

CBSE Class 9 Mathematics
Important Questions
Chapter 12
Heron's Formula

1 Marks Questions

1. The measure of each side of an equilateral triangle whose area is $\sqrt{3}$ cm² is

- (A) 8 cm
- (B) 2 cm
- (C) 4 cm
- (D) 16 cm

Ans. (B) 2 cm

2. Measure of each side of an equilateral triangle is 12cm. Its area is given by

- (A) $9\sqrt{3}$ sq cm
- (B) $18\sqrt{3}$ sq cm
- (C) $27\sqrt{3}$ sq cm
- (D) $36\sqrt{3}$ sq cm

Ans. D) $36\sqrt{3}$ sq cm

3. Two adjacent side of a parallelogram are 74cm and 40cm one of its diagonals is 102cm. area of the ||gram is

- (A) 612 sq m
- (B) 1224 sq m
- (C) 2448 sq m
- (D) 4896 sq m

Ans. (C) 2448 sq m

4.

(B) 8 cm

(C) 6 cm

(D) 5 cm

Ans. (A) 10 cm

5. The perimeter of a triangle is 60cm. If its sides are in the ratio 1:3:2, then its smallest side is

(a) 15

(b) 5

(c) 10

(d) none of these.

Ans. (c) 10

6. The perimeter of a triangle is 36cm. If its sides are in the ratio 1:3:2, then its largest side is

(a) 6

(b) 12

(c) 18

(d) none of these

Ans. (c) 18

7. If the perimeter of a rhombus is 20cm and one of the diagonals is 8cm. The area of the rhombus is

(a) 24 sq cm

(b) 48 sq cm

(c) 50 sq cm

(d) 30 sq cm

Ans. (a) 24 sq cm

8. One of the diagonals of a rhombus is 12cm and area is 54 sq cm. the perimeter of the rhombus is

(a) 72 cm

(b) $\sqrt[3]{10}$ cm

(c) $\sqrt[6]{10}$ cm

(d) $\sqrt[12]{10}$ cm

Ans. (d) $\sqrt[12]{10}$ cm

9. The side of a triangle is 12 cm, 16 cm, and 20 cm. Its area is

(A) 100sq cm

(B) 90sq cm

(C) 96sq cm

(D) 120sq cm.

Ans. (C) 96sq cm

10. The side of an equilateral triangle is $4\sqrt{3}$ cm . Its area is.

(A) $12\sqrt{3}$ sq cm

(B) $12\sqrt{6}$ sq cm

(C) $12\sqrt{10}$ sq cm

(D) $6\sqrt{10}$ sq cm.

Ans. (A) $12\sqrt{3}$ sq cm

11. If the perimeter of a rhombus is 20sq cm and one of the diagonals is 8 cm. then the area of the rhombus is

- (A) 40sq cm
- (B) 24sq cm
- (C) 20sq cm
- (D) 13sq cm.

Ans. (B) 24sq cm

12. One of the diagonals of a rhombus is 12 cm and its area is 54sq cm. the perimeter of the rhombus is.

- (A) 10 cm
- (B) 8 cm
- (C) 6 cm
- (D) $12\sqrt{10}$ cm.

Ans. (D) $12\sqrt{10}$ cm.

