

CHAPTER 10

Mensuration

Understanding the Lesson

- Concept of perimeter of different kind of shapes.
- Introduction to area.
- Area of rectangles and squares.
- Deducing the formula of the perimeter and area of rectangles and squares.
- Problems based on perimeter and area.

Conceptual Facts

- Perimeter is the distance covered along the boundary formed by the closed figures.
- Perimeter of rectangle = 2 (length + breadth)
- Perimeter of square = 4 × length of the side
- Perimeter of equilateral triangle = 3 × length of each side
- Area of a rectangle = length × breadth
- Area of a square = side × side
- Unit of perimeter = cm or m or km
- Unit of area = sq cm or sq m or sq km (cm^2 or m^2 or km^2)

TRY THESE (PAGE 206)

Q1. Measure and write the length of the four sides of the top of your study table.

$$AB = \text{_____ cm} \quad BC = \text{_____ cm}$$

$$CD = \text{_____ cm} \quad DA = \text{_____ cm}$$

Now, the sum of the lengths of the four sides

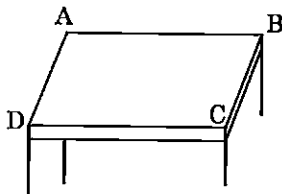
$$= AB + BC + CD + DA$$

$$= \text{_____ cm} + \text{_____ cm} + \text{_____ cm}$$

$$+ \text{_____ cm}$$

$$= \text{_____ cm.}$$

What is the perimeter?



Sol. On measuring the lengths of the four sides of the top of study table, we have the following observations:

$$AB = 140 \text{ cm} \quad BC = 80 \text{ cm}$$

$$CD = 140 \text{ cm} \quad DA = 80 \text{ cm}$$

$$\therefore \text{Sum } AB + BC + CD + DA$$

$$= 140 \text{ cm} + 80 \text{ cm} + 140 \text{ cm} + 80 \text{ cm}$$

$$= 440 \text{ cm}$$

The perimeter of the top of the table = 440 cm.

Q2. Measure and write the lengths of the four sides of a page of your notebook. The sum of the lengths of the four sides

$$= AB + BC + CD + DA$$

$$= \text{_____ cm} + \text{_____ cm} + \text{_____ cm}$$

$$+ \text{_____ cm}$$

$$= \text{_____ cm.}$$

What is the perimeter of the page?

Sol. On measuring the lengths of the four sides of the page of a notebook, we observe that

$$AB = 36 \text{ cm}, \quad BC = 20 \text{ cm}$$

$$CD = 36 \text{ cm}, \quad DA = 20 \text{ cm}$$

$$\therefore AB + BC + CD + DA$$

$$= 36 \text{ cm} + 20 \text{ cm} + 36 \text{ cm} + 20 \text{ cm}$$

$$= 112 \text{ cm}$$

$$\therefore \text{Perimeter of the notebook} = 112 \text{ cm.}$$

Q3. Meera went to a park 150 m long and 80 m wide. She took one complete round on its boundary. What is the distance covered by her?

Sol. Length of the rectangular park = 150 m
Breadth of the park = 80 m

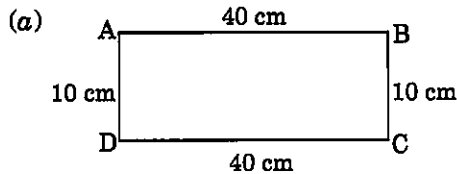
Perimeter of the park

$$= 2 (\text{length} + \text{breadth}) = 2 (150 \text{ m} + 80 \text{ m})$$

$$= 2 \times 230 \text{ m} = 460 \text{ m}$$

\therefore Distance covered by Meera is 460 metre.

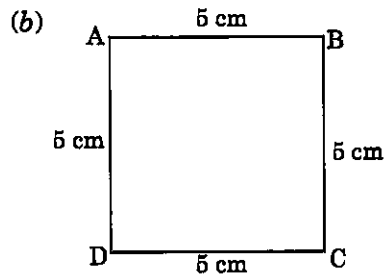
Q4. Find the perimeter of the following figures:



$$\text{Perimeter} = AB + BC + CD + DA$$

$$= \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

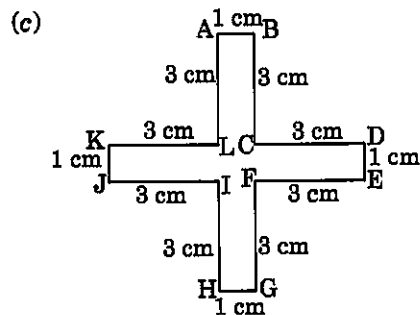
$$= \underline{\hspace{2cm}}$$



$$\text{Perimeter} = AB + BC + CD + DA$$

$$= \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$



$$\text{Perimeter} = AB + BC + CD + DE + EF + FG + GH + HI + IJ + JK + KL + LA$$

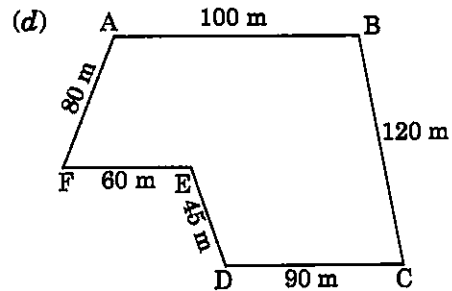
$$= \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$+ \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$+ \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$+ \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$



$$\text{Perimeter} = AB + BC + CD + DE + EF + FA$$

$$= \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$+ \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

Sol. (a) Perimeter = $AB + BC + CD + DA$

$$= 40 \text{ cm} + 10 \text{ cm} + 40 \text{ cm} + 10 \text{ cm} = 100 \text{ cm.}$$

(b) Perimeter = $AB + BC + CD + DA$

$$= 5 \text{ cm} + 5 \text{ cm} + 5 \text{ cm} + 5 \text{ cm} = 20 \text{ cm.}$$

(c) Perimeter = $AB + BC + CD + DE + EF + FG + GH + HI + IJ + JK + KL + LA$

$$= 1 \text{ cm} + 3 \text{ cm} + 3 \text{ cm} + 1 \text{ cm} + 3 \text{ cm} + 3 \text{ cm} + 1 \text{ cm} + 3 \text{ cm} + 3 \text{ cm} + 1 \text{ cm} + 3 \text{ cm} + 3 \text{ cm}$$

$$= 28 \text{ cm.}$$

(d) Perimeter = $AB + BC + CD + DE + EF + FA$

$$= 100 \text{ m} + 120 \text{ m} + 90 \text{ m} + 45 \text{ m} + 60 \text{ m} + 80 \text{ m}$$

$$= 495 \text{ m.}$$

TRY THESE (PAGE 208)

Q1. Find the perimeter of the following rectangles:

