



**SpeedLabs**

**MATHS**

**ICSE 8<sup>th</sup>**

**TEEVRA EDUTECH PVT. LTD.**

# PERIMETER AND AREA OF PLANE

1. Find the area of the triangle whose sides are 13 cm, 20 cm and 21 cm. Also find the altitude of the triangle corresponding to the largest side.

**Ans.**  $a = 13$  cm,  $b = 20$  cm,  $c = 21$  cm

$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$S = \frac{1}{2}(a+b+c) = \frac{1}{2}(13+20+21) = 27$$

Therefore, Area of triangle

$$= \sqrt{27(27-13)(27-20)(27-21)} = \sqrt{27 \times 14 \times 7 \times 6} = 126 \text{ cm}^2$$

$$\text{Height} = \frac{2 \times \text{Area}}{\text{Base}} = \frac{2 \times 126}{21} = 12 \text{ cm}$$

2. The base and the height of a triangle are in the ratio 5: 3 and its area is  $43.2 \text{ m}^2$ . Find the base and the height of the triangle.

**Ans.** Let the Base =  $5x$  and Height =  $3x$

$$\text{Area of a triangle} = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 5x \times 3x$$

$$\Rightarrow 43.2 = 7.5x^2$$

$$\Rightarrow x = 2.4$$

Therefore Base = 12 m and Height = 7.2 m

3. Find. the area and the height of an equilateral triangle whose each side measures: (i) 12 cm (ii) 10 m

(i)  $a = 12$  cm,  $b = 12$  cm,  $c = 12$  cm

**Ans.** Area of triangle =  $\sqrt{s(s-a)(s-b)(s-c)}$

$$S = \frac{1}{2}(a+b+c) = \frac{1}{2}(12+12+12) = 18$$

Therefore, Area of triangle

$$= \sqrt{18(18-12)(18-12)(18-12)} = \sqrt{18 \times 6 \times 6 \times 6} = 62.28 \text{ cm}^2$$

$$\text{Height} = \frac{2 \times \text{Area}}{\text{Base}} = \frac{2 \times 62.28}{12} = 10.38 \text{ cm}$$

(ii)  $a = 10 \text{ m}, b = 10 \text{ m}, c = 10 \text{ m}$

**Ans.** Area of triangle  $= \sqrt{s(s-a)(s-b)(s-c)}$

$$S = \frac{1}{2}(a+b+c) = \frac{1}{2}(10+10+10) = 15$$

$$= \sqrt{15(15-10)(15-10)(15-10)} = \sqrt{15 \times 5 \times 5 \times 5} = 43.25 \text{ m}^2$$

$$\text{Height} = \frac{2 \times \text{Area}}{\text{Base}} = \frac{2 \times 43.25}{10} = 8.65 \text{ m}$$

4. Find the area of a right triangle whose hypotenuse is 26 cm long and one of the sides containing the right-angle measures 10 cm.

**Ans.** Height  $= \sqrt{26^2 - 10^2} = \sqrt{576} = 24 \text{ cm}$

$$\text{Area of Triangle} = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 10 \times 24 = 120 \text{ cm}^2$$

5. The legs of a right triangle are in the ratio 3 : 4 and its area is  $1014 \text{ cm}^2$ . Find its hypotenuse.

**Ans.** Let the Base =  $3x$  and Height =  $4x$

$$\text{Area of a triangle} = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 3x \times 4x$$

$$\Rightarrow 1014 = 6x^2$$

$$\Rightarrow x = 13$$

$$\text{Therefore Hypotenuse} = \sqrt{(39)^2 + (52)^2} = \sqrt{1521 + 2704} = 65 \text{ cm}$$

6. The base of an isosceles triangle is 12 cm and its perimeter is 32 cm. Find its area.

**Ans.** Let the side of the isosceles triangle be  $x, x, 12$

$$\text{Therefore } 32 = 2x + 12 \Rightarrow x = 10$$

$$a = 10 \text{ cm}, b = 10 \text{ cm}, c = 12 \text{ cm}$$

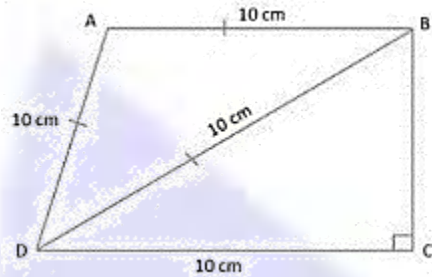
$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$S = \frac{1}{2}(a+b+c) = \frac{1}{2}(10+10+12) = 16$$