13. The lengths of the side of a triangular park are 90m, 70m and 40m, find its area.

- (A) 1340 sq m
- (B) 1344 sq m
- (C) 1440 sq m
- (D) 1444 sq m

Ans. (B) 1344 sq m

14. An equilateral triangle has a side 50cm long. Find the area of the triangles.

- (A) $625\sqrt{3}$ sq cm
- (B) $625\sqrt{6}$ sq m
- (C) $256\sqrt{6}$ sq m

(D) $625\sqrt{10}$ sq m

Ans. (A) $625\sqrt{3}$ sq cm

15. The area of an isosceles triangle is 12 sq cm. If one of the equal side is 5 cm, then the length of the base is

(A) 4 cm

(B) 5 cm

(C) 6 cm

(D) 8 cm

Ans. (C) 6 cm

16. Find the area of triangle whose side is 6 cm, 10 cm and 15cm.

(A) 404.9 sq cm

(B) 405.9 sq cm

(C) 402.9 sq cm

(D) 410sq cm

Ans. (A) 404.9 sq cm

17. If side of equilateral triangle is 25 m. Its area is

(a) $\frac{625}{4}\sqrt{3}$ sq cm

(b) $54\sqrt{3}$ sq cm

(c) $5\sqrt{3}$ sq cm

(d) $\sqrt{3}$ sq cm

Ans. (a) $\frac{625}{4}\sqrt{3}$ sq cm

18. The perimeter of an equilateral triangle is 48 cm. Its area is

(a) $18\sqrt{3}$ sq cm

(b) $72\sqrt{3}$ sq cm

(c) $64\sqrt{3}$ sq cm

(d) $60\sqrt{3}$ sq cm

Ans. (c) $64\sqrt{3}$ sq cm

19. If area of isosceles triangle is 48 sq cm and length of one of its equal sides is 10 m, then what is the base?

(a) 16 cm or 12 cm

(b) 12 cm or 14 cm

(c) 14 cm or 16 cm

(d) 16 cm or 18 cm

Ans. (a) 16 cm or 12 cm

20. If AB = 14 cm, BC = 13 cm, CD = 17 cm, DA = 8 cm and AC = 15 cm then area of quadrilateral ABCD is

(a) 150 sq cm

(b) 144 sq cm

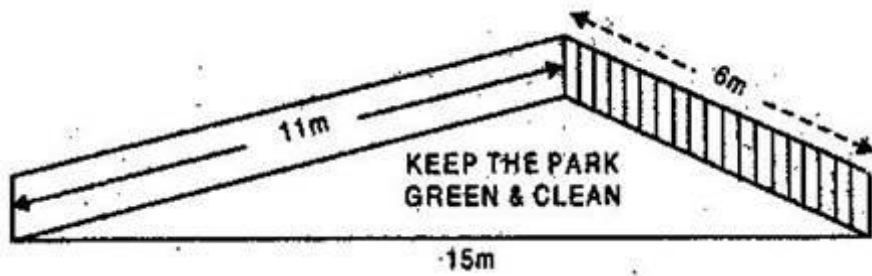
(c) 142 sq cm

(d) 140 sq cm

Ans. (b) 144 sq cm

2/3 Marks Questions

1. There is slide in a park. One of its side walls has been painted in some colour with a message "KEEP THE PARK GREEN AND CLEAN", (see figure). If the sides of the wall are 15 m, 11 m and 6 m, find the area painted in colour.



Ans. Since, sides of coloured triangular wall are 15 m, 11 m and 6 m.

∴ Semi-perimeter of coloured triangular wall

$$= \frac{15+11+6}{2} = \frac{32}{2} = 16 \text{ m}$$

Now, Using Heron's formula,

Area of coloured triangular wall

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

$$= \sqrt{16(16-15)(16-11)(16-6)}$$

$$= \sqrt{16 \times 1 \times 5 \times 10} = 20\sqrt{2} \text{ m}^2$$

Hence area painted in blue colour = $20\sqrt{2} \text{ m}^2$

2. Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.

Ans. Given: $a = 18 \text{ cm}$, $b = 10 \text{ cm}$.

Since Perimeter = 42 cm

$$\Rightarrow a+b+c = 42$$

$$\Rightarrow 18 + 10 + c = 42$$

$$\Rightarrow c = 42 - 28 = 14 \text{ cm}$$

∴ Semi-perimeter of triangle

$$= \frac{18+10+14}{2} = 21 \text{ cm}$$

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

$$\begin{aligned}
&= \sqrt{21(21-18)(21-10)(21-14)} \\
&= \sqrt{21 \times 3 \times 11 \times 7} \\
&= \sqrt{7 \times 3 \times 3 \times 11 \times 7} \\
&= 21\sqrt{11} \\
&= 21 \times 3.3 \\
&= 69.3 \text{ cm}^2
\end{aligned}$$

3. Sides of a triangle are in the ratio of 12: 17: 25 and its perimeter is 540 cm. Find its area.

Ans. Let the sides of the triangle be $12x, 17x$ and $25x$.

Therefore, $12x + 17x + 25x = 540$

$$\Rightarrow 54x = 540 \Rightarrow x = 10$$

\therefore The sides are 120 cm, 170 cm and 250 cm.

Semi-perimeter of triangle $(s) = \frac{120 + 170 + 250}{2} = 270 \text{ cm}$

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

$$= \sqrt{270(270-120)(270-170)(270-250)}$$

$$= \sqrt{270 \times 150 \times 100 \times 20}$$

$$= 9000 \text{ cm}^2$$

4. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.

