IMO

Perimeter and Area

Do You Know

What topics we will cover in this chapter?

Yes! The topics are:
➢ Perimeter of polygons
➢ Area of square and rectangle
➢ Finding perimeter and area by counting number of squares

MATHEMATICAL REASONING

1. A carpet is laid on the floor of a room 3 8 m by 5 m, leaving a border 0.5 m wide all round it. What is the perimeter of the carpet?
(a) 22 m   (b) 24 m
(c) 26 m   (d) 28 m

2. What is the area of the given figure?

1 ☐ = 1 sq. unit

(a) 21 square units   (b) 23 square units
(c) 25 square units   (d) 27 square units

3. The figure is made up of 8 identical rectangles, Find the total area of the shaded figure.

(a) 300 sq. cm   (b) 500 sq. cm
(c) 150 sq. cm   (d) 200 sq. cm

4. In the given figure, $DE = HI = AL = 2\,cm$ and $LK = IJ = HG = EF = 5\,cm$. Find the perimeter of the given figure (in cm).

(a) 52   (b) 34
(c) 54   (d) 70

5. ACEG is a square. AB is $\frac{1}{2}$ of AC. What is the perimeter of the square?

(a) 48 cm   (b) 40 cm
(c) 36 cm   (d) 24 cm

6. What is the area of the shaded figure?

(a) 26 cm^2 (b) 52 cm^2
(c) 64 cm^2 (d) 56 cm^2

7. Perimeter of any regular figure is _____.
(a) Sum of its all sides   (b) Product of its sides
(c) Both (a) and (b)   (d) None of these

8. The perimeter of a rectangular picture is 160 cm. It is 30 cm wide. How long is it?
(a) $5\frac{1}{3}$ cm   (b) 50 cm
(c) 100 cm   (d) 130 cm

9. Find the total shaded area of the figure made up of identical squares.

(a) 38 cm^2 (b) 243 cm^2
(c) 171 cm^2 (d) 196 cm^2

10. Find the perimeter of the given figure.

2 cm
1 cm
7 cm
6 cm 4 cm 10 cm
5 cm 5 cm 4 cm
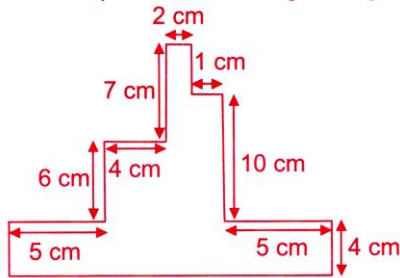
(a) 38 cm   (b) 40 cm
(c) 68 cm   (d) 52 cm

11. Find the perimeter of the given figure.

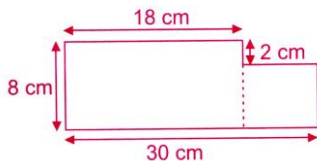5 cm
4 cm 8 cm
6 cm 4 cm
5 cm 3 cm
2 cm
12 cm
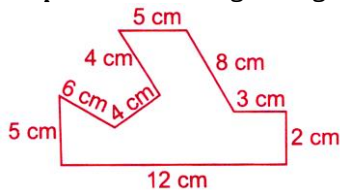
(a) 42 cm   (b) 45 cm
(c) 49 cm   (d) 53 cm

12. Find the total area of the shaded parts of the rectangle.
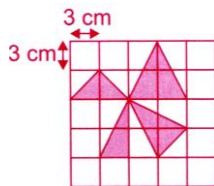

A H B
16 cm
F G
E D C
15 cm
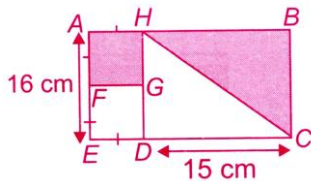
(a) $196\ cm^2$ (b) $148 cm^2$
(c) $200\ cm^2$ (d) $184\ cm^2$

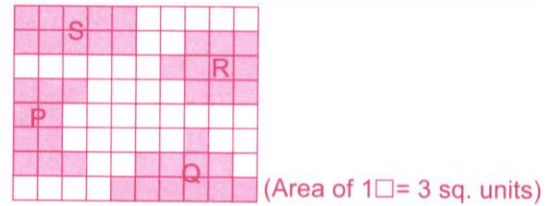**13.** The given figure is made up of two rectangles Find its total area.