Therefore, Area of triangle

$$= \sqrt{16(16-10)(16-10)(16-12)} = \sqrt{16 \times 6 \times 6 \times 4} = 48 \text{ cm}^2$$

7. Calculate the area of the quadrilateral ABCD in which  $AB = BD = AD = 10$  cm,  $\angle BCD = 90^\circ$  and  $CD = 8$  cm.  
(Take  $\sqrt{3} = 1.732$ )



**Ans.** Area of  $\triangle ABC = \sqrt{15(15-10)(15-10)(15-10)} = \sqrt{15 \times 5 \times 5 \times 5} = 43.3 \text{ cm}^2$

For  $\triangle BCD$

$$BC = \sqrt{10^2 - 8^2} = \sqrt{36} = 6$$

Therefore, Area of  $\triangle BCD = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 8 \times 6 = 24 \text{ cm}^2$

Therefore, the area of quadrilateral ABCD  $43.3 + 24 = 67.3 \text{ cm}^2$

8. Find the area of the quadrilateral ABCD, given in the adjoining figure in which  $AB = 28$  cm,  $BC = 78$  cm,  $CD = 112$  cm,  $BD = 50$  cm and  $DA = 30$  cm

**Ans.** For  $\triangle ABD$

$$a = 30 \text{ cm}, b = 28 \text{ cm}, c = 50 \text{ cm}$$

Area of triangle

$$= \sqrt{s(s-a)(s-b)(s-c)}$$

$$S = \frac{1}{2}(a+b+c) = \frac{1}{2}(30+28+50) = 54$$

Therefore, Area of  $\triangle ABD$

$$= \sqrt{54(54-30)(54-28)(54-50)} = \sqrt{54 \times 24 \times 26 \times 4} = 367.13 \text{ cm}^2$$

For  $\triangle BCD$

$$a = 50 \text{ cm}, b = 78 \text{ cm}, c = 112 \text{ cm}$$

$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$S = \frac{1}{2}(a+b+c) = \frac{1}{2}(50+78+112) = 120$$

Therefore, Area of  $\triangle BCD$

$$= \sqrt{120(120-50)(120-78)(120-112)} = \sqrt{120 \times 70 \times 42 \times 8} = 1680 \text{ cm}^2$$

Hence the area of quadrilateral ABCD  $= 367.13 + 1680 = 2047.13 \text{ cm}^2$

9. The perimeter of a rectangle is 68 cm and its length is 24 m. Find its breadth, area and diagonal.

**Ans.** Breadth =  $\left(\frac{\text{Perimeter}}{2} - l\right) = \frac{68}{2} - 24 = 10 \text{ m}$

Area of a rectangle =  $l \times b = 24 \times 10 = 240 \text{ m}^2$

Length of diagonal =  $\sqrt{l^2 + b^2} = \sqrt{24^2 + 10^2} = 26 \text{ m}$

10. The area of a rectangle is  $19.6 \text{ m}^2$  and its length is 5.6 m. Find the breadth and perimeter of the rectangle.

**Ans.** Length =  $\frac{\text{Area}}{b} = \frac{19.6}{5.6} = 3.5 \text{ m}$

Perimeter of a rectangle =  $2(l + b) = 2(3.5 + 5.6) = 20.2 \text{ m}$

11. The sides of a rectangular park are in the ratio 3 : 2. If its area is  $1536 \text{ m}^2$ , find the cost of fencing it at Rs. 23.50 per meter.

**Ans.** Let the length =  $3x$  and breadth =  $2x$

Therefore  $1536 = 3x \times 2x \Rightarrow x = 16 \text{ m}$

Therefore Length =  $48 \text{ m}$  and breadth =  $32 \text{ m}$

Perimeter of a rectangle =  $2(l + b) = 2(48 + 32) = 160 \text{ m}$

Cost of fencing =  $160 \times 23.50 = \text{Rs. } 3760$

12. A verandah 50 m long and 12 m broad is to be paved with tiles, each measuring 6 dm by 5 dm. Find the number of tiles needed.

