MATHEMATICS

Class-VI

Topic-13

MENSURATION

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CHAPTER 13

MENSURATION

TERMINOLOGIES

Perimeter and area

INTRODUCTION

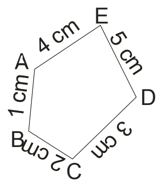
Mensuration is a branch of mathematics that deals with the measurement of areas and volumes of various geometrical figures. Figures such as triangle, rectangle, square ,trapezium or in higher classes cubes, cuboids, cylinders, cones and spheres are covered under mensuration. It also deals with the development of formulas to measure their areas and volumes.

13.1 PERIMETER

The perimeter of a closed figure is the length of the boundary of the figure.
we find perimeter when we

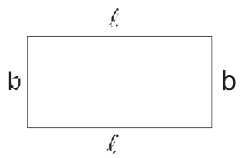
(a) walk around a garden.
(b) want to know the cost of fencing the field.
(c) build a boundary wall around our house.
(d) put a lace around a table cover.
(e) want to know the wood stick required to make a picture frame.

The perimeter of this pentagon is sum of the sides .
AB + BC + CD + DE+ EA = 1 cm + 2 cm+ 3 cm + 5 cm + 4 cm = 15 cm



(a) Perimeter of a Rectangle

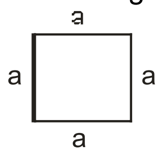
The perimeter of a rectangle is the sum of all its sides. The opposite sides of rectangle are equal. If one side , say the longer side, is ℓ unit and the shorter side is b unit, then perimeter = twice the length + twice the breadth.
Perimeter = length + breadth + length + breadth = 2(length) + 2(breadth)
= 2 (length + breadth)



= 2 (ℓ + b) where ℓ = length
b = breadth

(b) Perimeter Of a Square:

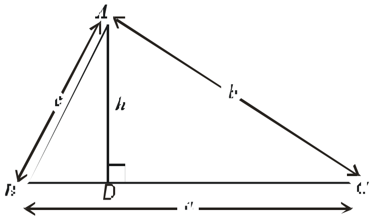
A square is a special rectangle with all the four sides equal. If one side of a square measures a unit, we can say that both the length and the breadth are a unit each.



Perimeter of a square = 2 (l + b) = 2 (a + a)
= 2 × 2a
= 4a
= 4 times the side

The perimeter of a square is equal to four times the length of its sides.

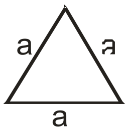
(c) Perimeter of a Triangle



Perimeter = a + b + c

(d) Perimeter of an Equilateral Triangle

A triangle with all sides equal is called an equilateral triangle. If the length of one side of an equilateral triangle is a units, its perimeter will be side + side + side = a + a + a = 3a



In general, if the sides of a polygon are equal, that is, if it is a **regular polygon**, its perimeter will be the product of the length of its side with the number of sides.
Perimeter of a regular pentagon = 5a units
Perimeter of a regular hexagon = 6a units
Perimeter of a regular octagon = 8a units
where a is the length of one side.

Illustration 13.1

Find the perimeter of rectangle having length 12cm and breadth 8 cm.

Sol. Length = 12cm
Breadth = 8 cm
Perimeter of rectangle = 2(length + breadth)
=2(12+8) =2(20) =40 cm

Illustration 13.2

Find the side of square having perimeter 28 cm

Sol. Perimeter of square = 4 × side

Side = $\frac{\text{Perimeter}}{4} = \frac{28}{4} = 7$ cm

Illustration 13.3

Find the cost of fencing a square park of side 300 m at the rate Rs. 25 per meter

Sol. Perimeter of square = 4 x side =4 × 300 = 1200 m
Cost of fencing = Perimeter x cost per meter
1200 x Rs.25 = Rs.30,000

Illustration 13.4

A rectangular field is 90 m by 70 m . A man walks round it at the rate of 4 km per hour . What time will he take in making 5 rounds ?

Sol. Distance covered in one round
= Perimeter of the field
= 2(90 + 70) m = 2 × 160 m = 320 m
Distance covered in 5 rounds
= 320 m × 5 = 1600 m
$\because$ The man walks 4 km = 4 × 1000 m in one hr.

$\therefore$ The men walks 1600 m in

$\frac{1}{4000} \times 1600$ hour $= \frac{2}{5}$ hour $= \frac{2}{5} \times$ 60 minutes = 24 minutes

Illustration 13.5

Mr. Verma has an orchard of length and breadth 280 m and 200 m respectively . He wants to fence it with 4 rounds of barbed wire . Find the cost of fencing at Rs.35 per meter.

Sol. Length of the orchard = 280 m
Breadth of the orchard = 200 m
Barbed wire required for 1 round of fencing = Perimeter of the orchard
= 2 (280 m + 200 m) = 2 × 480 = 960 m
$\because$ length of barbed wire required for 4 rounds of fencing = 4 × 960 m = 3840 m

$\therefore$ Cost of fencing at Rs.35 per metre
= Rs.(3840 × 35) = Rs. 1,34,400

Illustration 13.6

A piece of string is 48 cm long . What will be the length of each side if the string is used to form:

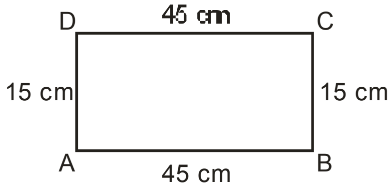
(i) a square **(ii)** an equilateral triangle **(iii)** an regular octagon .

Sol. **(i)** one side of the square
= Perimeter ÷ 4 = 48 ÷ 4 = 12 cm
(ii) one side of the equilateral triangle
= Perimeter ÷ 3 = 48 ÷ 3 = 16 cm
(iii) one side of regular octagon
= Perimeter ÷ 8 = 48 ÷ 8 = 6 cm

Ask yourself

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

2. Find the perimeter of the following figures :



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

(a) A triangle of side 4cm , 5cm and 7 cm.

(b) An equilateral triangle of side 15cm.

(c) An isosceles triangle with equal sides as 8cm and third side as 6cm.

4. Find the perimeter of a square whose side is 5 cm.

5. Find the cost of fencing a square park of side 300 m, at the rate of Rs. 20 per metre.

Anseers

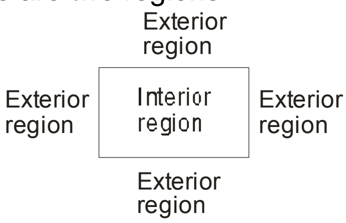
1. 106 cm **2.** 120 cm

3. **(a)** 16 cm **(b)** 45cm **(c)** 22 cm

4. 20 cm **5.** Rs. 24000

13.2 AREA

The amount of surface of the plane covered by a closed figure is called its area.
For every closed figure, there are two regions.