Length of rectangle	Breadth of rectangle	Perimeter by adding all the sides	Perimeter by $2 \times (\text{length} + \text{breadth})$
25 cm	12 cm	$= 25 \text{ cm} + 12 \text{ cm} + 25 \text{ cm} + 12 \text{ cm}$ $= 74 \text{ cm}$	$= 2 \times (25 \text{ cm} + 12 \text{ cm})$ $= 2 \times (37 \text{ cm}) = 74 \text{ cm}$
0.5 m	0.25 m		
18 cm	15 cm		
10.5 cm	8.5 cm		

Sol. From the above information, we have

(a) (i) Length of the rectangle = 0.5 m

Breadth of the rectangle = 0.25 m

\therefore Perimeter by adding all sides

$$= 0.5 \text{ m} + 0.25 \text{ m} + 0.5 \text{ m} + 0.25 \text{ m} = 1.50 \text{ m}$$

(ii) Perimeter by $2 \times [\text{length} + \text{breadth}]$

$$= 2 \times [0.5 \text{ m} + 0.25 \text{ m}] = 2 \times 0.75 \text{ m} = 1.50 \text{ m}$$

(b) (i) Length of the rectangle = 18 cm

Breadth of the rectangle = 15 cm

\therefore Perimeter by adding all the sides

$$= 18 \text{ cm} + 15 \text{ cm} + 18 \text{ cm} + 15 \text{ cm} = 66 \text{ cm}$$

(ii) Perimeter by

$$2 \times [\text{length} + \text{breadth}] = 2 \times [18 \text{ cm} + 15 \text{ cm}] \\ = 2 \times 33 \text{ cm} = 66 \text{ cm}$$

(c) (i) Length of the rectangle = 10.5 cm

Breadth of the rectangle = 8.5 cm

$$\therefore \text{Perimeter by adding all the sides} \\ = 10.5 \text{ cm} + 8.5 \text{ cm} + 10.5 \text{ cm} + 8.5 \text{ cm} \\ = 38 \text{ cm}$$

(ii) Perimeter by

$$2 \times [\text{length} + \text{breadth}] \\ = 2 \times [10.5 \text{ cm} + 8.5 \text{ cm}] \\ = 2 \times 19 \text{ cm} = 38 \text{ cm}$$

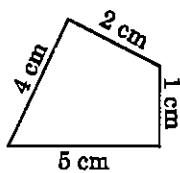
TRY THESE (PAGE 211)

Q1. Find various objects from your surroundings which have regular shapes and find their perimeters.

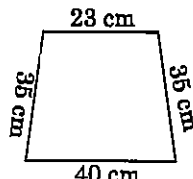
Sol. It is an activity. So, try yourself.

EXERCISE 10.1

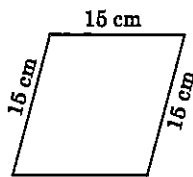
Q1. Find the perimeter of each of the following figures:



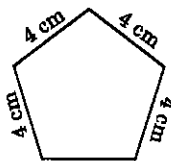
(a)



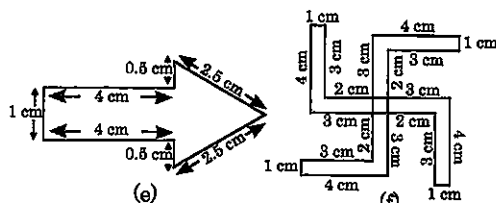
(b)



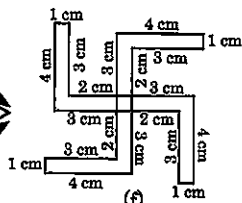
(c)



(d)



(e)



(f)

Sol. (a) Required perimeter

$$= 4 \text{ cm} + 2 \text{ cm} + 1 \text{ cm} + 5 \text{ cm} = 12 \text{ cm}$$

(b) Required perimeter

$$= 40 \text{ cm} + 35 \text{ cm} + 23 \text{ cm} + 35 \text{ cm} \\ = 133 \text{ cm or } 1.33 \text{ m}$$

(c) Required perimeter

$$= 15 \text{ cm} + 15 \text{ cm} + 15 \text{ cm} + 15 \text{ cm} \\ = 15 \text{ cm} \times 4 = 60 \text{ cm}$$

(d) Required perimeter

$$= 4 \text{ cm} + 4 \text{ cm} + 4 \text{ cm} + 4 \text{ cm} + 4 \text{ cm} \\ = 4 \text{ cm} \times 5 = 20 \text{ cm}$$

(e) Required perimeter

$$= 4 \text{ cm} + 0.5 \text{ cm} + 2.5 \text{ cm} + 2.5 \text{ cm} + 0.5 \text{ cm} \\ + 4 \text{ cm} + 1 \text{ cm} \\ = 15 \text{ cm}$$

(f) Required perimeter = 4 cm + 1 cm + 3 cm +

$$2 \text{ cm} + 3 \text{ cm} + 4 \text{ cm} + 1 \text{ cm} + 3 \text{ cm} + 2 \text{ cm} +$$

$$3 \text{ cm} + 4 \text{ cm} + 1 \text{ cm} + 3 \text{ cm} + 2 \text{ cm} + 3 \text{ cm} + \\ 4 \text{ cm} + 1 \text{ cm} + 3 \text{ cm} + 2 \text{ cm} + 3 \text{ cm} \\ = 52 \text{ cm}$$

Q2. The lid of a rectangular box of sides 40 cm by 10 cm is sealed all round with tape. What is the length of the tape required?

Sol. Total length of the tape required
= perimeter of the rectangular lid
= 2 [length + breadth] = 2 × [40 + 10]
= 2 × 50 = 100 cm

Q3. A table-top measures 2 m 25 cm by 1 m 50 cm. What is the perimeter of the table-top?

Sol. Length of table-top = 2 m 25 cm
Breadth of table-top = 1 m 50 cm

∴ Perimeter of the table top

$$= 2[\text{length} + \text{breadth}] \\ = 2[2 \text{ m } 25 \text{ cm} + 1 \text{ m } 50 \text{ cm}] \\ = 2 \times 3 \text{ m } 75 \text{ cm} \\ = 7 \text{ m } 50 \text{ cm} = 7.5 \text{ m}$$

2 m	25 cm
+ 1 m	50 cm
<hr/>	
3 m	75 cm
<hr/>	
× 2	
7 m	50 cm

Q4. What is the length of the wooden strip required to frame a photograph of length and breadth 32 cm and 21 cm respectively?

Sol. Length of the strip = 32 cm
Breadth of the strip = 21 cm
∴ Perimeter = 2 [length + breadth]
= 2[32 cm + 21 cm]
= 2 × 53 cm = 106 cm

Hence, the required length of the strip = 106 cm or 1 m 6 cm.

Q5. A rectangular piece of land measures 0.7 km by 0.5 km. Each side is to be fenced with 4 rows of wires. What is the length of the wire needed?