**Ans.** Area of a verandah =  $l \times b = 50 \times 12 = 600 \text{ m}^2$

Area of a tile =  $l \times b = 0.6 \times 0.5 = 0.30 \text{ m}^2$

Number of tiles required =  $\frac{600}{0.30} = 2000$

13. A rectangular plot of land measures 95 m by 72 m. Inside the plot, a path of uniform width 3.5 m is to be constructed all around. The rest of the plot is to be laid with grass. Find the total expense involved in constructing the path at Rs. 46.50 per  $\text{m}^2$  and laying the grass at Rs. 3.75 per  $\text{m}^2$ .

**Ans.** Area of inner perimeter =  $(95 - 2 \times 3.5) \times (72 - 2 \times 3.5) = 88 \times 65 = 5720 \text{ m}^2$

Area of outer perimeter =  $95 \times 72 = 6840 \text{ m}^2$

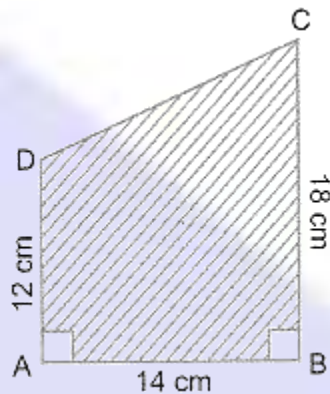
Therefore, area of the path =  $6840 - 5720 = 1120 \text{ m}^2$

Cost of constructing the path =  $1120 \times 46.50 = \text{Rs. } 52080$

Cost of laying the grass =  $5720 \times 3.75 = 21450 \text{ Rs.}$

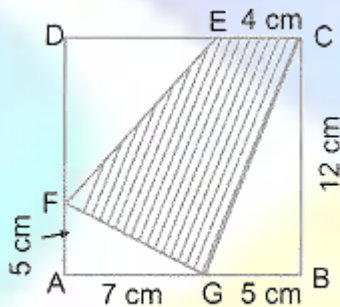
Total cost =  $52080 + 21450 = 73530 \text{ Rs.}$

14. Find the area of the shaded region in the adjoining figure,  $AD = 12$  cm,  $BC = 18$  cm and  $\angle DAJ = \angle CBA = 90^\circ$ .



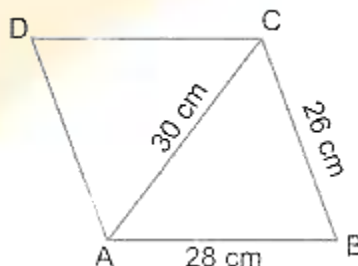
**Ans.** Area of ABCD =  $12 \times 14 + \frac{1}{2} \times 14 \times 6 = 210 \text{ cm}^2$

15. Find the area of the shaded region in the adjoining figure, it being given that ABCD is a square of side 12 cm,  $CE = 4$  cm,  $FA = 5$  cm and  $BG = 5$  cm.



**Ans.** Area of the shaded region =  $12 \times 12 - \left( \frac{1}{2} \times 5 \times 7 + \frac{1}{2} \times 5 \times 12 + \frac{1}{2} \times 7 \times 8 \right)$   
 $= 144 - 17.5 - 30 - 28 = 68.5 \text{ cm}^2$

16. In the adjoining figure, ABCD is a parallelogram in which  $AB = 28$  cm,  $BC = 26$  cm and diagonal  $AC = 30$  cm. Find
- the area of parallelogram ABCD;
  - the distance between AB and DC;
  - the distance between CB and DA.