The term 'area' refers to the measure of the total interior region. We find area when we

(a) Level the ground

(b) paint the wall

(c) cover the floor with the tiles

$$\text{No. of tiles} = \frac{\text{Area of floor}}{\text{Area of tiles}}$$

Look at the closed figures given below. All of them occupy some region. Can you tell which one occupies more region? It is difficult to make out unless we measure the area.

In order to calculate which closed figure having larger area we place them on a squared paper or graph paper where every square measures 1 cm × 1 cm.

Make an outline of the figure.

Look at the square enclosed by the figure. Some of them are completely enclosed some half, some less than half and some more than half.

The area is the number of centimeter squares that are needed to cover it.

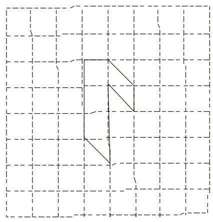
But there is a small problem that the square do not always fit exactly into the area you measure. We get over this difficulty by adopting a convention.

- The area of one full square is taken as 1 sq unit. If it is a centimetre square sheet, then area of one full area will be 1 sq. cm.
- Ignore portions of the area that are less than half a square.
- If more than half of a square is in a region, just count it as one square.
- If exactly half the square is counted , take its area as $\frac{1}{2}$ sq unit.

Such a convention gives a fair estimate of the desired area.

Illustration 13.7

Find the area of the shape shown in the figure.



Sol. This figure is made up of line segments moreover, it is covered by full squares and half squares only. This makes our job simple.

(i) fully filled squares = 3

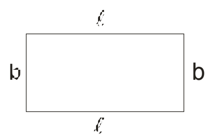
(ii) half filled squares = 3

Area covered by full squares = 3 × 1 sq units = 3 sq units

Area covered by half squares = $3 \times \frac{1}{2}$ sq units = $1\frac{1}{2}$ sq units

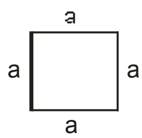
Total area = $3 + 1\frac{1}{2} = 4\frac{1}{2}$ sq units.

(a) **Area Of Rectangle :** For rectangle having length ℓ unit and breadth b units.



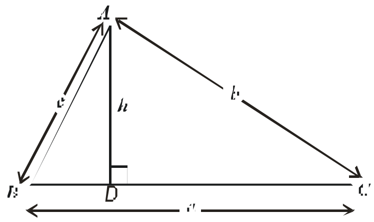
Area of rectangle = $\ell \times b$ sq. unit

(b) **Area Of Square :** For square having side a unit.



Area of square = $a \times a$ sq. unit

(c) Area Of Triangle :



Area = $\frac{1}{2}$ × Base × Height = $\frac{1}{2}$ah

Illustration 13.8

Find the area of a square whose side is 10 m.

Sol. Side of the square = 10 m

Area of the square = side × side

= (10 × 10) sq m = 100 sq m

Illustration 13.9

Find the breadth of a park whose area is 1500 sq. m and length is 50 m.

Sol. Area of the park = 1500 sq m

Length of the park = 50 m

Breadth of the park = $\frac{\text{area of the rectangle}}{\text{length of the rectangle}}$ = (1500 ÷ 50) m = 30 m

Illustration 13.10

Find the side of a square whose area is 25 sq. m.

Sol. Now we find the number which when multiplied by itself gives us 25. clearly, this number is 5.

∴ side of the square = 5m.

Illustration 13.11

A rectangle and a square are equal in area. The side of the square is 24 m. Find the width of the rectangle if it is 36 m long. Are their perimeters equal ?

Sol. Side of the square = 24 m

Area of the square = 24 × 24 sq m = 576 sq m

Area of the rectangle = area of the square = 576 sq m

Length of the rectangle = 36 m

∴ Breadth of the rectangle = $\frac{576}{36}$ m = 16 m

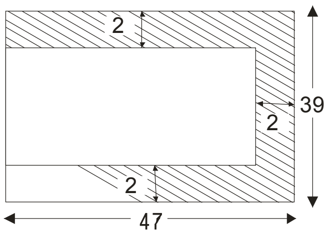
Perimeter of the square = 4 × 24 m = 96 m

Perimeter of the rectangle = 2 (length + breadth) = 2 (36 m + 16 m) = 2 × 52 m = 104 m

Their perimeters are not equal.

Illustration 13.12

In given figure, find the area of the shaded portion when all dimensions are given in centimeters.



Sol. Length of the bigger rectangle = 47 cm
Breadth of the bigger rectangle = 39 cm
Area of the bigger rectangle = length × breadth
= (47 × 39) sq cm = 1833 sq cm
Length of the smaller rectangle = (47 –2) cm = 45 cm
Breadth of the smaller rectangle = (39 – 2– 2) cm = 35 cm
Area of the smaller rectangle = (45 × 35) sq cm = 1575 sq cm
Area of shaded portion = (1833 – 1575) sq cm = 258 sq cm

Illustration 13.13

Find the cost of levelling a playground at Rs. 3 per square metre if it is 30 m long and 15 m wide. Find also the cost of fencing it at Rs. 1.20 per metre.

Sol. Length of the playground = 30 m
Breadth of the playground = 15 m
Area of the playground = 30 × 15 sq m = 450 sq m
Cost of levelling 1 sq m = Rs 3
Cost of levelling 450 sq m = Rs. 450 × 3 = Rs 1350
Perimeter of the playground = 2 (length + breadth)
= 2(30 + 15) m = 90 m
Cost of fencing 1 m = Rs 1.20
Cost of fencing 90 m = Rs 1.20 × 90 = Rs. 108

Illustration 13.14

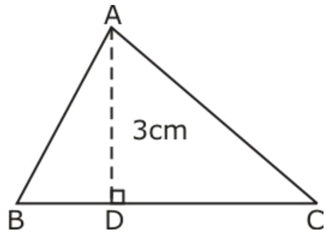
How many square tiles of side 18 cm will be required to pave the floor of a rectangular room 5.4 m × 4.8m?

Sol. Length of the floor = 5.4 m = 540 cm
Breadth of the floor = 4.8 m = 480 cm
Area of the floor = 540 × 480 sq cm = 259200 sq cm
Area of one tile = 18 × 18 sq cm = 324 sq cm

Number of tiles required = $\frac{259200}{324} = 800$

Illustration 13.15

In given figure, if the area of the triangle ABC is 36cm^2 and the height AD is 3 cm then the base would be



Sol. Given area = 36 sq cm and height = 3 cm base = ?

Area of the triangle = $\frac{\text{base} \times \text{height}}{2}$

$36 = \frac{\text{base} \times 3}{2}$

base = $\frac{36 \times 2}{3}$ = 24 cm

Ask yourself

1. The length and breadth of three rectangles are given below
   (a) 9m and 6m **(b)** 17m and 3m **(c)** 14m and 4m
   Find which rectangle has greatest area and which has least.