Sol. Length of the rectangular piece of land
= 0.7 km = 0.7 × 1000 m
= 700 m
Breadth of the rectangular piece of land
= 0.5 km = 0.5 × 1000 m
= 500 m.

$$\begin{aligned} \therefore \text{Perimeter of the rectangular land} \\ &= 2[\text{length} + \text{breadth}] \\ &= 2[700 \text{ m} + 500 \text{ m}] \\ &= 2400 \text{ m}. \end{aligned}$$

$$\begin{aligned} \text{Length of wire needed in 4 rounds of the land} \\ &= 4 \times 2400 = 9600 \text{ m} = 9.6 \text{ km}. \end{aligned}$$

Q6. Find the perimeter of each of the following shapes:

- (a) A triangle of sides 3 cm, 4 cm and 5 cm.
 (b) An equilateral triangle of side 9 cm.
 (c) An isosceles triangle with equal sides 8 cm each and third side 6 cm.

Sol. (a) We know that the perimeter of the given triangle = The sum of all sides of the triangle
 \therefore Perimeter of the triangle

$$= 3 \text{ cm} + 4 \text{ cm} + 5 \text{ cm} = 12 \text{ cm}$$

(b) We know that the perimeter of the given triangle

$$\begin{aligned} &= \text{Sum of all the sides of the triangle} \\ &= (9 + 9 + 9) = 27 \text{ cm} \end{aligned}$$

(c) Perimeter of the given isosceles triangle
 = Sum of all the sides of the triangle
 $= (8 + 8 + 6) \text{ cm} = 22 \text{ cm}$

Q7. Find the perimeter of a triangle with sides measuring 10 cm, 14 cm and 15 cm.

Sol. Perimeter of a triangle
 = Sum of all the sides of the triangle
 $= 10 \text{ cm} + 14 \text{ cm} + 15 \text{ cm} = 39 \text{ cm}$

Q8. Find the perimeter of a regular hexagon with each side measuring 8 m.

Sol. Perimeter of a regular hexagon
 $= 6 \times \text{side}$
 $= 6 \times 8 \text{ m} = 48 \text{ m}.$

Q9. Find the side of the square whose perimeter is 20 m.

Sol. Perimeter of a square = $4 \times \text{side}$
 $20 = 4 \times \text{side}$
 $\therefore \text{side} = 20 \text{ m} \div 4 = 5 \text{ m}$

Q10. The perimeter of a regular pentagon is 100 cm. How long is its each side?

Sol. We have
 Perimeter of the regular pentagon = 100 cm
 Number of sides in regular pentagon = 5
 \therefore Length of each side
 $= \text{Perimeter} \div \text{Number of sides}$
 $= 100 \text{ cm} \div 5 = 20 \text{ cm}.$

Q11. A piece of string is 30 cm long. What will be the length of each side if the string is used to form:

- (a) a square?
 (b) an equilateral triangle?
 (c) a regular hexagon?

Sol. (a) Length of string = 30 cm
 Number of equal sides in a square = 4
 \therefore Length of each side of the square
 $= 30 \text{ cm} \div 4 = 7.50 \text{ cm}.$

(b) Length of string = 30 cm
 Number of equal sides in equilateral triangle = 3

\therefore Length of each side of the equilateral triangle = $30 \text{ cm} \div 3 = 10 \text{ cm}$

(c) Length of string = 30 cm
 Number of equal sides in regular hexagon = 6

\therefore Length of each side of the regular hexagon
 $= 30 \text{ cm} \div 6 = 5 \text{ cm}$

Q12. Two sides of a triangle are 12 cm and 14 cm. The perimeter of the triangle is 36 cm. What is its third side?

Sol. Perimeter of the triangle = 36 cm.
 Length of two of its sides are 12 cm and 14 cm.
 \therefore Length of the third side of the triangle
 $= 36 - (12 + 14) \text{ cm}$
 $= (36 - 26) \text{ cm} = 10 \text{ cm}$

Q13. Find the cost of fencing a square park of side 250 m at the rate of ₹ 20 per metre.

Sol. Length of the side of a square = 250 m
 \therefore Perimeter of the square
 $= 250 \text{ m} \times 4 = 1000 \text{ m}$
 Rate of fencing = ₹ 20 per m.
 \therefore Cost of fencing = ₹ $20 \times 1000 = ₹ 20,000$

Q14. Find the cost of fencing a rectangular park of length 175 m and breadth 125 m at the rate of ₹ 12 per metre.

Sol. Length of the rectangular park = 175 m
 Breadth of the rectangular park = 125 m
 \therefore Perimeter of the park
 $= 2 [\text{length} + \text{breadth}]$
 $= 2[175 \text{ m} + 125 \text{ m}]$
 $= 2 \times 300 \text{ m} = 600 \text{ m}$
 Rate of fencing = ₹ 12 per metre
 \therefore Cost of fencing = ₹ $12 \times 600 = ₹ 7200$

Q15. Sweety runs around a square park of side 75 m. Bulbul runs around a rectangular park with length 60 m and breadth 45 m. Who covers less distance?

Sol. Side of the square park = 75 m
 \therefore its perimeter = $4 \times 75 \text{ m} = 300 \text{ m}$

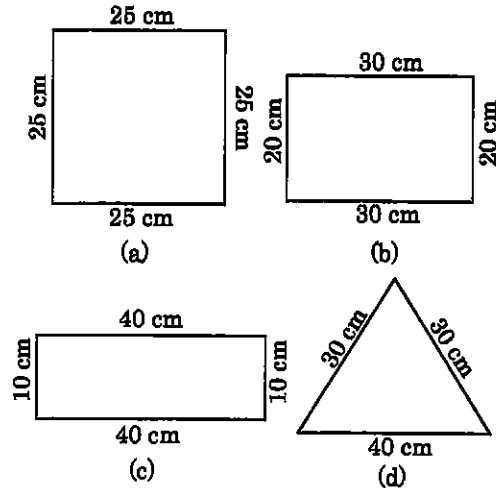
Perimeter of the rectangular park

$$\begin{aligned} &= 2 [\text{length} + \text{breadth}] \\ &= 2 [60 \text{ m} + 45 \text{ m}] \\ &= 2 \times 105 \text{ m} = 210 \text{ m}. \end{aligned}$$

Since $210 \text{ m} < 300 \text{ m}$.

So, Bulbul covers less distance.

Q16. What is the perimeter of each of the following figures? What do you infer from the answers?



Sol. (a) Perimeter of the square

$$\begin{aligned} &= 25 \text{ cm} + 25 \text{ cm} + 25 \text{ cm} + 25 \text{ cm} \\ &= 4 \times 25 \text{ cm} = 100 \text{ cm} \end{aligned}$$

(b) Perimeter of the rectangle

$$\begin{aligned} &= 30 \text{ cm} + 20 \text{ cm} + 30 \text{ cm} + 20 \text{ cm} \\ &= 2 [30 \text{ cm} + 20 \text{ cm}] \\ &= 2 \times 50 \text{ cm} = 100 \text{ cm} \end{aligned}$$

(c) Perimeter of the rectangle

$$\begin{aligned} &= 40 \text{ cm} + 10 \text{ cm} + 40 \text{ cm} + 10 \text{ cm} \\ &= 2[40 \text{ cm} + 10 \text{ cm}] \\ &= 2 \times 50 \text{ cm} = 100 \text{ cm} \end{aligned}$$

(d) Perimeter of the triangle

$$\begin{aligned} &= \text{Sum of all sides} \\ &= 30 \text{ cm} + 30 \text{ cm} + 40 \text{ cm} \\ &= 100 \text{ cm} \end{aligned}$$

From the above answers, we conclude that different figures may have equal perimeters.