18 cm
2 cm
8 cm
30 cm

(a) $144 cm^2$ (b) $216 cm^2$
(c) $240\ cm^2$ (d) $300\ cm^2$

14. Find the area of the shaded figure.

3 cm
3 cm

(a) $49.5\ cm^2$ (b) $36.5\ cm^2$
(c) $24.5\ cm^2$ (d) $30\ cm^2$

15. Which shape has the largest area?
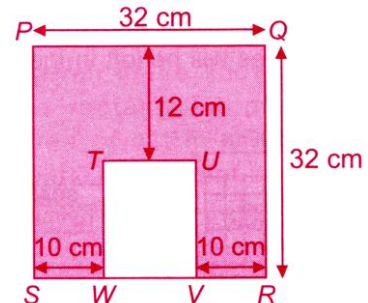

S
R
P
Q
(Area of 1☐= 3 sq. units)

(a) Q   (b) R
(c) P   (d) S

16. ABCD is a square of perimeter 56 m. Two triangular corners have been cut away as shown in figure. What is the perimeter of the remaining figure?

A F B
7 m 7 m
E G
D C
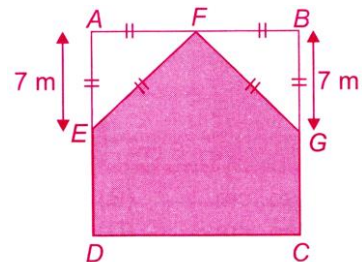
(a) 39 m   (b) 42 m
(c) 35 m   (d) 53 m

17. In the given figure. PQRS is a square and TUVW is a rectangle.

P 32 cm Q
12 cm
T U 32 cm
10 cm 10 cm
S W V R

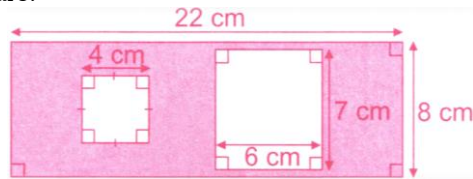Find the remaining area if TUVW was removed from the figure.
(a) 716 sq. cm   (b) 784 sq. cm
(c) 700 sq. cm   (d) 768 sq. cm

18. The figure below is made up of 6 similar squares and 2 triangles. The perimeter of each square is 32 cm. What is the perimeter of the figure?
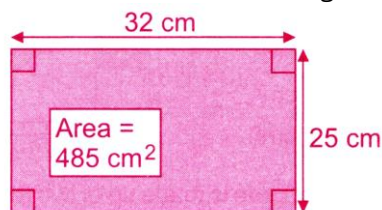

(a) 50 cm   (b) 75 cm
(c) 80 cm   (d) 95 cm

19. Find the area of the shaded part in the given figure.

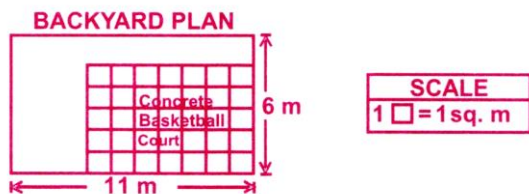(a) 139 sq. cm   (b) 118 sq. cm
(c) 126 sq. cm   (d) 152 sq. cm

20. The shaded part in the given figure is covered with cement. If it costs ₹ 84 to: cement an area of $3\ cm^2$, find the total cost of cementing.

(a) ₹ 8820   (b) ₹ 8125
(c) ₹ 8610   (d) ₹ 8804

EVERYDAY MATHEMATICS

21. Rohit's family is planning to build a concrete: basketball court in their backyard. How many square metres will be left in the backyard: for grass?