Ans. Given: $a = 12 \text{ cm}$, $b = 12 \text{ cm}$

Since Perimeter = 30 cm $\Rightarrow a + b + c = 30$

$$\Rightarrow 12 + 12 + c = 30$$

$$\Rightarrow c = 30 - 24 = 6 \text{ cm}$$

$$\therefore \text{Semi-perimeter of triangle} = \frac{12+12+6}{2} = 15 \text{ cm}$$

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

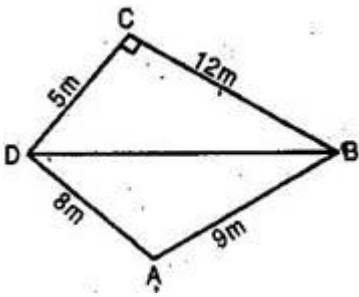
$$= \sqrt{15(15-12)(15-12)(15-6)}$$

$$= \sqrt{15 \times 3 \times 3 \times 9}$$

$$= \sqrt{5 \times 3 \times 3 \times 3 \times 3 \times 3}$$

$$= 9\sqrt{15} \text{ cm}^2$$

5. A park, in the shape of a quadrilateral ABCD has $\angle C = 90^\circ$, AB = 9 m, BC = 12 m, CD = 5 m and AD = 8 m. How much area does it occupy?



Ans. Since BD divides quadrilateral ABCD in two triangles:

(i) Right triangle BCD and (ii) \triangle ABD.

In right triangle BCD, right angled at C,

Therefore, Base = CD = 5 m and Altitude = BC = 12 m

$$\therefore \text{Area of } \triangle \text{BCD} = \frac{1}{2} \times CD \times BC$$

$$= \frac{1}{2} \times 5 \times 12 = 30 \text{ m}^2$$

In \triangle ABD, AB = 9 m, AD = 8 m

$$\text{And } BD = \sqrt{CD^2 + BC^2} \text{ [Using Pythagoras theorem]}$$

$$\Rightarrow BD = \sqrt{(5)^2 + (12)^2}$$

$$= \sqrt{25+144} = \sqrt{169} = 13 \text{ m}$$

$$\frac{9+8+13}{2}$$

Now, Semi-perimeter of $\triangle ABD = \frac{9+8+13}{2} = 15 \text{ m}$

Using Heron's formula,

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

$$= \sqrt{15(15-9)(15-8)(15-13)}$$

$$= \sqrt{15 \times 6 \times 7 \times 2}$$

$$= 6\sqrt{35} = 6 \times 5.91 \text{ m}^2$$

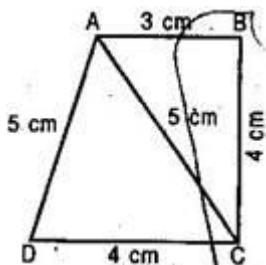
$$= 35.4 \text{ m}^2 \text{ (approx.)}$$

\therefore Area of quadrilateral ABCD = Area of $\triangle BCD$ + Area of $\triangle ABD$

$$= 30 + 35.4$$

$$= 65.4 \text{ m}^2$$

6. Find the area of a quadrilateral ABCD in which AB = 3 cm, BC = 4 cm, CD = 4 cm, DA = 5 cm and AC = 5 cm.



Ans. In quadrilateral ABCE, diagonal AC divides it in two triangles, $\triangle ABC$ and $\triangle ADC$.

$$\text{In } \triangle ABC, \text{ Semi-perimeter of } \triangle ABC = \frac{3+4+5}{2} = 6 \text{ cm}$$

Using Heron's formula,

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

$$= \sqrt{6(6-3)(6-4)(6-5)}$$

$$= \sqrt{6 \times 3 \times 2 \times 1} = 6 \text{ cm}^2$$

$$\text{Again, In } \triangle ADC, \text{ Semi-perimeter of } \triangle ADC = \frac{4+5+5}{2} = 7 \text{ cm}$$

$$\text{Using Heron's formula, Area of } \triangle ABC = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{7(7-4)(7-5)(7-5)}$$

$$= \sqrt{7 \times 3 \times 2 \times 2} = 2\sqrt{21}$$

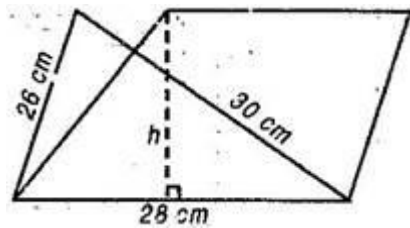
$$= 2 \times 4.6 = 9.2 \text{ cm}^2 \text{ (approx.)}$$