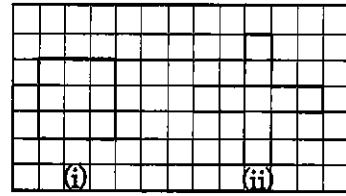
Q17. Avneet buys 9 square paving slabs, each with a side of $\frac{1}{2}$ m. He lays them in the form of a square.

(a) What is the perimeter of his arrangement [Fig. (i)]?

(b) Shari does not like his arrangement. She gets him to lay them out like a cross. What is the perimeter of her arrangement [Fig. (ii)]?

(c) Which has greater perimeter?

(d) Avneet wonders, if there is a way of getting an even greater perimeter. Can you find a way of doing this? (The paving slabs must meet along complete edges, i.e., they can not be broken).



Sol. (a) The arrangement is in the form of a square of side

$$\left(\frac{1}{2} \text{ m} + \frac{1}{2} \text{ m} + \frac{1}{2} \text{ m} \right) = 1 \frac{1}{2} \text{ m}.$$

\therefore Perimeter of the square arrangement

$$= 4 \times \text{side}$$

$$= 4 \times 1 \frac{1}{2} \text{ m}$$

$$= 4 \times \frac{3}{2} \text{ m} = 6 \text{ m}.$$

(b) Perimeter of cross-arrangement

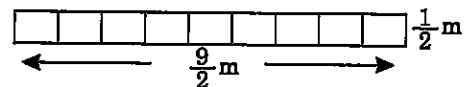
$$\begin{aligned} &= \frac{1}{2} \text{ m} + 1 \text{ m} + 1 \text{ m} + \frac{1}{2} \text{ m} + 1 \text{ m} + 1 \text{ m} + \frac{1}{2} \text{ m} \\ &+ 1 \text{ m} + 1 \text{ m} + \frac{1}{2} \text{ m} + 1 \text{ m} + 1 \text{ m} = 10 \text{ m} \end{aligned}$$

(c) Since $10 \text{ m} > 6 \text{ m}$

\therefore Cross-arrangement has greater perimeter.

(d) Total number of tiles = 9

\therefore We have the following arrangement



The above arrangement will also have the greater perimeter.

TRY THESE (PAGE 215)

Q1. Draw any circle on a graph sheet. Count the squares and used them to estimate the area of the circular region.

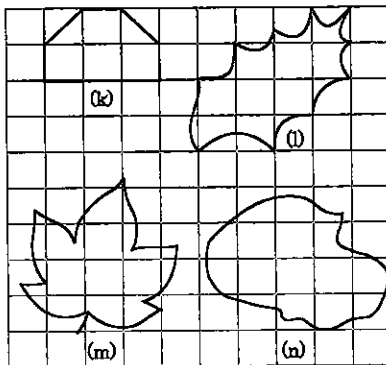
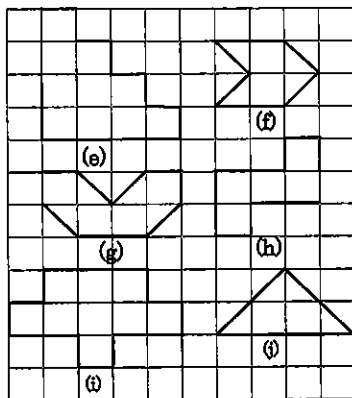
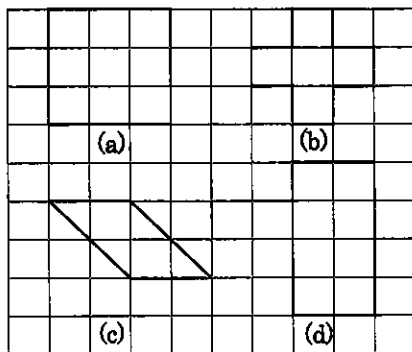
Sol. It is an activity. Please do it yourself.

Q2. Trace shapes of leaves, flower petals and other such objects on the graph paper and find their areas.

Sol. It is an activity. The students will try themselves.

EXERCISE 10.2

Q1. Find the areas of the following figures by counting square:



Sol. (a) Number of full squares = 9

Area of 1 square = 1 sq unit

\therefore Area of 9 squares = 9×1 sq unit
= 9 sq units.

So, the area of the portion covered by 9 squares = 9 sq units

(b) Number of full squares = 5

\therefore Area of the figure = 5×1 sq unit
= 5 sq units

(c) Number of full squares = 2

Number of half squares = 4

\therefore Area of the covered figure

$$= 2 \times 1 + 4 \times \frac{1}{2} = 2 + 2 \\ = 4 \text{ sq units}$$

(d) Number of full squares = 8

\therefore Area of the covered portion of the figure
= 8×1 sq unit
= 8 sq units.

(e) Number of full squares = 10

\therefore Area covered by the figure
= 10×1 sq unit = 10 sq units.

(f) Number of full squares = 2

Number of half squares = 4

\therefore Area of the covered figure

$$= \left(2 \times 1 + 4 \times \frac{1}{2} \right) \text{ sq units} \\ = (2 + 2) \text{ sq units} = 4 \text{ sq units.}$$

(g) Number of full squares = 4

Number of half squares = 4

\therefore Area of the covered figure

$$= \left(4 \times 1 + 4 \times \frac{1}{2} \right) \text{ sq units} \\ = (4 + 2) \text{ sq units} \\ = 6 \text{ sq units.}$$

(h) Number of full squares = 5

\therefore Area of the covered figure
= 5×1 sq unit
= 5 sq units.

(i) Number of full squares = 9

\therefore Area of the covered figure
= 9×1 sq units
= 9 sq units.

(j) Number of full squares = 2

Number of half squares = 4

\therefore Area of the covered figure

$$= \left(2 \times 1 + 4 \times \frac{1}{2} \right) \text{ sq units} \\ = (2 + 2) \text{ sq units} = 4 \text{ sq units.}$$

(k) Number of full squares = 4

Number of half squares = 2

\therefore Area of the covered figure

$$= \left(4 \times 1 + 2 \times \frac{1}{2} \right) \text{ sq units} \\ = (4 + 1) \text{ sq units} \\ = 5 \text{ sq units.}$$

(l) Number of full squares = 4
 Number of squares more than half = 3
 Number of half squares = 2
 \therefore Area of the covered figure
 $= \left(4 \times 1 + 3 \times 1 + 2 \times \frac{1}{2} \right)$ sq units
 $= (4 + 3 + 1)$ sq units = 8 sq units.