2. Find the area of a square whose side is
   (a) 13cm **(b)** 25cm

3. A room is 8m long and 4m 50cm wide. How many square metres of carpet is needed to cover the floor of the room ?

4. The area of a rectangle is 42 sq. cm. If breadth of the rectangle is 6 cm, then find its perimeter.

5. Five square flower beds each of size 2m are dug on a piece of land 15m long and 10m wide, find the area of the remaining part of land .

Answers

1. **(a)** 54 m^2 **(b)** 51 m^2 **(c)** 56 m^2

2. **(a)** 169 cm^2 **(b)** 625 cm^2 **3.** 36 m^2 **4.** 26 cm

5. 130 m^2

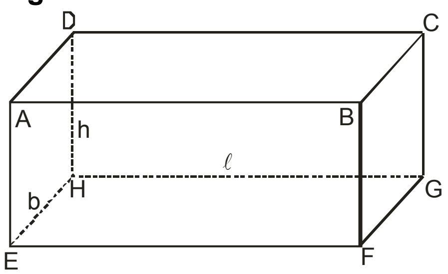
Add your knowledge

SURFACE AREA OF CUBE AND CUBOID:

(i) **Surface area of a cuboid :**

As we have seen that the surface of a cuboid consists of six rectangular faces. So, the surface area of a cuboid is equal to the sum of the areas of its six rectangular faces. In this section, we shall derive the formula for the surface area of a cuboid.

Consider a cuboid whose length is ℓ cm, breadth **b** cm and height **h** cm as shown in **Figure.**



Area of face ABCD = Area of face EFGH = (ℓb) cm^2

Area of face AEHD = Area of face BFGC = (bh) cm^2

Area of face ABFE = Area of face DHGC = (ℓh)cm^2

Total surface area of the cuboid

= Sum of the areas of all its six faces

$= 2(\ell \times b) + 2(b \times h) + 2(\ell \times h)\ cm^2$

$= 2(\ell \times b + b \times h + \ell \times h)\ cm^2 = 2(\ell \times b + b \times h + \ell \times h)\ cm^2$

= 2 (length × breadth + breadth × height + length × height) cm^2

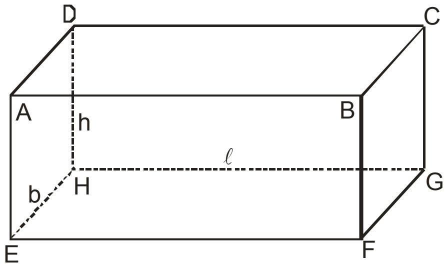
(ii) **Surface area of a cube :** Since all the faces of a cube are squares of the same size i.e. for a cube we have $\ell = b = h$. Thus, if ℓ cm is the length of the edge of side of a cube, then

Surface area of the cube $= 2(\ell \times \ell + \ell \times \ell + \ell \times \ell)$

$2 \times 3\ell^2 = 6\ell^2 = 6\ (\text{Edge})^2$

(iii) **Lateral surface area of a cuboid and a cube :** If out of the six faces of a cuboid, we only find the sum of the areas of four faces leaving the bottom and top faces. This sum is called the lateral surface area of the cuboid.

Consider a cuboid of length ℓ, breadth **b** and height **h** as shown in **figure.**



Lateral surface of the cuboid,

= Area of face AEHD + Area of face BFGC + Area of face ABFE + Area of face DHGC

$= 2(b \times h) + 2(\ell \times h) = 2(\ell + b) \times h = 2$ (Length + breadth) Height

= perimeter of the base × Height

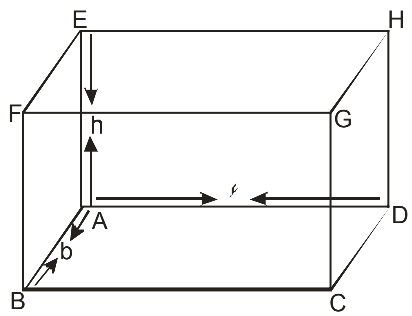
Lateral surface area of the cube

$= 2(\ell \times \ell + \ell \times \ell) = 2(\ell^2 + \ell^2) = 4\ell^2 = 4\ (\text{Edge})^2$

VOLUMES OF SOLID FIGURES:

The volume of a solid is the amount of space enclosed by its bounding surfaces. The unit of volume is cubic centimeter or cubic metre. The basic formula for **volume** is **area of base × height.**

(i) Volume of cuboid : Let there be a cuboid of length ℓ, breadth **b** and height **h** as in **figure**. The area of the rectangular base ABCD of the cuboid is $(\ell \times b)$.



If we take rectangular sheets congruent to the base ABCD of the cuboid and the sheets are put one over the other as shown in **fig.**. Then, the height to which the sheets are stacked to form the cuboid is **h**.

