Chapter - 3

Perimeter and Area

Ex 3.1

Question 1.
The table given below contains some measures of the rectangle. Find the unknown values.

S. No	Length	Breadth	Perimeter	Area
i)	5 cm	8 cm	?	?
ii)	13 cm	?	54 cm	?
iii)	?	15 cm	60 cm	?
iv)	10 m	?	?	120 sq. m
v)		4 feet	?	20 sq. feet

Solution:

(i) Area of the rectangle = (length × breadth) sq unit.
Perimeter of a rectangle = 2(1 + b) units.
l = 5 cm
b = 8 cm
∴ p = 2 (l + b) cm = 2 (5 + 8) cm = 2 × 13 cm
p = 26 cm
Area = (l × b) cm² = (5 × 8) cm²
A = 40 cm²

(ii) l = 13 cm
p = 54 cm
Perimeter = 2 (l + b) units
54 = 2 (13 + b) cm

54/2 = 13 + b

27 = 13 + b
b = 27 – 13
b = 14 cm
Area = l × b sq. unit = 13 × 14 cm²
A = 182 cm²

(iii) b = 15 cm
p = 60 cm
p = 2 (l + b) units
60 = 2 (l + 15) cm

60/2 = l + 15

30 = l + 15
l = 30 – 15 .
l = 15 cm
Area = l × b unit² = 15 × 15 cm² = 225 cm²
A = 225 cm²

(iv) l = 10 m
Area = 120 sq metre
Area = l × b sq.m
120 = 10 × 6

b = 120/10

b = 12 m
Perimeter = 2 (l + b) units = 2(10 + 12) units = 2 × 22 m
A = 44 m

(v) b = 4 feet.
Area = 20 sq. feet
Area = l × b sq .feet
20 = l × 4

$l = \frac{20}{4}$ feet

l = 5 feet
Perimeter = 2 (l + b) units.
p = 2 (5 + 4) feet = 2 × 9
p = 18 feet

Question 2.
The table given below contains some measures of the square. Find the unknown values.

S. No	Side	Perimeter	Area
i)	6 *cm*	?	?
ii)	?	100 *m*	?
iii)	?	?	49 *sq. feet*

Solution:
(i) 24 cm, 36 cm²
(ii) 25 m, 625 m²
(iii) 7 feet, 28 feet

Question 3.

The table given below contains some measures of the right angled triangle. Find the unknown values.

S. No	Base	Height	Area
i)	20 *cm*	40 *cm*	?
ii)	5 *feet*	?	20 *sq. feet*
iii)	?	12 *m*	24 *sq. m*

Solution:

Area of the right triangle = $\frac{1}{2}$ × (base × height) unit²

(i) b = 20 cm

h = 40 cm

Area = $\frac{1}{2}$ (b × h) cm² = $\frac{1}{2}$ × 20 × 40 = 400 cm²

A = 400 cm²

(ii) b = 5 feet

Area = $\frac{1}{2}$ × b × h unit²

= 20 = $\frac{1}{2}$ × 5 × h sq. feet

$\frac{20 \times 2}{5}$ = h

h = 8 feet

(iii) Area = $\frac{1}{2}$ × (base × height) unit^2

$24 = \frac{1}{2}$ × b × 12 m^2

base = $\frac{24 \times 2}{12}$ m = 4 m

Base = 4m

Question 4.
The table given below contains some measures of the triangle. Find the unknown values.

S. No	Side 1	Side 2	Side 3	Perimeter
i)	6 cm	5 cm	2 cm	?
ii)	?	8 m	3 m	17 m
iii)	11 feet	?	9 feet	28 feet

Solution:
(i) 13 cm
(ii) 6 m
(iii) 8 feet

Question 5.
Fill in the blanks.
(i) 5 cm^2 = _____ mm^2
(ii) 26 m^2 = _____ cm^2
(iii) 8 km^2 = _____ m^2