(m) Number of full squares = 6
 Number of more than half squares = 8
 \therefore Area of the covered figure
 $= (6 \times 1 + 8 \times 1)$ sq units
 $= (6 + 8)$ sq units = 14 sq units.

(n) Number of full squares = 9
 Number of more than half squares = 9
 \therefore Area of the covered figure
 $= (9 \times 1 + 9 \times 1)$ sq units
 $= (9 + 9)$ sq units = 18 sq units.

TRY THESE (PAGE 217)

Q1. Find the area of the floor of your classroom.

Sol. It is an activity. So, please do yourself.

Q2. Find the area of any one door in your house.

Sol. It is an activity. Try yourself.

EXERCISE 10.3

Q1. Find the areas of the rectangles whose sides are:

(a) 3 cm and 4 cm (b) 12 m and 21 m

(c) 2 km and 3 km (d) 2 m and 70 cm

Sol. (a) Length of the rectangle = 3 cm
 Breadth of the rectangle = 4 cm
 \therefore Area of the rectangle
 $= \text{length} \times \text{breadth} = 3 \text{ cm} \times 4 \text{ cm}$
 $= 12 \text{ cm}^2$ or 12 sq cm

(b) Length of the rectangle = 12 m
 and breadth = 21 m
 \therefore Area of the rectangle
 $= \text{length} \times \text{breadth} = 12 \text{ m} \times 21 \text{ m}$
 $= 252 \text{ m}^2$ or 252 sq m

(c) Length of the rectangle = 2 km
 and breadth = 3 km
 \therefore Area of the rectangle
 $= \text{length} \times \text{breadth} = 2 \text{ km} \times 3 \text{ km}$
 $= 6 \text{ km}^2$ or 6 sq km

(d) Length of the rectangle = 2 m
 and breadth = 70 cm or 0.70 m
 \therefore Area of the rectangle
 $= \text{length} \times \text{breadth} = 2 \text{ m} \times 0.70 \text{ m}$
 $= 1.40 \text{ m}^2$ or 1.40 sq m

Q2. Find the areas of the squares whose sides are:

(a) 10 cm (b) 14 cm (c) 5 m

Sol. (a) Side of the square = 10 cm
 \therefore Area of the square = Side \times Side
 $= 10 \text{ cm} \times 10 \text{ cm}$
 $= 100 \text{ cm}^2$ or 100 sq cm

(b) Side of the square = 14 cm
 \therefore Area of the square = Side \times Side
 $= 14 \text{ cm} \times 14 \text{ cm}$
 $= 196 \text{ cm}^2$ or 196 sq cm

(c) Side of the square = 5 m
 \therefore Area of the square = Side \times Side
 $= 5 \text{ m} \times 5 \text{ m} = 25 \text{ m}^2$ or 25 sq m

Q3. The length and breadth of three rectangles are as given below:

(a) 9 m and 6 m (b) 17 m and 3 m

(c) 4 m and 14 m

Which one has the largest area and which one has the smallest?

Sol. (a) Length of the rectangle = 9 m
 and breadth = 6 m
 \therefore Area of the rectangle
 $= \text{length} \times \text{breadth} = 9 \text{ m} \times 6 \text{ m}$
 $= 54 \text{ m}^2$ or 54 sq m

(b) Length of the rectangle = 17 m
 and breadth = 3 m
 \therefore Area of the rectangle
 $= \text{length} \times \text{breadth} = 17 \text{ m} \times 3 \text{ m}$
 $= 51 \text{ m}^2$ or 51 sq m

(c) Length of the rectangle = 4 m
 and breadth = 14 m
 \therefore Area of the rectangle
 $= \text{length} \times \text{breadth} = 4 \text{ m} \times 14 \text{ m}$
 $= 56 \text{ m}^2$ or 56 sq m

Rectangle (c) has the largest area, i.e., 56 sq m and Rectangle (b) has the smallest area, i.e., 51 sq m.

Q4. The area of a rectangular garden 50 m long is 300 sq m. Find the width of the garden.

Sol. Length of the rectangular garden = 50 m
 Area of the rectangular garden = 300 sq m
 \therefore Width = Area \div Length
 $= 300 \text{ sq m} \div 50 \text{ m} = 6 \text{ m}$
 Hence width of the garden = 6 m.

Q5. What is the cost of tiling a rectangular plot of land 500 m long and 200 m wide at the rate of ₹ 8 per hundred sq m?

Sol. Length of the rectangular plot = 500 m
and the breadth = 200 m
∴ Area of the plot = length × breadth
= 500 m × 200 m
= 100000 sq m
Now rate of tiling the plot
= ₹ 8 per 100 sq m
∴ Cost of tiling the garden
= ₹ $\left(\frac{8}{100} \times 100000\right)$ = ₹ 8000

Hence the required cost = ₹ 8000

Q6. A table-top measures 2 m by 1 m 50 cm. What is its area in square metres?

Sol. Length of the table-top = 2 m
and its breadth = 1 m 50 cm or 1.50 m
∴ Area of the table-top
= length × breadth = 2 m × 1.50 m
= 3 m² or 3 sq m

Hence, the area of table-top = 3 sq m.

Q7. A room is 4 m long and 3 m 50 cm wide. How many square metres of carpet is needed to cover the floor of the room?

Sol. Length of the room = 4 m
and its breadth = 3 m 50 cm
= 3.5 m
Area of the room = length × breadth
= 4 m × 3.5 m = 14 sq m

Hence, the area of the carpet needed = 14 sq m

Q8. A floor is 5 m long and 4 m wide. A square carpet of sides 3 m is laid on the floor. Find the area of the floor that is not carpeted.

Sol. Length of the floor = 5 m
and its breadth = 4 m
∴ Area of the floor = length × breadth
= 5 m × 4 m = 20 sq m
Side of the carpet = 3 m
∴ Area of the square carpet
= side × side
= 3 m × 3 m = 9 sq m
∴ Area of the floor which is not carpeted
= 20 sq m – 9 sq m
= 11 sq m.

Q9. Five square flower beds each of side 1 m are dug on a piece of land 5 m long and 4 m wide. What is the area of the remaining part of the land?

Sol. Side of the square flower bed = 1 m.
∴ Area of 1 square flower bed
= 1 m × 1 m = 1 sq m.

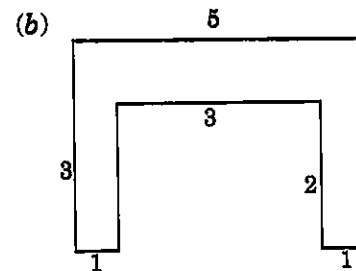
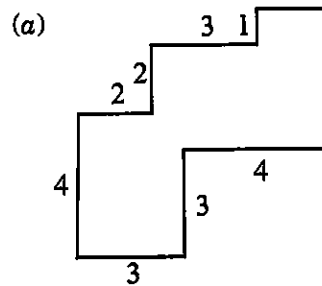
∴ Area of 5 square flower beds
= 1 sq m × 5 = 5 sq m.