(a) 60 sq. m   (b) 35 sq. m
(c) 31 sq. m   (d) 24 sq. m

22. The area of the floor of a rectangular hall is 80 sq. m. What is its perimeter if its length is 10 m?
(a) 8 m   (b) 18 m
(c) 30 m   (d) 36 m

23. Four poles are stuck into the square ground of side 30 m at the four corners. A rope fence is to be put around the poles. What length of rope will be required if 2 m are required for tying the knots?
(a) 120 m   (b) 118
(c) 122m   (d) None of these

24. The cost of ploughing a field at ₹ 9 per square metre is ₹ 1872. If the breadth of the field is 13 m, then its length is ____.

(a) 8 m   (b) 16 m
(c) 39 m   (d) 3 m

25. Mr. Gupta wanted to make a border for his bulletin board. He marked the board to help him figure out the perimeter of the board. What is the perimeter (in feet), of Mr Gupta's bulletin board?


(a) 15   (b) 30
(c) 54   (d) 56

ACHIEVERS SECTION (HOTS)

26. A big rectangle is made up of 81 small rectangles. After removing some small rectangles from the big rectangle, the given figure is obtained. The length of a small rectangle is 3 cm and its breadth is 2 cm. Find the total area of the rectangles removed.
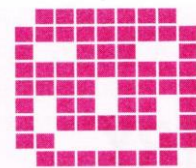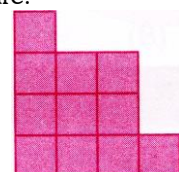

(a) 81 sq. cm   (b) 114 sq. cm
(c) 129 sq. cm   (d) 90 sq. cm

27. Two corners of a napkin are folded as shown. Find the area of the napkin when It is unfolded.
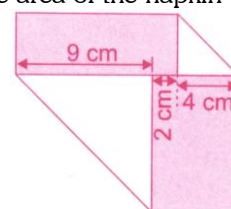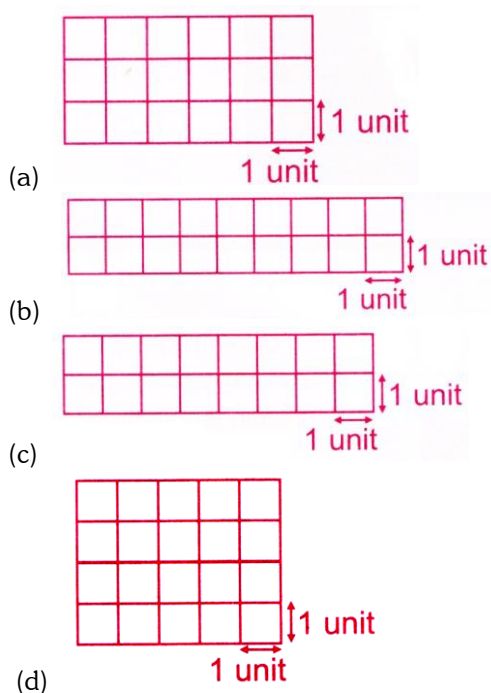

(a) 60 cm^2 (b) 225 cm^2
(c) 195 cm^2 (d) 450 cm^2

28. The figure is made up of 11 squares of the same size. The area of the figure is 99 cm^2. Find the perimeter of the figure.
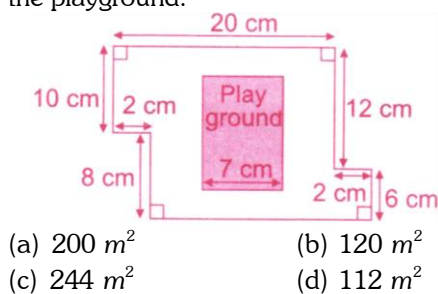

(a) 12 cm   (b) 24 cm
(c) 48 cm   (d) 36 cm

29. Which figure has an area of 20 sq. units and a perimeter of 18 units?
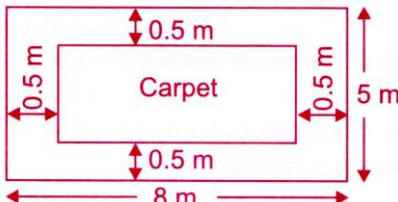
(a)

(b)