Solution:
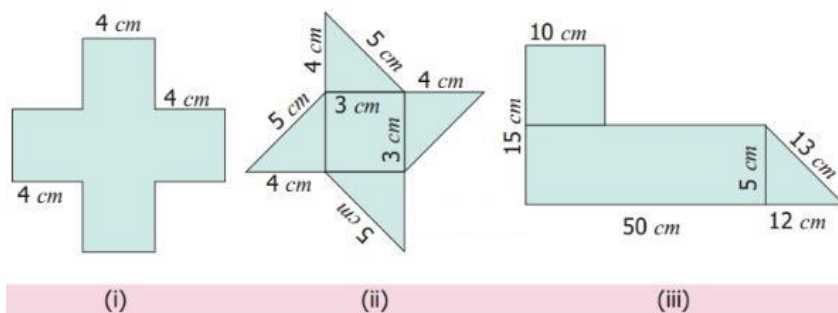(i) 500
(ii) 260000
(iii) 8000000

Question 6.
Find the perimeter and area of the following shapes.

(i) (ii) (iii)

Solution:
(i) Perimeter $= (4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4)$
$= 48$ cm
a $= 4$ cm
Area of 1 square $= 4 \times 4$ cm²
$= 16$ cm²
Area of 5 squares $= 5 \times 16$ cm²
$= 80$ cm²

(ii) Perimeter $= (4 + 5 + 4 + 5 + 4 + 5 + 4 + 5)$
$= 36$ cm

Area of 1 triangle $= \frac{1}{2} \times b \times h$ sq units
$= \frac{1}{2} \times 4 \times 5$ cm²
$= 10$ cm²
Area of 4 triangles $= 4 \times 10$ cm²
$= 40$ cm²
Area of the square $= 3 \times 3$ cm²
$= 9$ cm²
Total area $= (40 + 9)$ cm²
$= 49$ cm²

(iii) Perimeter $= (15 + 50 + 12 + 13 + 10 + 10 + 40)$
$= 150$ cm
Area of the square $= 10 \times 10$ cm²
$= 100$ cm²
$= 250$ cm²

Area of the triangle $= \frac{1}{2} \times 12 \times 5$ cm²
$= \frac{1}{2} \times 12^6 \times 5$ cm²
$= 30$ cm²
Total area $= (100 + 250 + 30)$ cm²
$= 380$ cm²

Question 7.
Find the perimeter and the area of the rectangle whose length is 6 m and breadth is 4m?

Solution:
l $= 6$ m, b $= 4$ m Perimeter of the rectangle

= 2 (l + b) units
= 2 (6 + 4) m
= 2 (10) m
= 20 m
Area of the rectangle = l × b sq units
= 4 × 6 m²
= 24 m²

Question 8.
Find the perimeter and area of a square whose side is 8 cm.

Solution:
a = 8 cm
The perimeter of a square
= 4a units
= 4 × 8 cm
= 32 cm
Area of the square = a × a sq units
= 8 × 8 cm²
= 64 cm²

Question 9.
Find the perimeter and the area of right angled triangle whose sides are 6 feet, 8 feet and 10 feet.

Solution:
Perimeter of the triangle
= (a + b + c) units
= (6 + 8 + 10) feet
= 24 feet

Area of the triangle = $\frac{1}{2}$ × b × h sq units
$\frac{1}{2}$ × 6³× 8 feet square = 24 sq. feet

Question 10.
Find the perimeter of
(i) A scalene triangle with sides 7 m, 8 m, 10 m.
(ii) An isosceles triangle with equal sides 10 cm each and third side is 7 cm.
(iii) An equilateral triangle with a side of 6 cm.

Solution:
(i) Perimeter of the triangle
= (a + b + c) units
= (7 + 8 + 10) m
= 25

(ii) Perimeter of the triangle
= (10 + 10 + 7) cm
= 27 cm

(iii) Perimeter of the triangle
= (6 + 6 + 6) cm
= 18 cm

Question 11.
The area of a rectangular shaped photo is 820 sq. cm. and its width is 20 cm. What is its length? Also find its perimeter.

Solution:
Given Area = 820 cm^2
Width = 20 cm
Area of the rectangle
= l × b sq. units
820 = l × 20

$\frac{820}{20}$ = l

41 = l
length l = 41 cm
Perimeter = 2(l + b) units
= 2(41 + 20) cm
= 2(61) cm
= 122 cm

Question 12.
A square park has 40 m as its perimeter. What is the length of its side? Also find its area.

