2</sup>
- The side of a square room is 12 m. Find the cost of carpeting the room at the rate of ₹ 5 per sq m.  
(a) ₹ 700 (b) ₹ 720 (c) ₹ 725 (d) ₹ 750
- A boy runs around a rectangular field, length of which is double of breadth. If breadth is 25 m, find the distance covered by the boy.  
(a) 148 m (b) 149 m (c) 150 m (d) 155 m
- Breadth of a rectangular field is 20 m and length is double of its breadth. Find the perimeter.  
(a) 118 m (b) 120 m (c) 125 m (d) 130 m
- The length of a room is two times of its breadth and is 30 m. Find the area of the carpet so that the whole floor can be carpeted.

- 450 m<sup>2</sup> (b) 425 m<sup>2</sup>  
449 m<sup>2</sup> (d) 429 m<sup>2</sup>
- The perimeter of a rectangle is 30 m and the ratio between length and breadth is 7 : 3. Find the area of the rectangle.  
(a) 46.55 m<sup>2</sup> (b) 48.50 m<sup>2</sup>  
(c) 45.25 m<sup>2</sup> (d) 47.25 m<sup>2</sup>
- How many square plots of side 5 m can be cut from a square field of side 50 m?  
(a) 100 (b) 105 (c) 99 (d) 101

- 10) Find the area and perimeter of figure



- 20 m<sup>2</sup>, 24 m (b) 18 m<sup>2</sup>, 28 m  
20 m<sup>2</sup>, 20 m (d) 24 m<sup>2</sup>, 24 m

## Answers

- |       |       |       |       |        |
|-------|-------|-------|-------|--------|
| 1 (d) | 2 (a) | 3 (c) | 4 (b) | 5 (c)  |
| 6 (b) | 7 (a) | 8 (d) | 9 (a) | 10 (a) |