(c)

(d)

30. The given figure shows a park which has a rectangular playground with an area of $112m^2$. Find the area of the park that is not occupied by the playground.
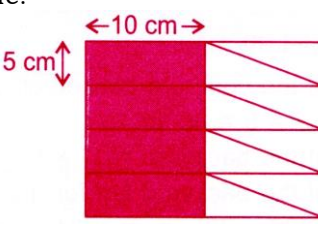
(a) $200\ m^2$ (b) $120\ m^2$
(c) $244\ m^2$ (d) $112\ m^2$

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

HINTS & EXPLANATIONS

1. (a)

Length of carpet $=[8-(0.5\times2)]m$
$\qquad\qquad\qquad = (8-1)\,m = 7\,m$
Breadth of carpet $=[5-(0.5\times2)]m$
$\qquad\qquad\qquad = (5-1)\,m = 4\,m$
So, perimeter of carpet = 2(Length + Breadth)
$\qquad\qquad = 2(7+4)m$
$\qquad\qquad = 2\times11m = 22\,m$

2. (b) : Number of unit squares = 23
Now, 1 ■ = 1 sq. unit
∴ Area of figure = 23 square units

3. (d): After rearranging the given figure, we get the new figure.

Area of 1 small rectangle $=10\times5=50\ sq.\ cm$
Number of shaded rectangles ^ 4
∴ Total shaded area $=4\times50=200\ sq.cm$

4. (c) : We have,
$\qquad BC = AL+KJ+IH+GF+ED$
$= (2+2+2+2+2)cm = 10\,cm$
∴ Perimeter of the given figure
$= (7+10+7+2+5+2+5+2+5+2+5+2)\,cm\ 54\,cm$

5. (a) We have, $AB = \dfrac{1}{2}\times AC$

$\Rightarrow\ 6cm = \dfrac{1}{2}\times AC \Rightarrow AC = 6\times2 = 12cm$

∴ Side of square $-=12\ cm$
So, perimeter of square $12\times4 = 48\,cm$

6. (d) : Area of 1 small square $= (2 \times 2) cm^2$

$$= 4\ cm^2$$

Number of shaded square $\wedge$ 14

∴ Shaded area $= 14 \times 4 = 56\, cm^2$

7. (a)

8. (b) : Perimeter $= 160\, cm$

Breadth $= 30\ cm$

∴ 2(Length + Breadth) = 160 cm

$\Rightarrow$ 2(Length + 30 cm) = 160 cm

$\Rightarrow$ Length $+30\, cm = 80\, cm$

$\Rightarrow$ Length $= (80 - 30)\, cm = 50\, cm$

9. (c) : Area of 1 small square $= (3 \times 3) cm^2$
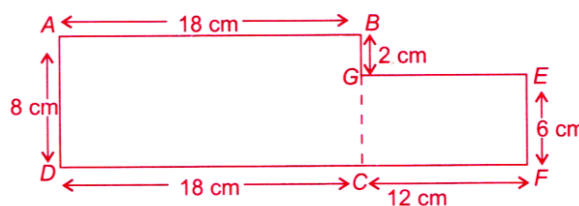
$$= 9 cm^2$$

Number of shaded squares $= 19$

∴ Shaded area $= 19 \times 9 = 171 cm^2$

10. (c) : Perimeter of the given figure
$= (2+3+1+10+5+4+17+4+5+6+4+7)$
$cm = 68 cm$