Now area of quadrilateral ABCD = Area of $\triangle ABC$ + Area of $\triangle ADC$

$$= 6 + 9.2$$

$$= 15.2 \text{ cm}^2$$

7. A triangle and a parallelogram have the same base and the same area. If the sides of the triangle are 26 cm, 29 cm and 30 cm and the parallelogram stands on the base 28 cm, find the height of the parallelogram.



$$\text{Ans. Semi-perimeter of triangle } (s) = \frac{26 + 28 + 30}{2} = 42 \text{ cm}$$

Using Heron's formula,

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

$$= \sqrt{42(42-26)(42-28)(42-30)}$$

$$= \sqrt{42 \times 16 \times 14 \times 12} = 336 \text{ cm}^2$$

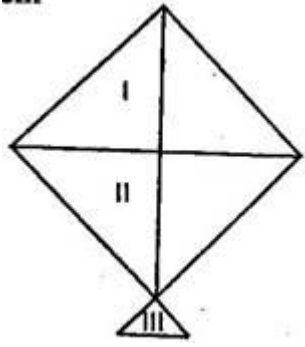
According to question, Area of parallelogram = Area of triangle

$$\Rightarrow \text{Base} \times \text{Corresponding height} = 336$$

$$\Rightarrow 28 \times \text{Height} = 336$$

$$\Rightarrow \text{Height} = 12 \text{ cm}$$

8. A kite is in the shape of a square with a diagonal 32 cm and an isosceles triangle of base 8 cm and sides 6 cm each is to be made of three different shades as shown in figure.



How much paper of each side has been used in it?

Ans. Let ABCD is a square of side a cm and diagonals $AC = BD = 32$ cm

In right triangle ABC, $AB^2 + BC^2 = AC^2$ [Using Pythagoras theorem]

$$\Rightarrow a^2 + a^2 = (32)^2$$

$$\Rightarrow 2a^2 = 32 \times 32$$

$$\Rightarrow a^2 = \frac{32 \times 32}{2} = 512$$

$$\Rightarrow \text{Area of square} = 512 \text{ cm}^2 \text{ [Area of square} = \text{side} \times \text{side}]$$

Diagonal BD divides the square in two equal triangular parts I and II.

$$\therefore \text{Area of shaded part I} = \text{Area of shaded part II} = \frac{1}{2} \times 512 = 256 \text{ cm}^2$$

$$\text{Now, semi-perimeter of shaded part III } (s) = \frac{6+6+8}{2} = 10 \text{ cm}$$

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

$$= \sqrt{10(10-6)(10-6)(10-8)}$$

$$= \sqrt{10 \times 4 \times 4 \times 2} = 8\sqrt{5}$$

$$= 8 \times 2.236 = 17.88 \text{ cm}^2$$

9. An umbrella is made by stitching 10 triangles pieces of cloth of two different colour, each piece measuring 20 cm 50 cm and 50 cm. How much cloth of each colour is required for the umbrella?

Ans. $a=20\text{cm}$, $b=50\text{cm}$

\therefore cloth required for each colour

$= 5 \times$ Area of one triangle piece

$$= 5 \times \frac{a}{4} \sqrt{4b^2 - a^2}$$

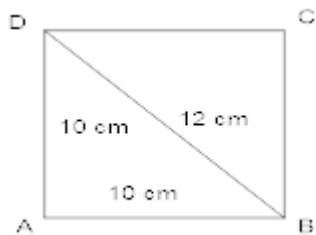
$$= 5 \times \frac{20}{4} \sqrt{4(50)^2 - (20)^2} \text{ sq cm}$$