Measure of the space occupied by the cuboid

= Area of a rectangular sheet h

= (ℓ × b) h = ℓ b h

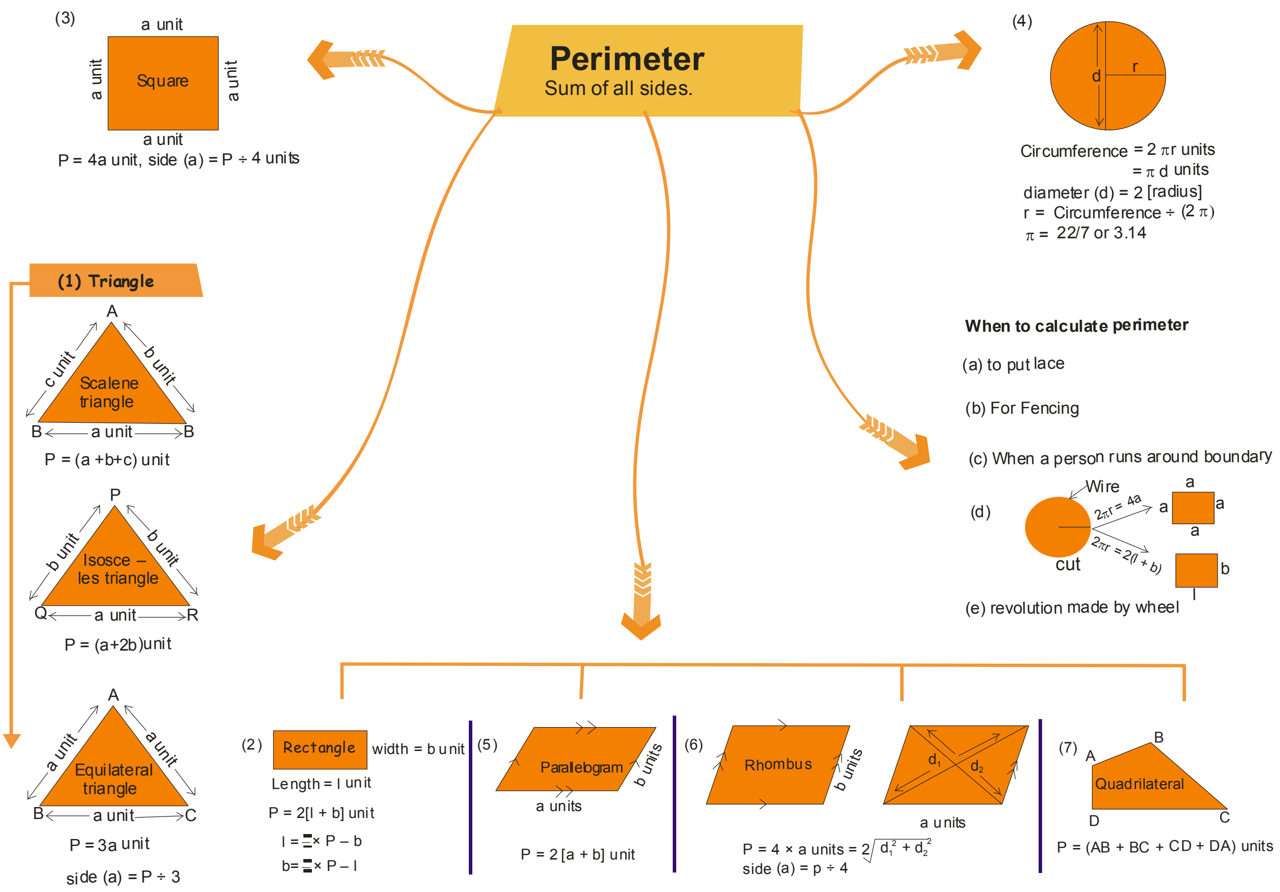
Hence, Volume of the cuboid = ℓ b h = Length × Breadth × Height

(ii) Volume of a cube : We know that a cube is special type of a cuboid whose length, breadth and height are all equal.

So, the volume V of cube of edge ℓ is given by

V = ℓ × ℓ × ℓ × ℓ^3 = (Edge)^3

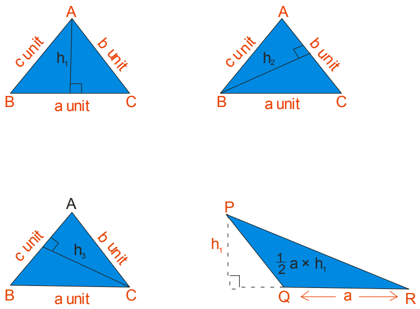
Concept Map



Area

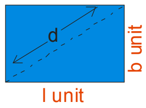
Measure of Region Enclosed by a closed Rectilinear Figure

Triangle



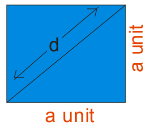
- Base = 2 Area ÷ Altitude
- Altitude = 2 Area ÷ Base
- Area of Equilateral $\Delta = \frac{\sqrt{3}}{4}(\text{side})^2$

Rectangle



Area = l × b sq. units
length = (Area ÷ breadth) unit
breadth = (Area ÷ length) unit
$d = \sqrt{l^2 + b^2}$

Square



A = a × a sq. unit
Side = $\sqrt{\text{area}}$ unit
d = $\sqrt{2}$ a

When to calculate Area :

(a) Painting / white washing
(b) Levelling
(c) Ploughing
(d) Grazing / watering

Summary

1. Distance covered along the boundary of a closed figure in going round once is its perimeter.

2. Perimeter of square = 4 × side.

3. Perimeter of rectangle = 2 (length + breadth)

4. Perimeter of triangle = sum of its three sides.

5. The magnitude of region enclosed by a closed figure is called the area of figure.

6. Area of rectangle = Length × Breadth.

7. Length of rectangle = $\frac{\text{Area}}{\text{Breadth}}$

8. Breadth of rectangle = $\frac{\text{Area}}{\text{Length}}$

9. Area of square = side × side.

10. Area of triangle = $\frac{1}{2}$ × Base × Height

11. Standard unit of perimeter is same as that of length.

12. Standard unit of area is 1 sq. m or 1sq. cm or 1 sq. mm.

13. 1 cm^2 = 100 mm^2

14. 1 m^2 = 10000 cm^2

15. 1 hectare = 10000 m^2

16. 1 km^2 = 1000000 m^2

EXERCISE 01

SECTION -A (FIXED RESPONSE TYPE)

OBJECTIVE DPP

1. The perimeter of regular pentagon of side 8 cm is:
(A) 32 cm (B) 40 cm (C) 48 cm (D) 56 cm

2. Length and breadth of a rectangle is x and y, the its perimeter is :
(A) xy (B) x + y (C) 2(x + y) (D) 2xy

3. Perimeter of an equilateral triangle of side x is :
(A) x^3 (B) x^2 (C) 3x (D) 2x

4. To find the distance around the figure we find its
(A) area (B) perimeter (C) both (D) none of these

5. The side of regular pentagon having perimeter 5x units is
(A) 25 units (B) x units (C) 5 units (D) none of these

6. Find the area of square having perimeter 20 cm.
(A) 5 cm^2 (B)10 cm^2 (C) 20 cm^2 (D) 25 cm^2

7. A regular polygon having n side perimeter m unit, then length of each side of polygon is:
(A) mn unit (B) $\frac{m}{n}$ unit (C) $\frac{n}{m}$ unit (D) can't be determine

8. Rectangle having length l unit and perimeter p unit then its breadth is :
(A) $\frac{p}{l}$ unit (B) $\frac{p}{2}-l$ unit (C) $\frac{p}{2}+l$ unit (D) $\frac{l}{p}$ unit

9. The cost of levelling a playground at Rs.5 per square meter is Rs. 7000. It is 20m wide. Find the cost of fencing it at Rs.2 per meter.
(A) Rs.330 (B) Rs.340 (C) Rs.350 (D) Rs.360

10. If the side of the square field is doubled, then its area will be :
(A) four times (B) doubled (C) halved (D) tripled

11. To calculate length of rectangle we divide its area by its :
(A) breadth (B) length (C) perimeter (D) 2

12. The length and breadth of rectangle are 10cm and 6 cm respecitively .Its area will be :
(A) 36 cm^2 (B) 60 cm^2 (C) 100 cm^2 (D) 16 cm^2

13. Area of square of side 5 cm is :
(A) 25 sq cm (B) 10 sq cm (C) 20 sq cm (D) none of these

14. If the area and length of a rectangular plot are 440 m^2 and 22 m respectively, then find its breadth ?
(A) 20 m (B) 10 m (C) 30 m (D) 40 m