11. (c): Perimeter of the given figure
$= (5+6+4+4+5+8+3+2+12)\, cm$
$= 49\ cm$

12. (d) : We have,
$AF = FE = ED = GD = GF = HG = AH$
Now, $AF + FE = 16\ cm$
$\Rightarrow AF + AF = 16\ cm \Rightarrow AF = 8\ cm$
∴ Area of square AFGH $= 8 \times 8 = 64\ cm^2$
Now, area of rectangle HBCD $= (15 \times 16) cm^2$

$$= 240\ cm^2$$

Area of shaded part of rectangle

$$= 240 \div 2 = 120\ cm^2$$

∴ Total shaded area $= (64 + 120)\, cm^2$

$$= 184\ cm^2$$

13. (b) : Area of rectangle ABCD $= (18 \times 8)\, cm^2$

$$= 144\ cm^2$$

Area of rectangle GEFC $= (12 \times 6)\, cm^2$

$$= 72\ cm^2$$

∴ Total area $= (144 + 72)\ cm^2 = 216\, cm^2$

14. (a) : Area of 1 small square $= 3 \times 3 = 9\ cm^2$

Number of shaded squares $= 5 + \dfrac{1}{2} = \dfrac{11}{2}$

∴ Shaded $= \dfrac{11}{2} \times 9 = 49.5\, cm^2$

15. (a): Area of 1 $\square = 3\ sq.$ units

∴ Area of shape $P = 10\ sq.$ units

Area of shape $Q = 11\ sq.$ units.

Area of shape $R = 10\ sq.$ units.

Area of shape $S = 10\ sq.$ units.

So, shape Q has largest area

16. (b): Perimeter of square = 56 m
$\Rightarrow 4 \times$ side of square = 56 m
$\Rightarrow$ Side of square $= (56 \div 4) = 14\, m$
Now, $AE + ED = 14\ m$
$\Rightarrow 7\ m + ED = 14\ m \Rightarrow ED = 7\ m$
So, AE = AF = £F = FB = BG = FG = 7 m and
ED = CG = 7 m
∴ Perimeter of remaining figure
$= ED + DC + CG + GF + FE$
$= (7 + 14 + 7 + 7 + 7)\, m = 42\, m$

17. (b): Area of square PQRS
$$= (32 \times 32)\, sq.cm$$
$$= 1024\ sq.\ cm$$
Length of rectangle TUVW $= (32 - 12)\, cm$
$$= 20\ cm$$
Breadth of rectangle TUVW $= (32 - 20)\, cm$
$$= 12\ cm$$
So, area of rectangle TUVW
$$= (12 \times 20)\, sq.cm$$
$$= 240\ sq.\ cm$$
∴ Area of remaining figure
$= (1024 - 240)\, sq.cm = 784\, sq.cm$

18. (c) : Perimeter of each square = 32 cm

$\Rightarrow$ 4 × side of square $= 32\ cm$

$\Rightarrow$ Side of square $= (32 \div 4)\ cm = 8\ cm$

$\therefore$ Perimeter of the figure $= 10 \times 8 = 80\ cm$

19. (b): Area of larger rectangle $= (22 \times 8)\ sq.\ cm$

$\qquad\qquad\qquad = 176\ sq.\ cm$

Area of unshaded rectangle $= (7 \times 6)\ sq.\ cm$

$\qquad\qquad\qquad = 42\ sq.\ cm$

Area of square $= (4 \times 4)\ sq.\ cm = 16\ sq.\ cm$

$\therefore$ Area of shaded region

$= 176\ sq.cm - (42 + 16)\ sq.cm$

$= 118\ sq.\ cm$

20. (a) : Area of larger rectangle

$= (32 \times 25)\ cm^2 = 800\ cm^2$

Also, area of smaller rectangle $= 485\ cm^2$

$\therefore$ Area of shaded part

$= (800 - 485)\ cm^2 = 315\ cm^2$

Now,

Cost of cementing of $3\ cm^2 = Rs.84$

$\therefore$ Cost of cementing of $1\ cm^2 = (84 \div 3)$

$\qquad\qquad\qquad = Rs.28$

$\therefore$ Cost of cementing of $315\ cm^2$

$= Rs.(28 \times 315) = Rs.8820$

21. (c): 1 sq. m = 1 D

Area of the concrete basketball court

$= 7 \times 5 = 35\ sq.\ m$

Area of the backyard $= 11 \times 6 = 66\ sq.\ m$

Area of the backyard left for grass

$= (66 - 35)\ sq.m = 31\ sq.m$

22. (d): Area of rectangular floor $= 80\ sq.m$

Length × Breadth = 80 sq. m

$\Rightarrow$ 10 × Breadth $= 80\ sq.\ m$

$\Rightarrow$ Breadth = 8 m

$\therefore$ Perimeter = 2(Length + Breadth)