$$= 25 \times 40\sqrt{6} \text{ sq cm}$$

$$= 1000 \times \sqrt{6} \text{ sq cm}$$

Thus, $(1000\sqrt{6})$ sq cm cloth of each colour is required

10. The perimeter of a rhombus ABCD is 40cm. find the area of rhombus of Its diagonals BD measures 12cm



Ans. $\therefore AB = BC = CD = DA = \frac{40}{4} \text{ cm } 10\text{cm}$

now in $\triangle ABD$,

$AB=10\text{cm}$, $BD =12\text{cm}$ and $DA=10\text{cm}$

$$\therefore S = \frac{10+12+10}{2} \text{ cm} = 16\text{cm}$$

Area of \therefore by herons pormula

$$\triangle ABD = \sqrt{16(16-10)(16-12)(16-10)}$$

$$= \sqrt{16 \times 6 \times 4 \times 6} = 48\text{sq cm}$$

\therefore area of rhombus ABCD $= 2 \times$ area of $\triangle ABD$

$$= 2 \times 48\text{sq cm}$$

$$= 96 \text{ sq cm}$$

11. Find area of triangle with two sides as 18cm & 10cm and the perimeter is 42cm.

Ans. Let $a=18$ cm, $b=10$ cm

Perimeter =42cm

$$\therefore a+b+c = 42\text{cm}$$

So, $C=14$ cm

$$\therefore S = \frac{a+b+c}{2} = \frac{18+10+14}{2} = 21 \text{ cm}$$

$$\begin{aligned} \text{new area of triangles} &= \sqrt{21(21-18)(21-10)(21-14)} \\ &= \sqrt{21 \times 3 \times 11 \times 7} \\ &= 21\sqrt{11} \text{ sq cm} \end{aligned}$$

12. Find the area of in isosceles triangle, the measure of one of its equals side being 'b' and the third side 'a'.

Ans. Here

$$S = \frac{a+b+c}{2} \text{ units} = \frac{a+2b}{2} \text{ units}$$

$$\therefore \text{area of } \Delta = \sqrt{\left(\frac{a+2b}{2}\right)\left(\frac{a+2b}{2}-a\right)\left(\frac{a+2b}{2}-b\right)\left(\frac{a+2b}{2}-c\right)}$$

$$= \sqrt{\left(\frac{a+2b}{2}\right)\left(\frac{2b-a}{2}\right)\frac{a}{2} \times \frac{a}{2}} \text{ sq units}$$

$$= \frac{a}{4} \sqrt{4b^2 - a^2} \text{ sq units}$$

13. Find the cost of leveling the ground in the form of a triangle having its sides are 40 m, 70 m and 90 m at Rs 8 per square meter. [use $\sqrt{5} = 2.24$]

Ans. Here $S = \frac{40+70+90}{2} \text{ m} = 100 \text{ m}$

$$\therefore \text{Area of a triangular ground} = \sqrt{100(100-40)(100-70)(100-90)} \text{ sq m}$$

$$= \sqrt{100 \times 60 \times 30 \times 10} \text{ sq m}$$

$$= (10 \times 10 \times \sqrt[5]{5}) \text{ sq m}$$

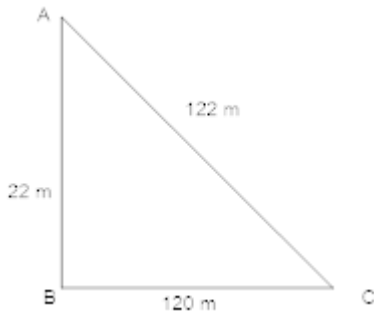
$$= (600 \times 2.24) \text{ sq m}$$

$$= 1344 \text{ sq m}$$

$$\therefore \text{Cost of leveling the ground} = \text{Rs } (8 \times 1344)$$

$$= \text{Rs } 10752$$

14. The triangular side's walls of a flyover have been used for advertisements. The sides of the walls are 122m, 22m and 120m. The advertisement yield on earning of Rs 5000 per m² per year. A company hired one of its walls for 4 months. How much rent did it pay?



Ans. The lengths of the sides of the walls are 122m, 22m and 120m.