Now length of the land = 5 m
and its breadth = 4 m

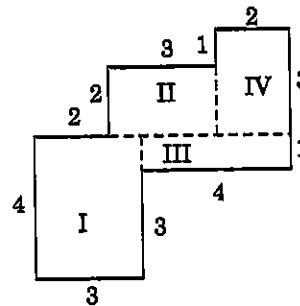
∴ Area of the land = length × breadth
= 5 m × 4 m
= 20 sq m

∴ Area of the remaining part of the land
= 20 sq m – 5 sq m
= 15 sq m.

Q10. By splitting the following figures into rectangles, find their areas (The measures are given in centimetres).



Sol. (a)



Splitting the given figure into the rectangles I, II, III and IV, we have

Area of the rectangle I
= length × breadth
= 4 cm × 3 cm = 12 sq cm

Area of the rectangle II
= length × breadth
= 3 cm × 2 cm = 6 sq cm.

Area of the rectangle III = length × breadth
= 4 cm × 1 cm = 4 sq cm

Area of the rectangle IV

$$= \text{length} \times \text{breadth}$$

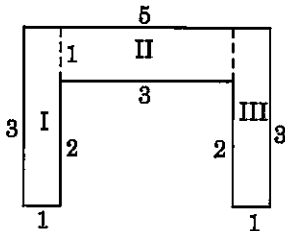
$$= 3 \text{ cm} \times 2 \text{ cm} = 6 \text{ sq cm}$$

$$\therefore \text{Total area of the whole figure}$$

$$= 12 \text{ sq cm} + 6 \text{ sq cm} + 4 \text{ sq cm} + 6 \text{ sq cm}$$

$$= 28 \text{ sq cm.}$$

(b) Splitting the given figure into the rectangles I, II and III, we get



Area of rectangle I

$$= 3 \text{ cm} \times 1 \text{ cm} = 3 \text{ sq cm}$$

Area of rectangle II

$$= 3 \text{ cm} \times 1 \text{ cm} = 3 \text{ sq cm}$$

Area of rectangle III

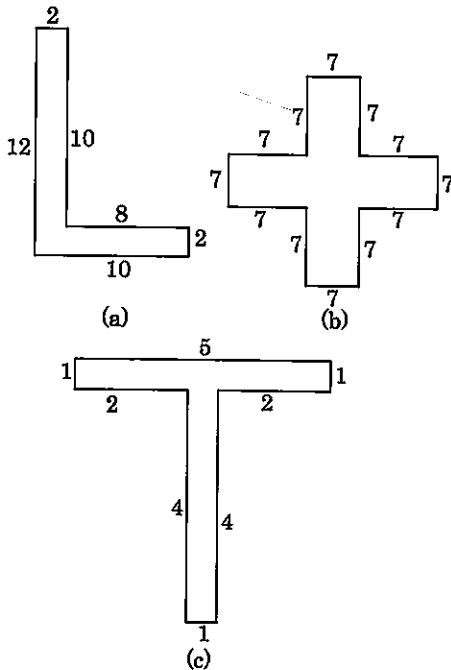
$$= 3 \text{ cm} \times 1 \text{ cm} = 3 \text{ sq cm}$$

$$\therefore \text{Total area of the given figure}$$

$$= 3 \text{ sq cm} + 3 \text{ sq cm} + 3 \text{ sq cm}$$

$$= 9 \text{ sq cm.}$$

Q11. Split the following shapes into rectangles and find their areas (The measures are given in centimetres).



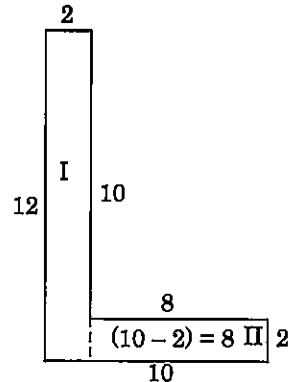
Sol. (a) Splitting the given figure into the rectangles I and II, we get

Area of the rectangle I

$$= 12 \text{ cm} \times 2 \text{ cm} = 24 \text{ sq cm}$$

Area of the rectangle II

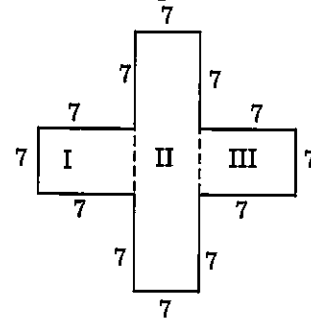
$$= 8 \text{ cm} \times 2 \text{ cm} = 16 \text{ sq cm}$$



$$\therefore \text{Total area of the whole figure}$$

$$= 24 \text{ sq cm} + 16 \text{ sq cm} = 40 \text{ sq cm.}$$

(b) Splitting the given figure into the rectangles I, II and III, we get



Area of the rectangle I

$$= 7 \text{ cm} \times 7 \text{ cm} = 49 \text{ sq cm}$$

Area of the rectangle II

$$= 21 \text{ cm} \times 7 \text{ cm} = 147 \text{ sq cm}$$

Area of the rectangle III

$$= 7 \text{ cm} \times 7 \text{ cm} = 49 \text{ sq cm}$$

$$\therefore \text{Total area of the whole figure}$$

$$= 49 \text{ sq cm} + 147 \text{ sq cm} + 49 \text{ sq cm}$$

$$= 245 \text{ sq cm.}$$

Q12. How many tiles whose length and breadth are 12 cm and 5 cm respectively will be needed to fit in a rectangular region whose length and breadth are respectively:

(a) 100 cm and 144 cm

(b) 70 cm and 36 cm

Sol. Length of one tile = 12 cm

Breadth of the tile = 5 cm

$$\therefore \text{Area of 1 tile} = \text{length} \times \text{breadth}$$

$$= 12 \text{ cm} \times 5 \text{ cm} = 60 \text{ sq cm}$$

- (a) Length of the rectangular region = 144 cm
 Breadth of the region = 100 cm
 \therefore Area of the rectangular region
 = length \times breadth = 144 cm \times 100 cm
 = 14400 sq cm
 \therefore Number of tiles needed to cover the whole rectangular region
 = 14400 sq cm \div 60 sq cm
 = 240 tiles

- (b) Length of the rectangular region = 70 cm
 Breadth of the region = 36 cm
 \therefore Area of the rectangular region
 = length \times breadth = 70 cm \times 36 cm
 = 2520 sq cm
 \therefore Number of tiles needed to cover the whole rectangular region
 = 2520 sq cm \div 60 sq cm
 = 42 tiles.

Learning More Q & A

I. VERY SHORT ANSWER (VSA) QUESTIONS

- Q1. The perimeter of a square is 64 cm. Find the length of each side.