15. The length of a rectangle having area 340 cm^2 and breadth 20 cm is :
(A) 170 cm (B) 15 cm (C) 17 cm (D) 20 cm

16. The cost of flooring a room at Rs.25 per m^2 is Rs.625. The area of the floor is :
(A) 25 m^2 (B) 15 cm^2 (C) 50 cm^2 (D) 25 cm^2

17. A rectangular floor having dimension 40m x 30 m is paved with square tiles of side 5 m, find the number of tiles required.
(A) 24 (B) 48 (C) 96 (D) 120

18. A lawn is in the shape of a rectangle of length 80 m and width 40 m. Out side the lawn there is a footpath of uniform width 3 m. Find the area of the path.
(A) 756 m^2 (B) 706 m^2 (C) 736 m^2 (D) 726 m^2

19. The length and width of a rectangular field are 500 m and 400 m respectively; within it two roads of 10 metres width run parallel to both sides. Find the area covered by both the roads.
(A) 8800 m^2 (B) 8900 m^2 (C) 8860 m^2 (D) 8830 m^2

20. A street lane is to be paved with bricks. The length of the lane is 200 m and its breadth 15m . Find the number of bricks required to pave the lane if each brick measures 20 cm by 10 cm
(A)15 (B) 150 (C) 1500 (D) 150000

21. The perimeters of two squares are 748 cm and 336 cm. Find the perimeter of a square whose area is equal to the sum of the areas of these two squares :
(A) 810 cm (B) 815 cm (C) 820 cm (D) 825 cm

22. The dimensions of a hall are 40 m, 25 m and 20m. If each person requires 200 cubic metres. Then the number of persons who can be accommodated in the hall are :
(A) 120 (B) 150 (C) 140 (D) 100

FILL IN THE BLANKS

1. The length of the boundary of a figure is called its _____

2. The perimeter of ________ = 3$\times$ side

3. Perimeter of a square = ________ $\times$ side

4. Area of a rectangle= ________ $\times$ breadth

5. If the perimeter of a regular pentagon is 10cm , its side is __________

6. The amount of surface enclosed by a figure is its _____

7. Area of a rectangle = ________ $\times$ _________

8. Area of a square = _________

9. If the length of a rectangle is 5 m and its breadth is 4 m, then its area is ________

10. Whose area is greater a square of side 4cm or of rectangle 5cm $\times$ 3cm ________

TRUE / FALSE

1. Perimeter of a square of side 16 cm is 64 cm

2. The perimeter of square whose area is 25cm^2 is 20 cm

3. If a square , a rectangle and hexagon are all made from a string of length 28cm, their perimeters will be different

4. If the side of a square is doubled , the perimeter of the square if halved.

5. If we need to find the cost of levelling a square playground , we need to find its perimeter.

6. 2.5 hectare = $1000\ \text{m}^2$

7. The breadth of a rectangle of area 24cm^2 and length 8cm is 6cm

8. Area of a rectangle = Product of Adjacent sides

MATCH THE COLUMNS

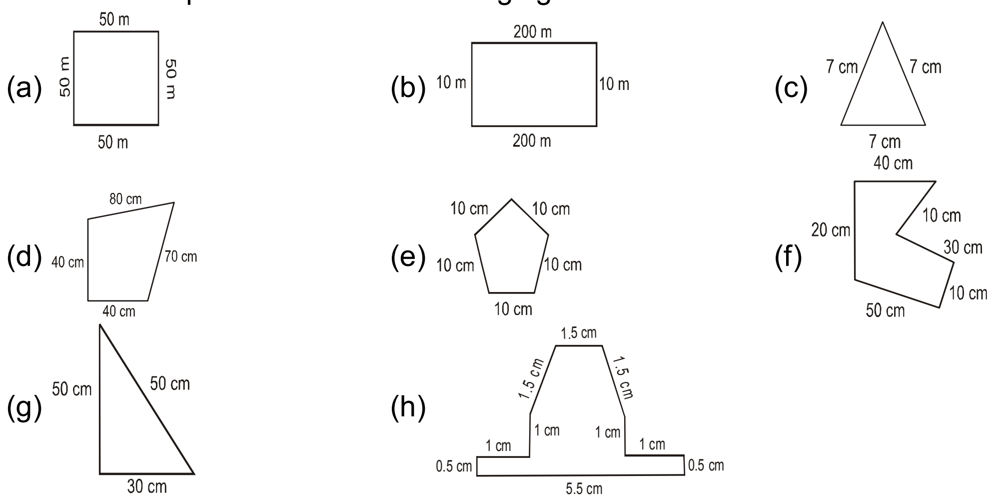
1.

	Column – I		Column – II
(A)	Area of a rectangle	(p)	πr^2
(B)	Area of a square	(q)	$4 \times$ side
(C)	Perimeter of a rectangle	(r)	$l \times b$
(D)	Perimeter of a square	(s)	$(\text{side})^2$
(E)	Area of a circle	(t)	$2\ (l + b)$

SECTION -B (FREE RESPONSE TYPE)

VERY SHORT ANSWER TYPE

1. Calculate the perimeter of the following figures.



2. A square sheet of paper has a perimeter of 40 cm. What is the length of its side ?

3. The area of a square picture is 441 sq. cm. What is the length of its side ?

4. The area of a rectangular field is 594 square metre. Its breadth is 22 m. Find its perimeter.

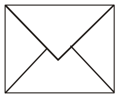
SHORT ANSWER TYPE

5. Find the perimeter of a rectangle whose length and breadth are 15.4cm and 11.6cm respectively.

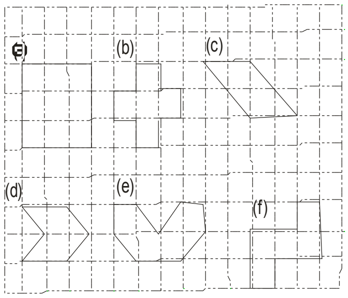
6. Find the perimeter of square, each of whose side measures 3.6cm?

7. A marble tile measures 10 cm × 12 cm. How many tiles will be required to cover a wall of size 3 m ×4m?

8. How many envelope of size 15 cm × 20 cm can be made out of a paper of size 4 m × 6 m ?



9. Find the area of each of the figure drawn on squared paper in given figure. Area of each square is 1 cm^2.



LONG ANSWER TYPE

10. Anand's garden is 70 m long and 50 m wide and is in the form of a rectangle. If he uses three layers of barbed wire to fence the garden, what is the total length of the wire used ?

11. Find the cost of fencing a rectangular field 260m long and 175m wide at Rs 40 per metre

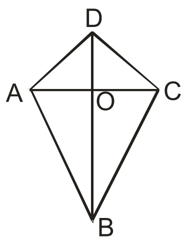
12. The cost of fencing a square field at Rs.125 per metre is Rs. 8000. Find the length of each side of the field.