As,

$$120^2 + 22^2$$

$$= 14400 + 484$$

$$= 14884$$

$$= (122)^2$$

\therefore Walls are in the form of right triangles

$$\text{Area of one wall} = \frac{1}{2} \times \text{Base} \times \text{height}$$

$$= \frac{1}{2} \times 120 \times 22 \text{ sq m}$$

$$= 1320 \text{ sq m.}$$

Rent = Rs 5000/sq m per year

∴ Rent for 4 month

$$= \text{Rs} \left[\frac{5000 \times 1320 \times 4}{12} \right]$$

$$= \text{Rs } 22,00,000$$

15. Find the perimeter and area of a triangle whose sides are of length 2cm, 5cm and 5cm.

Ans. Here, a = 2cm, b = 5cm and c = 5cm

$$\therefore \text{Perimeter} = a + b + c = (2 + 5 + 5) = 12 \text{ cm}$$

S = semi perimeter

$$= \frac{12}{2} = 6 \text{ cm}$$

using Heron's formula,

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

$$= \sqrt{6(6-2)(6-5)(6-5)} \text{ sq cm}$$

$$= \sqrt{24} \text{ sq cm}$$

$$= 4.9 \text{ sq cm}$$

16. There is a slide in a park. One of its sides wall has been painted in some colour with a message "KEEF THE CITY GREEN AND CLEAN".

If the sides of the wall are 15m, 11m and 6m. Find the area painted in colour.

Ans. ∴ The sides of the wall is in the triangular form with sides,

$$A = 15 \text{ m, } b = 6 \text{ m and } c = 11 \text{ m}$$

$$\therefore S = \frac{15+6+11}{2} \text{ m}$$

$$= 16 \text{ m}$$

∴ Area to be painted in colour = Area of the side wall

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

$$= \sqrt{16(16-5)(16-6)(16-11)} \text{ sq m}$$

$$= \sqrt[4]{50} \text{ sq m}$$

$$= \sqrt[20]{2} \text{ sq m}$$

17. Find the area of isosceles triangle whose side is 14 m, 12 m, 14m?

Ans. $S = \frac{14+12+14}{2} = 20m$

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

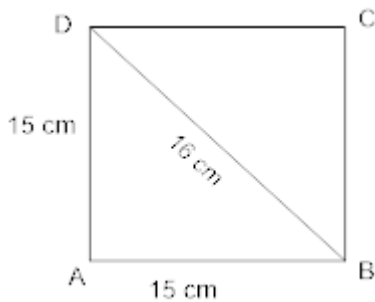
$$= \sqrt{20(20-14)(20-12)(20-14)}$$

$$= \sqrt{20 \times 6 \times 8 \times 6}$$

$$= 6\sqrt{160} = 6 \times 12.6$$

$$= 75.6$$

18. The perimeter of a rhombus ABCD is 60 cm. find the area of the rhombus of Its diagonal BD measures 16 cm?



Ans. As side of rhombus are equal.

$$\therefore AB=BC=CD=DA = \frac{60}{4} = 15 \text{ cm}$$

in ΔABD ,

$$S = \frac{15+15+16}{2} = 23 \text{ cm}$$

So,

$$\text{Area of } \triangle ABD = \sqrt{23(23-15)(23-15)(23-16)}$$

$$= \sqrt{23 \times 8 \times 8 \times 7} = 8\sqrt{23 \times 7}$$

$$= 8 \times 12.7 = 101.6 \text{ sq cm}$$

$$\text{Area of rhombus} = 2 \times 101.6 = 203.2 \text{ sq cm}$$

19. Find the cost of leveling the ground in the form of a triangle having its side as 70 cm, 50 cm, and 60 cm, at Rs 7 per square meter.

Ans.
$$S = \frac{70+50+60}{2} = \frac{180}{2} = 90 \text{ cm}$$

$$\therefore \text{ area of triangle} = \sqrt{90(90-70)(90-50)(90-60)}$$

$$= \sqrt{90 \times 20 \times 40 \times 30}$$

$$= 1469.7 \text{ sq m}$$

$$\therefore \text{ cost of levelling the ground} = \text{RS } (7 \times 1469.7)$$

$$= 10287.9$$

20. Find the area of a triangle two sides of the triangle are 18 cm, and 12 cm. and the perimeter is 40 cm.

Ans. Let $a=18 \text{ cm}$, $b=12 \text{ cm}$ and $C=?$

$$\text{So, } a+b+c=40 \text{ cm}$$

$$18+12+C=40$$

$$C=(40-30) \text{ cm} = 10 \text{ cm}$$

$$\therefore S = \frac{18+12+10}{2} = 20 \text{ cm}$$

$$\therefore \text{ area of triangle} = \sqrt{20(20-18)(20-12)(20-10)}$$

$$= \sqrt{20 \times 2 \times 8 \times 10} \text{ sq cm}$$

$$= 56.56 \text{ sq cm}$$

21. Find the area of triangle whose side is 42m, 56m and 70m?

$$\text{Ans. } S = \frac{42+56+70}{2} \text{ m} = \frac{168}{2} \text{ m or } 84$$

$$\begin{aligned}\therefore \text{Area of } \triangle ABC &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{84(84-42)(84-56)(84-70)} \text{ sq m} \\ &= 42 \times 28 \text{ sq m} \\ &= 1176 \text{ sq m}\end{aligned}$$