Solution:
perimeter = 40 m
4a = 40 m

$a = \frac{40}{4}$

Side a = 10 m
Area = a × a sq units
= 10 × 10 m²
= 100 m²

Question 13.
The scalene triangle has 40 cm as its perimeter and whose two sides are 13 cm and 15 cm, find the third side.

Solution:
Let the third side be C
perimeter = (a + b + c) units
40 = 13 + 15 + C
40 = 28 + C
C = 40 – 28
C = 12 units
C = 12 cm

Question 14.
A field is in the shape of a right angled triangle whose base is 25 m and height 20 m. Find the cost of levelling the field at the rate of Rs 45/- per sq.m²

Solution:
b = 25 m, h = 20 m

Area of the triangle = $\frac{1}{2}$ × bh sq.units
= $\frac{1}{2}$ × 25 × 20 m²
= 250 m²
Cost of levelling 1 m² = Rs 45
Cost of levelling 250 m² = Rs 45 × 250
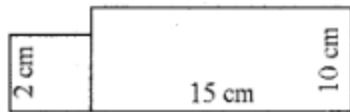
= Rs. 11250

Question 15.
A square of side 2 cm is joined with a rectangle of length 15 cm and breadth 10 cm. Find the perimeter of the combined shape.
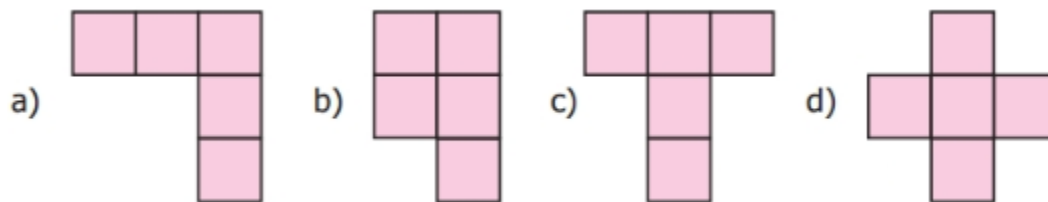
Solution:

Perimeter of the combined shape = Lengths of the outer boundaries
= (15 + 10 + 2 + 2 + 2 + 13 + 10) cm = 54 cm
Perimeter = 54 cm

Objective Type Questions

Question 16.
The following figures are of equal area. Which figure has the least perimeter?

Solution:
(b)

Question 17.
If two identical rectangles of perimeter 30 cm are joined together, then the perimeter of the new shape will be
(a) equal to 60 cm
(b) less than 60 cm
(c) greater than 60 cm
(d) equal to 45 cm

Solution:
(b) less than 60 cm

Question 18.
If every side of a rectangle is doubled, then its area becomes ____ times
(a) 2
(b) 3
(c) 4
(d) 6

Solution:
(c) 4
$2l \times 2b = 4l \times b$

Question 19.
The side of the square is 10 cm. If its side is tripled, then by how many times will its perimeter increase?
(a) 2 times
(b) 4 times
(c) 6 times
(d) 3 times

Solution:
(d) 3 times

Question 20.
The length and breadth of a rectangular sheet of paper are 15 cm and 12 cm respectively. A rectangular piece is cut from one of its corners. Which of the following statement is correct for the remaining sheet?
(a) Perimeter remains the same but the area changes
(b) Area remains the same but the perimeter changes
(c) There will be a change in both area and perimeter
(d) Both the area and perimeter remains the same.

Solution:
(a) Perimeter remains the same but the area changes

Ex 3.2

Miscellaneous Practice Problems

Question 1.
A piece of wire is 36 cm long. What will be the length of each side if we form
(i) a square
(ii) an equilateral triangle

Solution:

Given the length of the wire = 36 cm
i) When a square is formed out of it
The perimeter of the square = 36 cm
$4 \times$ side = 36

$$\text{side} = \frac{36}{4} = 9 \text{ cm}$$

Side of the square

ii) When an equilateral triangle is formed out of it, its perimeter = 36 cm
i.e., side + side + side = 36 cm .
3 × side = 36 cm

$$\text{side} = \frac{36}{3} = 12 \text{ cm}$$

One side of an equilateral triangle = 12 cm

Question 2.
From one vertex of an equilateral triangle with a side of 40 cm, an equilateral triangle with 6 cm side is removed. What is the perimeter of the remaining portion? The perimeter of the remaining portion

Solution:

= (40 + 34 + 6 + 34) cm
= 114 cm

Question 3.
Rahim and Peter go for a morning walk, Rahim walks around a. square path of side 50 m and Peter walks around a rectangular path with a length of 40 m and a breadth of 30 m. If both of them walk 2 rounds each, who covers more distance and by how much?