13. The length of a rectangular field is 300 m and its breadth is 2/3 its length. If a road of width 10 m is built along the inner wall of the field, what is the area of the road ?

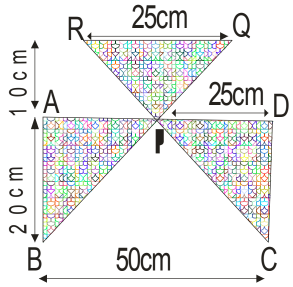
14. Five squares flower beds each of side 1.2 m are dug on a piece of land 4.8 m long and 4.2 m wide . What is the area of the remaining part of the land ?

15. The area of a triangle, whose base and the corresponding altitude are 15 cm and 7 cm, is equal to a right triangle whose one of the sides containing the right angle is 10.5 cm. Find the other side of this triangle.

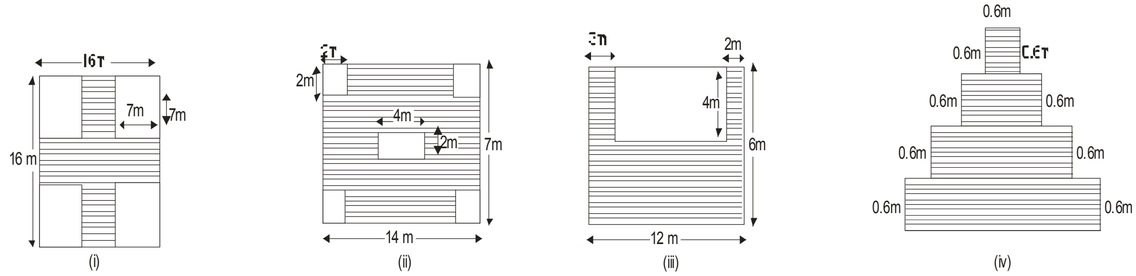
16. Calculate the area of the quadrilateral ABCD as shown in **figure**, given that BD = 42 cm, AC = 28 cm, OD = 12 cm and ACBD.



17. Find the area of the shaded **figure,** where $\angle BAP = 90^o$ & $\angle CDP = 90^o$.



18. Calculate the area of the shaded region in each of the following figures.



EXERCISE 02

SECTION -A (COMPETITIVE EXAMINATION QUESTION)

MULTIPLE CHOICE QUESTIONS

1. The area of rectangle is 225 cm^2. If its breadth is 25 cm, then its length will be
(A) 7 cm. (B) 9 cm. (C) 12 cm. (D) 13 cm.

2. The area of square with perimeter 28cm is
(A) 7 cm^2 (B) 49cm^2 (C) 784cm^2 (D) 196cm^2

3. A piece of board 8m by 6m is cut into 12 equal squares. The perimeter of each square is
(A) 2m (B) 4m (C) 6m (D) 8m

4. The area of a square whose perimeter is equal to the perimeter of a rectangle with length 10cm and breadth 6cm is
(A) 64cm^2 (B) 8cm^2 (C) 16cm^2 (D)32cm^2

5. If the length of a rectangle is doubled , the area of the new rectangle
(A) remains the same (B) is doubled
(C) becomes four times (D) none of these

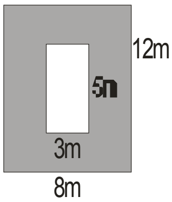
6. The area of a triangle field is 1.5 hectares. If its altitude is 300 m, then the corresponding base is
(A) 100 m (B) 54 m (C) 81 m (D) 80 m

7. A rectangular field is half as wide as it is long and is completely enclosed by x metres of fencing. The area in terms of x is
(A) $\frac{x^2}{2}$ (B) $2x^2$ (C) $\frac{2x^2}{9}$ (D) $\frac{x^2}{18}$

8. Samuel wanted to implant some vertical stones along the boundary of his plot at a distance of 10 m each. If length of the plot is 30 m and the breadth is 15 m then the number of stones used is

(A) 450 (B) 45 (C) 9 (D) 10

9. Area of the shaded region is



(A) 96 sq. m (B) 15 sq. m (C) 81 sq. m (D) 111 sq. m

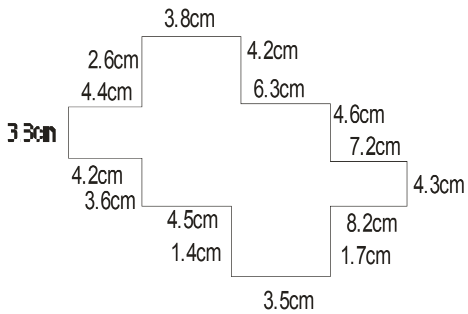
10. On a wall of dimensions 10.5 m long and 8.5 m wide, a square shaped wall poster is stuck at the centre whose measure is 2.5 m. If the remaining part of the wall to be painted with pink colour costing Rs. 12 per sq. m, the amount to be spent is

(A) Rs. 89.25 (B) Rs. 996 (C) Rs. 830 (D) Rs. 12

11. In a square shaped park, whose side measures 28 m, a rectangular pond is located at the centre with dimensions 3 m and 2m. The area of the park excluding the pond is

(A) 784 sq. m (B) 6 sq. m (C) 778 sq. m (D) 708 sq. m

12. Perimeter of the figure is

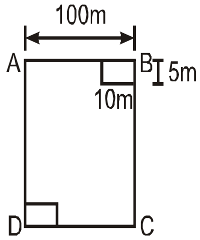


(A) 68.2 cm (B) 68.1 cm (C) 86.3 cm (D) 68.3 cm

13. The side of a square is 10cm . How many times will the new perimeter become if the side of the square is doubled ?

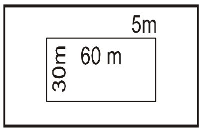
(A) 2 times (B) 4 times (C) 6 times (D)8 times

14. A square shaped park ABCD of side 100m has two equal rectangular flower beds each of size 10m5m. Length of the boundary of the remaining park is



(A) 360m (B) 400m (C) 340m (D) 460m

15. A 5 m wide lawn is cultivated all along the outside of a rectangular plot measuring 60 m × 30 m. The total area of the lawn is



(A) 1000 m^2 (B) 2000 m^2 (C) 475 m^2 (D) 1500 m^2

SECTION -B (TECHIE STUFF)

16. The side of a cube whose surface area is 600 cm^2.
(A) 100 cm (B) 10 cm (C) 60 cm (D) 600 cm

17. If length and breadth of a cuboid is 4 cm and 6 cm and having total surface area is 208 cm^2 then the height of cuboid is
(A) 8 cm (B) 4 cm (C) 6 cm (D) 10 cm