**Ans.(i)**  $a = 26$  cm,  $b = 28$  cm,  $c = 30$  cm

$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$S = \frac{1}{2}(a+b+c) = \frac{1}{2}(26+28+30) = 42$$

Therefore, Area of parallelogram

$$= 2 \times \sqrt{42(42-26)(42-28)(42-30)} = 2 \times \sqrt{42 \times 16 \times 14 \times 12} = 672 \text{ cm}^2$$

**(ii)** Let the distance between the longer sides =  $x$

$$\text{Therefore } 672 = 28 \times x \Rightarrow x = 24 \text{ cm}$$

**(iii)** Let the distance between the shorter sides =  $y$

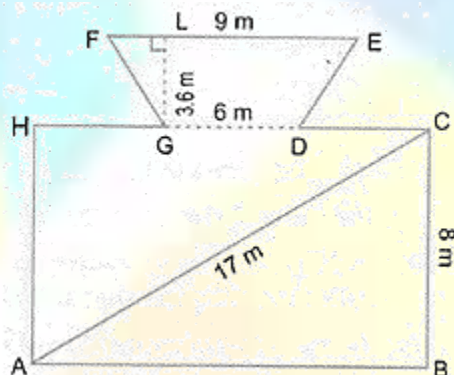
$$\text{Therefore } 672 = 26 \times y \Rightarrow y = 25.84 \text{ cm}$$

**17.** The area of a rhombus is  $139.2 \text{ cm}^2$  and its altitude is  $9.6$  cm. Find the perimeter of the rhombus.

**Ans.** Side (or Base) of Rhombus =  $\frac{\text{area of Rhombus}}{\text{Altitude}} = \frac{139.2}{9.6} = 14.5 \text{ cm}$

$$\text{Perimeter of Rhombus} = 4 \times 14.5 = 58 \text{ cm}^2$$

**18.** Find the area of the figure ABCDEFGH, given alongside, it being given that  $AC = 17$  m,  $BC = 8$  m,  $EF = 9$  m,  $GD = 6$  m,  $GL \parallel EF$  and  $GL = 3.6$  m.



**Ans.**  $AB = \sqrt{17^2 - 8^2} = \sqrt{225} = 15$

$$\text{Area of ABCH} = 2 \times \frac{1}{2} \times 15 \times 8 = 120 \text{ m}^2$$

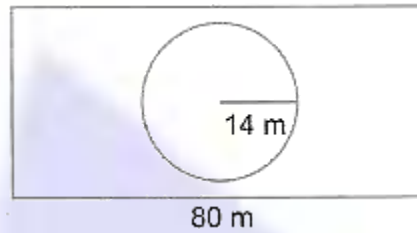
$$\text{Area of Trapezium} = \frac{1}{2} \times (\text{sum of parallel sides}) \times (\text{distance between them})$$

$$= \frac{1}{2} \times (6+9) \times 3.6 = 27 \text{ m}^2$$

$$\text{Therefore, total area} = 120 + 27 = 147 \text{ m}^2$$



19. A rectangular ground is 80 m long and 35 m broad. In the middle of the ground, there is a circular tank of radius 14 m. Find the cost of turfing the remaining portion at the rate of Rs. 21.50 sq. meter.



**Ans.** Area of rectangular ground

$$= 80 \times 35 = 2800 \text{ m}^2$$

$$\text{Area of circular tank} = \frac{22}{7} \times 14^2 = 616 \text{ m}^2$$

$$\text{Area of remaining sheet} = 2800 - 616 = 2184 \text{ m}^2$$

$$\text{Cost of turfing} = 2184 \times 21.50 = 46956 \text{ Rs.}$$

20. The area of a circular grass lawn is  $2464 \text{ m}^2$ . A path of uniform width was laid all around it, on the outside. The area of the path is  $1386 \text{ m}^2$ . Find (i) the radius of the grass lawn; (ii) the width of the path.

$$\text{Ans. Radius of circular grass lawn} = \sqrt{\frac{\text{Area}}{\pi}} = \sqrt{\frac{2464}{\frac{22}{7}}} = 28 \text{ m}$$

Therefore = Area including the path - 2464

$$\text{Area including the path} = 3850 \text{ m}^2$$

$$\text{Radius of circular grass lawn} + \text{Path} = \sqrt{\frac{\text{Area}}{\pi}} = \sqrt{\frac{3850}{\frac{22}{7}}} = 35 \text{ m}$$

Therefore, the width of the path =  $35 - 28 = 7 \text{ m}$