Solution:
Distance covered by Rahim
= 50 × 4 m
= 200 m
If he walks 2 rounds, distance covered = 2 × 200 m
= 400 m
Distance covered by peter
= 2 (40 + 30) m
= 2(70)m
= 140 m
If he walks 2 rounds, distance covered = 2 × 140 m
= 280 m
∴ Rahim covers more distance by (400 – 280) = 120 m

Question 4.
The length of a rectangular park is 14 m more than its breadth. If the perimeter of the park is 200 m, what is its length? Find the area of the park.

Solution:
Let the length be b + 14 m
breadth = b
perimeter = 200
2 (l + b) = 200
2 (b + 14 + b) = 200
2 (2b + 14) = 200
28 + 4b = 200
4b = 200 – 28
4b = 172 m

$b = \frac{172}{4}$

b = 43 m
Length = b + 14
= 43 + 14
Length l = 57 m
Area = l × b units
= 57 × 43 m²
= 2451 m²

Question 5.
Your garden is in the shape of a square of side 5 m. Each side is to be fenced with 2 rows of wire. Find how much amount is needed to fence the garden at ₹ 10 per metre.

Solution:
a = 5 m
The perimeter of the garden
= 4 a units
= 4 × 5 m
= 20 m
For 1 row
Amount needed to fence l m= Rs 10
Amount needed to fence 20 m
= Rs 10 × 20
= Rs 200

For 2 rows
Total amount needed = 2 × Rs 200 = Rs 400

Challenge Problems

Question 6.
A closed shape has 20 equal sides and one of its sides is 3 cm. Find its perimeter.

Solution:
Number of equal sides in the shape = 20
One of its side = 3 cm
Perimeter = length of one side × Number of equal sides
∴ Perimeter = (3 × 20) cm = 60 cm
∴ Perimeter = 60 cm

Question 7.
A rectangle has length 40 cm and breadth 20 cm. How many squares with side 10 cm can be formed from it.

Solution:
Area of rectangle = (length × breadth) units²
Length = 40 cm
Breadth = 20 cm
∴ Area = (40 × 20) cm² = 800 cm²
Area of rectangle = 800 cm²
Area of square = (side × side) units²
side = 10 cm
∴ Area of square = (10 × 10) cm² = 100 cm²

$$\text{Required number of squares} = \frac{\text{Area of Rectangle}}{\text{Area of 1 square}} = \frac{800 cm^2}{100 cm^2} = 8$$

8 squares can be formed.

Question 8.
The length of a rectangle is three times its breadth. If its perimeter is 64 cm, find the sides of the rectangle.

Solution:
Given perimeter of a rectangle = 64 cm
Also given length is three times its breadth.
Let the breadth of the rectangle = b cm
∴ Length = 3 × b cm

Perimeter = 64 m
i.e., $2 \times (l + b) = 64$ m
$2 \times (3b + b) = 64$ m
$2 \times 4b = 64$m

$4b = \frac{64}{2} = 32$ m
$b = \frac{32}{4} = 8$ m

$l = 3 \times b = 3 \times 8 = 24$ m
∴ Breadth of the rectangle = 8 m
Length of the rectangle = 24 m

Question 9.
How many different rectangles can be made with a 48 cm long string? Find the possible pairs of length and breadth of the rectangles.

Solution:
Length of the string to be made into rectangle = 48 cm
∴ Perimeter of the rectangle = 48 cm
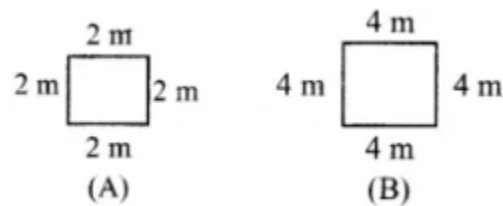$2 \times (l + b) = 48$ cm

$l + b = \frac{48}{2}$

$l + b = 24$ cm
Possible pairs of length and breadth are (1, 23), (2, 22) (3, 21), (4, 20), (5, 19), (6, 18), (7, 17), (8, 16), (9, 15), (10, 14), (11, 13), (12, 12)
Number of different rectangles = 12.