18. The number of 8 cm cubes that can be cut out of a cube of side 24 cm is
(A) 24 (B) 8 (C) 27 (D) None of these

19. An open box is made of a thin cardboard (negligible thickness of cardboard). It is 8 cm long, 6 cm wide and 5 cm high. It is without a lid, the total surface area of the box is
(A) 240 cm^2 (B) 188 cm^2 (C) 170 cm^2 (D) 180 cm^2

20. Three cubes, each having an edge 4 cm, are joined together, the surface area of the cuboid thus formed is
(A) 224cm^2 (B) 248 cm^2 (C) 200 cm^2 (D) 242 cm^2

21. A cube of 9 cm edge is immersed completely in a rectangular vessel containing water. If the dimensions of the base are 15 cm and 12 cm, the rise in water level in the vessel is
(A) 18.5 cm (B) 6.5 cm (C) 4.05 cm (D) 0.405 cm

EXERCISE 03

(PREVIOUS YEAR EXAMINATION QUESTIONS)

1. Anshu wants to find the distance her unicycle moves on the side walk when the tyre makes one 360° rotation.

Which of the following best describes the distance in one 360° rotation? **[NSTSE 2009]**
(A) The area of the tyre (B) The radius of the tyre
(C) The diameter of the tyre (D) The circumference of the tyre

2. If the side of a square is 5 m, then its perimeter is: **[NSTSE 2009]**
(A) 20 cm (B) 25m (C) 5 m (D) 20m

3. The length of a rectangle is 4 times as long as its breadth. If the length is 8 cm shorter and the breadth is 4 cm longer, a square will be formed. What is the area of the rectangle? **[NSTSE 2010]**

(A) 16 cm^2 (B) 32 cm^2 (C) 64 cm^2 (D) 80 cm^2

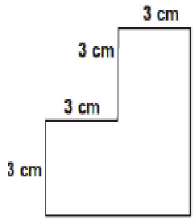
4. Circumference of a circle is approximately equal to ________ times the diameter. **[NSTSE 2010]**

(A) 6 (B) 5 (C)4 (D) 3

5. The perimeter of the rectangle whose length 25 cm and breadth 15 cm is: **[NSTSE 2010]**

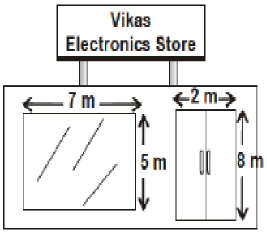
(A) 80cm^2 (B) 375 cm (C) 40 cm (D) 80 cm

6. The figure is made of three squares joined together. What is the area of the figure in square cm? **(IMO 2010)**



(A) 9 square cm (B) 18 square cm (C) 27 square cm (D) 81 square cm

7. Vikas Electronics Store is having a sale. To advertise the sale, the store manager wants to outline the store window with colourful ribbon. How many meters of ribbon will be needed to outline the four sides of the window **(IMO 2010)**

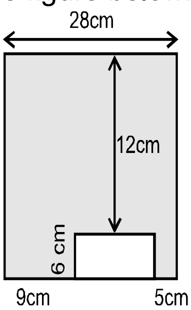


(A) 35 m (B) 24 m (C) 19 m (D) 32 m

8. Mohit sliced an orange into circular pieces to put into a bowl of punch. The piece shown below had a radius of 4 centimetres. Which expression can be used to find the approximate circumference of this piece of orange? **(IMO 2010)**

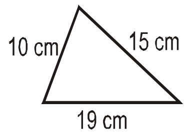
(A) $\pi \times (4)^2$ (B) $4 \times \pi$ (C) $2 \times \pi \times 7$ (D) $2 \times \pi \times 4$

9. Find the area of the shaded part in the figure below: **[NSTSE 2011]**

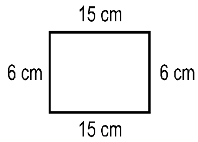


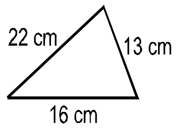
(A) 336 cm^2 (B) 420 cm^2 (C) 504cm^2 (D) 632 cm^2

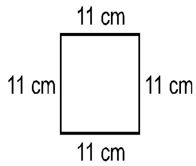
10. The diagram shows a triangle constructed with a piece of wire. **[NSTSE 2011]**

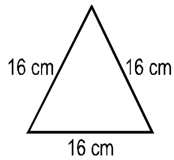


Which of the following shapes can be constructed with the same piece of wire?

(A) 

(B) 

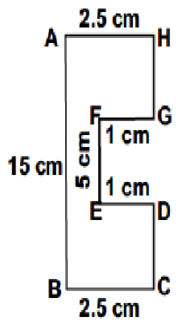
(C) 

(D) 

11. The length of a rectangular hall is 5 meters more than its breadth. If the breadth of the hall is 25 meters, then area of the hall is_________. **(IMO 2011)**

(A) 150 m^2 (B) 225 m^2 (C) 750 m^2 (D) 850 m^2

12. Find the area of the given figure. (Figure not drawn to scale) **(IMO 2012)**



(A) 12.5 cm^2 (B) 42.5 cm^2 (C) 32.5 cm^2 (D) 10 cm^2

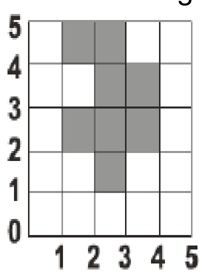
13. Students are decorating a rectangular bulletin board that measures $8\frac{1}{4}$ m by $4\frac{2}{3}$ m. What is the area of the bulletin board, in square meters ? **(IMO 2012)**

(A) $25\frac{5}{6}$ sq.m (B) $30\frac{1}{3}$ sq.m (C) $32\frac{1}{6}$ sq.m (D) $38\frac{1}{2}$ sq.m

14. How many students in a class of size 10 m by 6 m can be made to sit, if each student occupies 1.2 sq. metres of floor area? **(IMO 2012)**

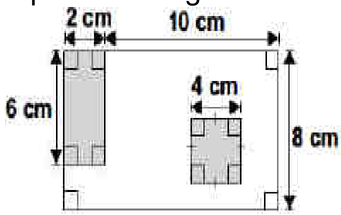
(A) 50 (B) 60 (C) 30 (D) 90

15. What is the perimeter of the shaded area in the given figure? **(IMO 2012)**



(A) 18 units (B) 19 units (C) 16 units (D) 9 units

16. Find the area of the unshaded part of the figure. **(IMO 2012)**

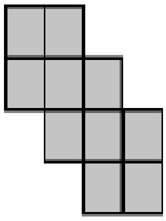


(A) 45 sq. cm (B) 52 sq. cm (C) 68 sq. cm (D) 78 sq. cm

17. The circumference of a circle is approximately equal to how many times its diameter? **[NSTSE 2013]**

(A) $\frac{\Pi}{4}$ (B) $\frac{\Pi}{3}$ (C) $\frac{\Pi}{2}$ (D) Π

18. The given figure is made up of 10 squares of the same size. The perimeter of the figure is 80 cm. Find the area of the figure. **(IMO 2013)**