22. Find the area of an isosceles triangle, the measure of one of its equal sides being b and the third side a .

$$\text{Ans. } S = \frac{a+b+b}{2} \text{ units} = \frac{a+2b}{2} \text{ units}$$

$$\begin{aligned}\therefore \text{Area of triangle} &= \sqrt{\frac{a+2b}{2} \times \left(\frac{a+2b}{2} - a\right) \left(\frac{a+2b}{2} - a\right) \left(\frac{a+2b}{2} - a\right)} \text{ units} \\ &= \sqrt{\left(\frac{a+2b}{2}\right) \times \left(\frac{2b-a}{2}\right) \times \frac{a}{2} \times \frac{a}{2}} \text{ units} \\ &= \frac{a}{4} \sqrt{4b^2 - a^2} \text{ sq units}\end{aligned}$$

23. Find the area of an equilateral triangle whose side is 12 cm using Heron's formula.

$$\text{Ans. } S = \frac{12+12+12}{2} \text{ cm}$$

$$= \frac{36}{2} \text{ cm} = 18 \text{ cm}$$

$$\begin{aligned}\therefore \text{Area of equilateral} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{18(18-12)(18-12)(18-12)} \\ &= \sqrt{18 \times 6 \times 6 \times 6} \\ &= 36\sqrt{3} \text{ sq cm}\end{aligned}$$

24. Find the area of isosceles triangle whose equal side is 6 cm, 6 cm and 8 cm.

$$\text{Ans. } S = \frac{6+6+8}{2} \text{ cm}$$

$$= \frac{20}{2} = 10 \text{ cm}$$

$$\therefore \text{Area of isosceles triangle} = \sqrt{10(10-6)(10-6)(10-8)}$$

$$= \sqrt{10 \times 4 \times 4 \times 2} \text{ sq cm}$$

$$= 17.8 \text{ sq cm}$$

25. Find the area of an isosceles triangles, the measure of one of its equal sides being 10 cm and the third side is 6 cm.

$$\text{Ans. } S = \frac{10+10+6}{2} = \frac{26}{2} = 13 \text{ cm}$$

$$\therefore \text{Area if tringle} = \sqrt{13(13-5)(13-5)(13-6)} \text{ sq cm}$$

$$= \sqrt{13 \times 3 \times 3 \times 7} \text{ sq cm}$$

$$= 3\sqrt{91} \text{ sq cm}$$

26. Find the area of equilateral triangle the length of one of its sides being 24 cm.

$$\text{Ans. } a = b = c = 24 \text{ cm}$$

$$\therefore S = \frac{24+24+24}{2} \text{ cm} = \frac{72}{2} \text{ cm}$$

$$= 36 \text{ cm}$$

$$\therefore \text{Area of triangle} = \sqrt{36(36-24)(36-24)(36-24)} \text{ sq cm}$$

$$= 246.12 \text{ sq cm}$$

27. Find the perimeter and area of a triangle whose sides are 3 cm, 4 cm and 10 cm?

$$\text{Ans. Perimeter} = 3+4+5$$

$$= 12 \text{ cm}$$

$$\therefore S = \text{semiperimeter} = \frac{12}{2}$$

$$\text{Or} = 6 \text{ cm}$$

$$\begin{aligned} \text{Area of triangle} &= \sqrt{6(6-3)(6-4)(6-5)} \text{ sq cm} \\ &= 6 \text{ sq cm} \end{aligned}$$

28. Using Heron's formula, find area of triangle whose sides are 6 cm, 8 cm and 10 cm?

$$\text{Ans. } S = \frac{6+8+10}{2} = \frac{24}{2}$$

$$= 12 \text{ cm}$$

$$\therefore \text{Area of triangle} = \sqrt{12(12-6)(12-8)(12-10)} \text{ sq cm}$$

$$= 24 \text{ sq cm}$$