$= 2(10 + 8) = 2 \times 18 = 36\ m$

23. (d) : Length of rope required

$= 30 \times 4 + 2 \times 4 = 120 + 8 = 128\ m$

24. (b) Total cost $= Rs.1872$

Cost of ploughing $1\ sq.\ m = Rs.9$

$\therefore$ Area of field $= 1872 - 9 = 208\ sq.\ m$

$\Rightarrow$ Length × Breadth $= 208\ sq.\ m$

$\Rightarrow$ Length ×13 $m = 208\ sq.\ m$

$\Rightarrow$ Length $= 208 \div 13 = 16\ m$

25. (b): 1 foot = ⊢

Length of the board = 8 ⊢ = 8 feet

Breadth of the board = 7 ⊢ = 7 feet

Perimeter of the rectangular board

$2(7 + 8) = 30$ feet

26. (b): Area of 1 small rectangle

$= 3 \times 2 = 6\ sq.\ cm$

Number of rectangles removed = 19

$\therefore$ Total area of rectangles removed

$= 19 \times 6\ sq.\ cm = 114\ sq.\ cm$

27. (c): Unfolded form of given napkin is shown as below.
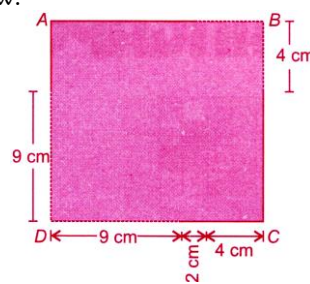
Area of napkin $= AD \times DC$

$= [(9 + 4) \times (9 + 2 + 4)]cm^2$

$= (13 \times 15)\ cm^2 = 195\ cm^2$

28. (c) : Area of figure $= 99\ cm^2$

$\Rightarrow$ Area of 11 small squares $= 99\ cm^2$

$\Rightarrow$ Area of 1 small square $= 99 \div 11 = 9\ cm^2$

$\Rightarrow$ Side of 1 small square = 3 cm

$\therefore$ Perimeter of the figure $= 16 \times 3 = 48\ cm$

**29.** (d) : Side of one square = 1 unit

Area of one square $= 1 \times 1 = 1\ sq.\ unit$

(a) Area of 18 squares = 18 sq. units

Perimeter $= 2(6 + 3) = 18$ units

(b) Area of 18 squares $= 18\ sq.\ units$

Perimeter $= 2(9 + 2) = 22$ units

(c) Area of 16 squares $= 16\ sq.\ units$

Perimeter $= 2(8 + 2) = 20$ units

(d) Area of 20 squares $= 20\ sq.\ units$

Perimeter $= 2(5+4) = 18$ units

30. (c) : Area of rectangle $ABCJ = (20 \times 10) \, m^2$
$$= 200 \, m^2$$
Area of rectangle CIHG $= (18 \times 8) \, m^2$
$$= 144 \, m^2$$
Area of rectangle DEFG $= (2 \times 6) \, m^2$
$$= 12 \, m^2$$
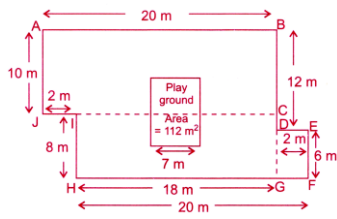
$\therefore$ Area of park excluding playground
= Total area of park - Area of playground
$= (200 + 144 + 12 - 112) \, m^2$
$= 244 \, m^2$