(A) 250 cm^2 (B) 150 cm^2 (C) 280 cm^2 (D) 190 cm^2

19. Dinesh joined 2 squares of area 81 cm^2 and 36 cm^2 together. What is the perimeter of the new figure now? **(IMO 2013)**

(A) 45 cm (B) 48 cm (C) 54 cm (D) 60 cm

20. Meeku fenced up a square area. He used 100 poles on each side of the square. How many poles did he use altogether? **(IMO 2013)**

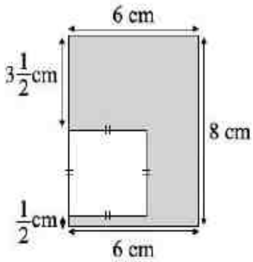
(A) 400 (B) 398 (C) 394 (D) 396

21. Find the correct match. **(IMO 2013)**

Length of rectangle (cm)	Breadth of rectangle (cm)	Area (cm^2)	Perimeter (cm)
25	P	300	Q
18	R	S	66

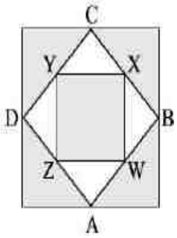
	P	**Q**	**R**	**S**
(A)	12	74	15	207
(B)	12	15	74	270
(C)	12	74	15	270
(D)	42	15	270	74

22. What is the area of the shaded part in the figure below? **(IMO 2013)**



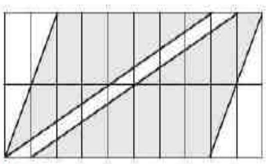
(A) 16 cm^2 (B) 24 cm^2 (C) 32 cm^2 (D) 48 cm^2

23. The given figure is formed by three squares. A. B. C and D are the mid-points of the sides of the big square. W. Y. Y and Z are the mid-points of the sides of the medium square. The big square is of side 16 cm. Find the unshaded area. **(IMO 2013)**



(A) 16 cm² (B) 46 cm² (C) 64 cm² (D) 72 cm²

24. What is the ratio of the shaded area to the unshaded area? **(IMO 2013)**



(A) 5:7 (B) 3:4 (C) 7:10 (D) 7:3

25. Vishal jogged round a rectangular field 4 times. If the rectangular field was 135 m long and 78 in wide. how far did Vishal jog? **(IMO 2013)**

(A) 426 m (B) 852 m (C) 1278 m (D) 1704 m

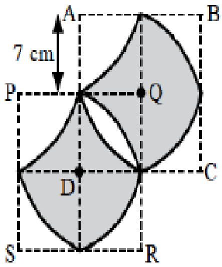
26. The length of two sides of a triangle are 5cm and 7cm. If the third side is an integer, what is the least possible perimeter of the triangle ? **[NSTSE 2014]**

(A) 17 cm (B) 12 cm (C) 14 cm (D) 15 cm

27. If the radius of a circle is increased by 3 times , by how many times does its diameter increase? **[NSTSE 2014]**

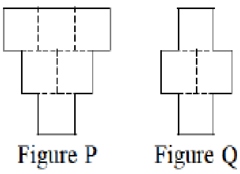
(A) 4 (B) 6 (C) 3 (D) 8

28. ABCD and PQRS are two squares of same dimensions. Find the area of shaded part **(IMO 2014)**



(A) 49 cm (B) 49 cm² (C) 196 cm² (D) 196 cm

29. Figure P is made up of six identical squares. Two squares were removed from figure P to form figure Q. The perimeter of figure P is 240 cm. What is the perimeter of figure Q? **(IMO 2014)**

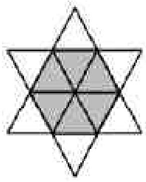


(A) 220 cm (B) 180 cm (C) 200 cm (D) 160 cm

30. The breadth of a rectangle is w cm and the length is 5 times as long as its breadth. What is the perimeter of the rectangle? **(IMO 2014)**

(A) $5w^2$ cm (B) $12w$ cm (C) $(10 + 2w)$ cm (D) $(25 + w^2)$ cm

31. The star is formed from 12 identical equilateral triangles. The perimeter of star is 72 cm. What is the perimeter of shaded hexagon? **(IMO 2014)**



(A) 42 cm (B) 36 cm (C) 48 cm (D) 30 cm

ANSWER KEY

EXERCISE 01

SECTION -A (FIXED RESPONSE TYPE)

OBJECTIVE DPP

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	C	C	B	B	D	B	B	D	A	A	B	A	A	C	A	B	A	B	D
Ques.	21	22																		
Ans.	C	D																		

FILL IN THE BLANKS

1. Perimeter **2.** triangle **3.** 4 **4.** length

5. 2 cm **6.** area **7.** length × breadth

8. side × side **9.** 20 m^2 **10.** square

TRUE / FALSE

1. True **2.** True **3.** False **4.** False

5. False **6.** False **7.** False **8.** True

MATCH THE COLUMNS

1. (A) - r, (B) - s, (C) - t , (D) - q , (E) - p

VERY SHORT ANSWER TYPE

1. **(a)** 200 m **(b)** 420 m **(c)** 21 cm **(d)** 230 cm
(e) 50 cm **(f)** 160 cm **(g)** 130 cm

2. 10 cm **3.** 21 cm **4.** 98 m

SHORT ANSWER TYPE

5. 54cm **6.** 14.4cm **7.** 1000 **8.** 800

9. **(a)** 9 square $\therefore$ Area = 9 cm^2 **(b)** 5 square $\therefore$ 5 cm^2

(c) 4 cm^2 **(d)** 4 cm^2 **(e)** 6 cm^2 **(f)** 5 cm^2

LONG ANSWER TYPE

10. 720 m **11.** 34800m **12.** 16m **13.** 9600 m^2

14. 12.96 sq m **15.** 10 cm **16.** 588 cm^2 **17.** 625 cm^2

18. **(i)** 60 m^2 **(ii)** 74 m^2 **(iii)** 44 m^2 **(iv)** 5.76 m^2

EXERCISE 02

SECTION -A (COMPETITIVE EXAMINATION QUESTION)

MULTIPLE CHOICE QUESTIONS

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	B	D	A	B	A	D	C	C	B	C	D	A	B	A	B	A	C	B	A
Ques.	21																			
Ans.	C																			

EXERCISE 03

(PREVIOUS YEAR EXAMINATION QUESTIONS)

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	D	D	C	D	D	C	B	D	B	C	C	C	D	A	C	C	D	A	B	D
Ques.	21	22	23	24	25	26	27	28	29	30	31									
Ans.	C	C	C	D	D	D	C	C	C	C	B									