

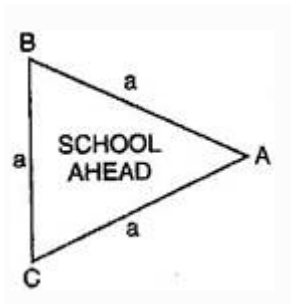
Exercise 10.1 (Revised) - Chapter 12 - Heron's Formula - Ncert Solutions class 9 - Maths

Updated On 11-02-2025 By Lithanya

Chapter 10: Heron's Formula - NCERT Solutions for Class 9 Maths

Ex 10.1 Question 1.

A traffic signal board, indicating 'SCHOOL AHEAD' is an equilateral triangle with side ' a '. Find the area of the signal board, using Heron's formula. If its perimeter is **180 cm**, what will be the area of the signal board?



Answer.

Let the Traffic signal board is $\triangle ABC$.

According to question, Semi-perimeter of $\triangle ABC(s) = \frac{a+a+a}{2} = \frac{3a}{2}$

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

$$\begin{aligned} &= \sqrt{\frac{3a}{2} \left(\frac{3a}{2} - a \right) \left(\frac{3a}{2} - a \right) \left(\frac{3a}{2} - a \right)} \\ &= \sqrt{\frac{3a}{2} \times \frac{a}{2} \times \frac{a}{2} \times \frac{a}{2}} = \sqrt{3 \left(\frac{a}{2} \right)^4} \\ &= \frac{\sqrt{3}a^2}{4} \end{aligned}$$

Now, Perimeter of this triangle = 180 cm $\Rightarrow$ Side of triangle $(a) = \frac{180}{3} = 60$ cm

$\Rightarrow$ Semi-perimeter of this triangle = $\frac{180}{2} = 90$ cm

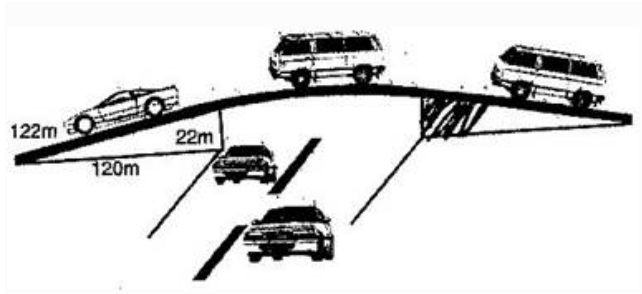
Using Heron's Formula, Area of this triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

$$\begin{aligned} &= \sqrt{90(90-60)(90-60)(90-60)} \\ &= \sqrt{90 \times 30 \times 30 \times 30} \\ &= 30 \times 30\sqrt{3} \\ &= 900\sqrt{3} \text{ cm}^2 \end{aligned}$$

Ex 10.1 Question 2.

The triangular side walls of a flyover has been used for advertisements. The sides of the walls are 122 m, **22m** and 120 m (see figure). The advertisement yield an earning of Rs. **5000** per **m²** per year. A company hired one of its walls for 3 months, how much rent did it pay?





Answer.

Given: $a = 122$ m, $b = 22$ m and $c = 120$ m

Semi-perimeter of triangle (s) = $\frac{122+22+120}{2} = \frac{264}{2} = 132$ m

Using Heron's Formula,

$$\begin{aligned} \text{Area of triangle} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{132(122-132)(132-22)(132-120)} \\ &= \sqrt{132 \times 10 \times 110 \times 12} \\ &= \sqrt{11 \times 12 \times 10 \times 10 \times 11 \times 12} \\ &= 10 \times 11 \times 12 \\ &= 1320 \text{ m}^2 \end{aligned}$$

$\therefore$ Rent for advertisement on wall for 1 year = Rs. 5000 per m^2

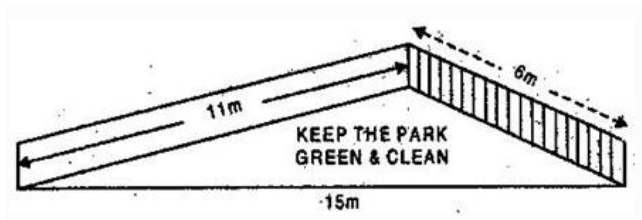
$\therefore$ Rent for advertisement on wall for 3 months for $1320 \text{ m}^2 = \frac{5000}{12} \times 3 \times 1320$

= Rs. 1650000

Hence rent paid by company = Rs. 16,50,000

Ex 10.1 Question 3.

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, find the area painted in colour.



Answer.

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

$\therefore$ Semi-perimeter of coloured triangular wall = $\frac{15+11+6}{2} = \frac{32}{2} = 16$ m

Now, Using Heron's formula,

$$\begin{aligned} \text{Area of coloured triangular wall} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{16(16-15)(16-11)(16-6)} \\ &= \sqrt{16 \times 1 \times 5 \times 10} = 20\sqrt{2} \text{ m}^2 \end{aligned}$$

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

Ex 10.1 Question 4.

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

Answer.

Given: $a = 18$ cm, $b = 10$ cm.

Since Perimeter = 42 cm

$\Rightarrow a + b + c = 42$

$\Rightarrow 18 + 10 + c = 42$

$\Rightarrow c = 42 - 28 = 14$ cm

$\therefore$ Semi-perimeter of triangle = $\frac{18+10+14}{2} = 21$ cm

$$\begin{aligned} \therefore \text{Area of triangle} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{21(21-18)(21-10)(21-14)} \\ &= \sqrt{21 \times 3 \times 11 \times 7} = \sqrt{7 \times 3 \times 3 \times 11 \times 7} \\ &= 21\sqrt{11} = 21 \times 3.3 = 69.3 \text{ cm}^2 \end{aligned}$$

Ex 10.1 Question 5.

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

Answer.

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

Therefore, $12x + 17x + 15x = 540$

$$\Rightarrow 54x = 540$$

$$\Rightarrow x = 10$$

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

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

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

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

$$= \sqrt{270 \times 150 \times 100 \times 20} = 9000 \text{ cm}^2$$

Ex 10.1 Question 6.

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

Answer.

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

Since Perimeter = 30 cm

$$\Rightarrow a + b + c = 30$$

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

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

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

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

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

$$= \sqrt{15 \times 3 \times 3 \times 9} = \sqrt{5 \times 3 \times 3 \times 3 \times 3 \times 3}$$

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