Sol. Perimeter of the square = 64 cm

$$\therefore \text{Length of its side} = \frac{\text{Perimeter}}{\text{Number of sides}}$$

$$= \frac{64}{4} = 16 \text{ cm.}$$

- Q2. Length and breadth of a rectangular table-top are 36 cm and 24 cm respectively. Find its perimeter.

Sol. Length of the rectangular table-top = 36 cm
 and its breadth = 24 cm.

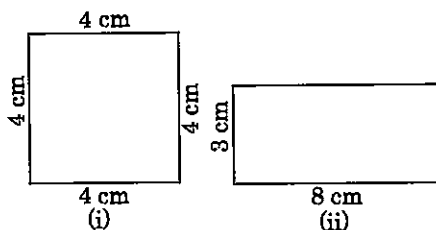
$$\therefore \text{Perimeter of the table-top}$$

$$= 2[\text{length} + \text{breadth}]$$

$$= 2[36 \text{ cm} + 24 \text{ cm}]$$

$$= 2 \times 60 \text{ cm} = 120 \text{ cm.}$$

- Q3. Which of the following figure has greater perimeter?



Sol. Fig. (i) Perimeter of the square

$$= 4 \times \text{side}$$

$$= 4 \times 4 \text{ cm} = 16 \text{ cm}$$

Fig. (ii) Perimeter of the rectangle

$$= 2[\text{length} + \text{breadth}]$$

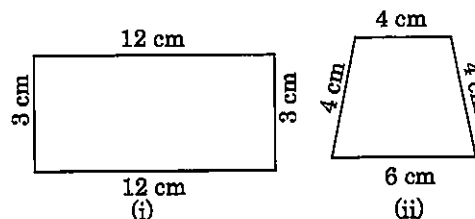
$$= 2[8 \text{ cm} + 3 \text{ cm}]$$

$$= 2 \times 11 \text{ cm} = 22 \text{ cm}$$

Since 22 cm > 16 cm

\therefore Rectangle has greater perimeter than the square.

- Q4. How much distance will you have to travel in going around each of the following figures?



Sol. Distance travelled in going around Fig. (i)

$$= 12 \text{ cm} + 3 \text{ cm} + 12 \text{ cm} + 3 \text{ cm} = 30 \text{ cm}$$

Distance travelled in going around Fig. (ii)

$$= 6 \text{ cm} + 4 \text{ cm} + 4 \text{ cm} + 4 \text{ cm} = 18 \text{ cm}$$

- Q5. Find the perimeter of a square whose side is 15 cm.

Sol. Side of the square = 15 cm

$$\therefore \text{Perimeter of the square}$$

$$= 15 \text{ cm} \times 4 = 60 \text{ cm}$$

- Q6. Find the cost of fencing a rectangular park 300 m long and 200 m wide at the rate of ₹ 4 per metre.

Sol. Length of the park = 300 m

Breadth = 200 m

$$\therefore \text{Perimeter of the park}$$

$$= 2[\text{length} + \text{breadth}]$$

$$= 2[300 \text{ m} + 200 \text{ m}]$$

$$= 2 \times 500 \text{ m} = 1000 \text{ m.}$$

\therefore Cost of fencing the rectangular park

$$= 1000 \times 4 = ₹ 4000$$

- Q7. Find the area of a square field whose each side is 150 m.

Sol. Side of the square field = 150 m

$$\therefore \text{Area of the square field}$$

$$= \text{Side} \times \text{Side}$$

$$= 150 \text{ m} \times 150 \text{ m}$$

$$= 22500 \text{ sq m.}$$

Q8. Length and breadth of a rectangular paper are 22 cm and 10 cm respectively. Find the area of the paper.

Sol. Length of the rectangular paper = 22 cm
Breadth = 10 cm
 \therefore Area of the rectangular paper
= length \times breadth
= 22 cm \times 10 cm = 220 sq cm.

II. SHORT ANSWER (SA) QUESTIONS

Q9. Find the length of a rectangle given that its perimeter is 880 m and breadth is 88 m.

Sol. Perimeter of the rectangle
= 2[length + breadth]
 \therefore 2[length + breadth] = 880
length + breadth = $880 \div 2 = 440$
 \therefore Breadth = 88 m
 \therefore Length = 440 m – 88 m
= 352 m

Hence, the required length = 352 m.

Q10. How many trees can be planted at a distance of 6 metres each around a rectangular plot whose length is 120 m and breadth is 90 m?

Sol. Length of the rectangular plot = 120 m
Breadth = 90 m
 \therefore Perimeter of the rectangular plot
= 2[length + breadth]
= 2[120 m + 90 m]
= 2 \times 210 m = 420 m

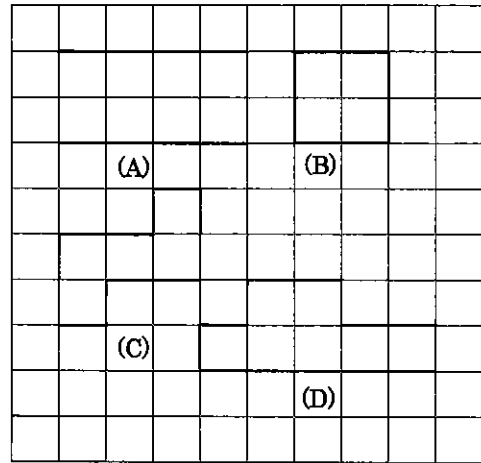
Now distance between two trees = 6 m

\therefore Number of trees around the rectangular plot
= 420 m \div 6 m = 70

Q11. A rectangular park is 30 metres long and 20 metres broad. A steel wire fence is put up all around it. Find the cost of putting the fence at the rate of ₹ 15 per metre.

Sol. Length of the rectangular park = 30 m
Breadth = 20 m
 \therefore Perimeter of the rectangular park
= 2(length + breadth)
= 2[30 + 20] = 2 \times 50 m = 100 m
 \therefore Cost of fencing all around the park
= ₹ 15 \times 100 = ₹ 1500

Q12. Find the area of the figures A, B, C and D drawn on a squared paper in the following figure by counting squares.



Sol. (A) Counting the squares, we have 8 squares
 \therefore Area = 8 sq units
(B) Counting the squares, we have 4 squares
 \therefore Area = 4 sq units
(C) Counting the squares, we have 5 squares
 \therefore Area = 5 sq units
(D) Counting the squares, we have 7 squares
 \therefore Area = 7 sq units

III. HIGHER ORDER THINKING SKILLS (HOTS)

Q13. A rectangle and a square have the same perimeter 100 cm. Find the side of the square. If the rectangle has a breadth 2 cm less than that of the square. Find the breadth, length and area of the rectangle.