Question 10.
Draw a square B whose side is twice of the square A. Calculate the perimeters of the squares A and B.

Solution:

Perimeter of A = s + s + s + s units = 4 s units
Perimeter of B = (2s + 2s + 2s + 2s) units

= 8s units = 2 (4s) units.
∴ The perimeter of B is twice the perimeter of A

Question 11.
What will be the area of a new square formed if the side of a square is made one – fourth?

Solution:
Let the side of square is s units then area = (s × s) units²

If the side of the new square is made one fourth then side = $\left(\frac{1 \times s}{4}\right)$ units
Then area = $\left(\frac{1 \times s}{4} \times \frac{1 \times s}{4}\right)$ units² = $\frac{s \times s}{16}$ = $\frac{1}{16}$ (s × s) units²
Area of the new square is reduced to $\frac{1}{16}$ times to that of original area.

Question 12.
Two plots have the same perimeter. One . is a square of side 10 m and another is a rectangle of breadth 8 m. Which plot has the greater area and by how much?

Solution:
a = 10 m, b = 8 m
Perimeter of the square plot
= 4 a units
= 4 × 10 m
= 40 m
Perimeter of the rectangular plot
40 = 2 (l + b) units
40 = 2 (l + 8) m
40 = 2 l + 16
2 l = 40 – 16
2 l = 24

$l = \frac{24}{2}$

Area of the square plot
= a × a sq units
= 10 × 10 m²
= 100 m²
Area of the rectangular plot
= l × b sq units
= 8 × 12 m²

= 96 m²
Square plot has the greater area by 100 m² − 96 m² − 4 m²

Question 13.
Look at the picture of the house given and find the total area of the shaded portion.
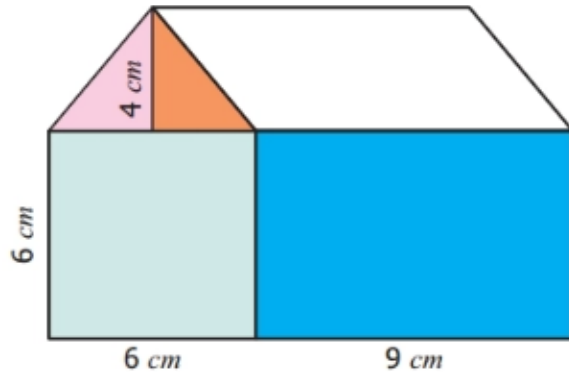
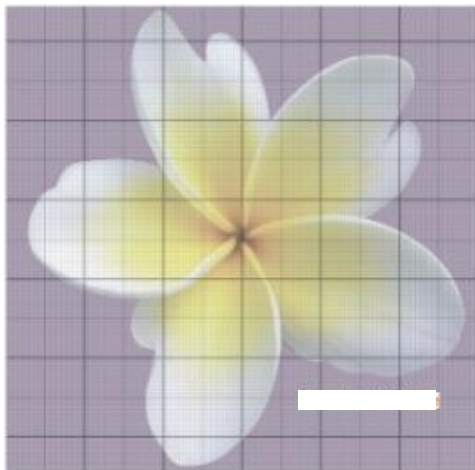
Solution:
Total area of the shaded region = Area of a right triangle + Area of a rectangle

$= (\frac{1}{2} \times b \times h) + (l \times b)$ cm²
$= [(\frac{1}{2} \times 3 \times 4) + (9 \times 6)]$ cm²
$= (6 + 54)$ cm² $= 60$ cm²

Question 14.
Find the approximate area of the flower in the given square grid.

Solution:
No of full squares = 11
No of half squares = 9
Area of 11 full squares
= 11 x 1 cm²

$= 11 \text{ cm}^2$

Area of 9 half squares

$= 9 \times \frac{1}{2} \text{ cm}^2$

$= 4.5 \text{ cm}^2$

Area of the flower $= (11 + 4.5) \text{ cm}^2$

$= 15.5 \text{ cm}^2$