Sol. Perimeter of the square = 100 cm

$$\text{Side of the square} = \frac{\text{Perimeter}}{4} = \frac{100}{4} = 25 \text{ cm.}$$

$$\therefore \text{Breadth of the rectangle} = 25 \text{ cm} - 2 \text{ cm} = 23 \text{ cm}$$

Now perimeter of the rectangle = 100 cm

$$\therefore 2[\text{length} + \text{breadth}] = 100$$

$$\text{length} + \text{breadth} = 100 \div 2 = 50 \text{ cm}$$

But breadth = 23 cm

$$\therefore \text{Length} = 50 \text{ cm} - 23 \text{ cm} = 27 \text{ cm}$$

Now, Area of the rectangle

$$= \text{length} \times \text{breadth}$$

$$= 27 \text{ cm} \times 23 \text{ cm} = 621 \text{ sq cm.}$$

Q14. Fencing the compound of a house costs ₹ 5452. If the rate is ₹ 94 per metre, find the perimeter of the compound. If the breadth is 10 m, find its length.

Sol. Cost of fencing the compound = ₹ 5452
and the rate of fencing = ₹ 94 per metre

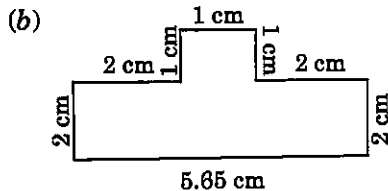
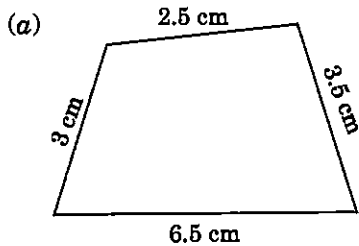
∴ Perimeter of the compound
 = $5452 + 94 = 58$ metres
 Now breadth of the compound = 10 m.
 $2[\text{length} + \text{breadth}] = 58$ m

∴ length + breadth = $58 + 2$ m = 29 m
 ∴ Length of the compound
 = 29 m - 10 m = 19 m.

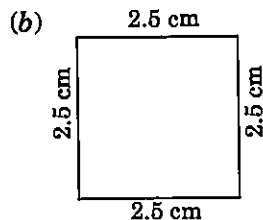
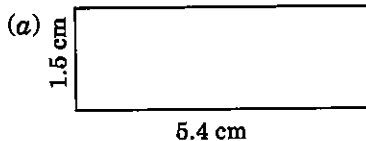
Test Yourself

I. VERY SHORT ANSWER (VSA) QUESTIONS

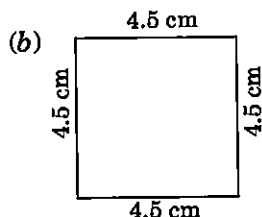
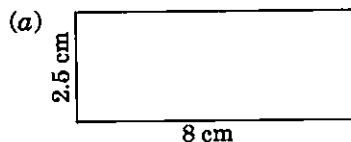
1. Find the perimeters of the following figures:



2. Find the area of the following rectangles:



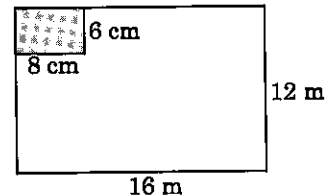
3. The perimeter of a square is 6.4 cm. Find its side.
 4. Perimeter of a rectangle is 84 cm. If its length is 24 cm, find its breadth.
 5. Which one of the following figures has larger area?



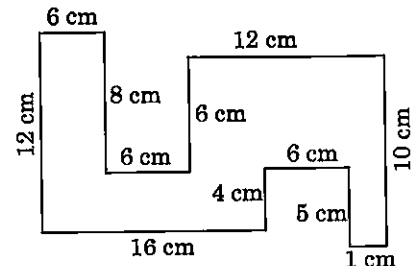
6. The area of a rectangle is 56 sq cm. If its length is 8 cm, find its breadth.
 7. The perimeter of a regular hexagon is 36 cm. Find its each side.
 8. A wire of length 84 cm is bent into a square. Find its side and then its area.
 9. What happens to the area of a square if its side is doubled?
 10. What happens to the perimeter of a square if its side is halved?

II. SHORT ANSWER (SA) QUESTIONS

11. The cost of flooring a room at ₹ 9.50 per square metre is ₹ 1330. If the breadth of the room is 7 m, find its length.
 12. A hall in the form of a rectangular region is 16 m × 12 m. How many marble slabs 8 cm × 6 cm are needed to cover the floor of the hall?



13. What will be the area of a rectangle if its length is doubled and breadth is halved?
 14. Find the area of this shape.



15. Fill in the blanks:

(a) Area of rectangle = _____

(b) Area of a square = $4 \times$ _____

(c) Length of rectangle = $\frac{\text{Area}}{\text{---}}$

(d) If the side of a square is doubled, then its area will be _____.

(e) Side of a regular hexagon = $\frac{\text{---}}{6}$

ANSWERS

- | | | | |
|------------------|---------------------|---------------------------------|---------------|
| 1. (a) 15.5 cm | (b) 16.65 cm | 11. 20 m | 12. 40000 |
| 2. (a) 8.1 sq cm | (b) 6.25 sq cm | 13. Same | 14. 189 sq cm |
| 3. 1.6 cm | 4. 18 cm | 15. (a) length \times breadth | |
| 5. (b) | 6. 7 cm | (b) side | (c) breadth |
| 7. 6 cm | 8. 21 cm, 441 sq cm | (d) 4 times | (e) perimeter |
| 9. 4 times | 10. halved | | |

Internal Assessment

- | | | | |
|---|---------------------------------|--|----------------------------|
| 1. If the side of a square is 2.5 cm, then its area is
(a) 62.5 sq cm
(c) 0.625 sq cm | (b) 6.25 sq cm
(d) 625 sq cm | 6. If the perimeter of a triangle is 18 cm and two of its sides are 4.5 cm and 8.5 cm, then the third side is
(a) 5 cm
(c) 5.5 cm | (b) 6 cm
(d) 6.5 cm |
| 2. If the side of a square is doubled, then its area will be
(a) one fourth
(c) four times | (b) doubled
(d) halved | 7. Area of a rectangle is equal to a square. If the area of a square is 288 sq cm and length of the rectangle is 18 cm, then its breadth is
(a) 12 cm
(c) 9 cm | (b) 8 cm
(d) 16 cm |
| 3. If area of a rectangle is 108 sq cm and its breadth is 9 cm, then its length is
(a) 16 cm
(c) 18 cm | (b) 10 cm
(d) 12 cm | 8. The cost of fencing a square park of side 200 m at the rate of ₹ 25 per metre is
(a) ₹ 25000
(c) ₹ 20000 | (b) ₹ 24000
(d) ₹ 18000 |
| 4. Perimeter of a rectangle is 72 cm. If its length is 24 cm, then its breadth is
(a) 8 cm
(c) 6 cm | (b) 12 cm
(d) 4 cm | 9. The side of a square field is 20 metre. The distance covered by a boy in going round it once is
(a) 80 m
(c) 40 m | (b) 60 m
(d) 100 m |
| 5. Length and breadth of a rectangle are 8.4 cm and 4.5 cm. The perimeter of the rectangle is
(a) 12.9 cm
(c) 28.5 cm | (b) 25.8 cm
(d) 19.2 cm | | |

ANSWERS

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