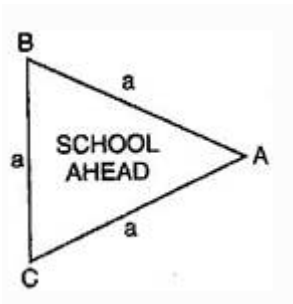
Exercise 10.1 (Revised) - Chapter 12 - Heron's Formula - Ncert Solutions class 9 - Maths

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 'SCHOOLAHEAD' is an equilateral triangle with side ' a '. Find the area of the signal board, using Heron's formula. If its perimeter is $\mathbf{180\ cm}$, what will be the area of the signal board?



Answer.

Let the Traffic signal board is $\triangle \mathrm{ABC}$.

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

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

$$= \sqrt{\frac{3a}{2}\left(\frac{3a}{2}-a\right)\left(\frac{3a}{2}-a\right)\left(\frac{3a}{2}-a\right)}$$

$$= \sqrt{\frac{3a}{2}\times\frac{a}{2}\times\frac{a}{2}\times\frac{a}{2}} = \sqrt{3\left(\frac{a}{2}\right)^4}$$

$$= \frac{\sqrt{3}a^2}{4}$$

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

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

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

$$= \sqrt{90(90-60)(90-60)(90-60)}$$

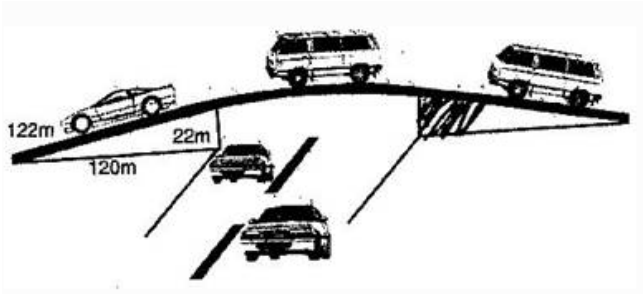
$$= \sqrt{90\times30\times30\times30}$$

$$= 30\times30\sqrt{3}$$

$$= 900\sqrt{3}\ \mathrm{cm}^2$$

Ex 10.1 Question 2.

The triangular side walls of a flyover has been used for advertisements. The sides of the walls are $122\ \mathrm{m}, \mathbf{22}\mathrm{m}$ and $120\ \mathrm{m}$ (see figure). The advertisement yield an earning of Rs. $\mathbf{5000}$ per $\mathbf{m}^2$ per year. A company hired one of its walls for 3 months, how much rent did it pay?



Answer.

Given: $a = 122\ \text{m}, b = 22\ \text{m}$ and $c = 120\ \text{m}$

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

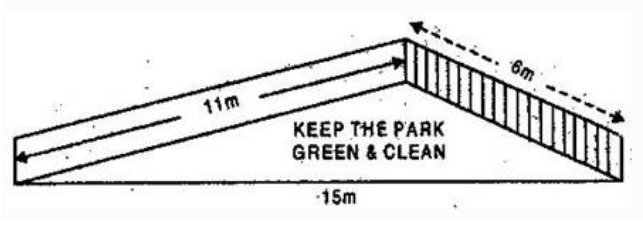
Using Heron's Formula,

Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$
$= \sqrt{132(122-132)(132-22)(132-120)}$
$= \sqrt{132 \times 10 \times 110 \times 12}$
$= \sqrt{11 \times 12 \times 10 \times 10 \times 11 \times 12}$
$= 10 \times 11 \times 12$
$= 1320m^2$
$\because$ 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 $\text{m}, 11\ \text{m}$ and $\mathbf{6}$, find the area painted in colour.



Answer.

Since, sides of coloured triangular wall are $15\ \text{m}, 11\ \text{m}$ and $6\ \text{m}$.
$\therefore$ 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 $= 20\sqrt{2}m^2$

Ex 10.1 Question 4.

Find the area of a triangle two sides of which are $18\ \text{cm}$ and $10\ \text{cm}$ and the perimeter is 42 cm.

Answer.

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

Since Perimeter $= 42\ \text{cm}$
$\Rightarrow a + b + c = 42$

$\Rightarrow 18 + 10 + c = 42$
$\Rightarrow c = 42 - 28 = 14\ \text{cm}$
$\therefore$ Semi-perimeter of triangle $= \frac{18+10+14}{2} = 21\ \text{cm}$
$\therefore$ Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$
$= \sqrt{21(21-18)(21-10)(21-14)}$
$= \sqrt{21 \times 3 \times 11 \times 7} = \sqrt{7 \times 3 \times 3 \times 11 \times 7}$
$= 21\sqrt{11} = 21 \times 3.3 = 69.3\ \text{cm}^2$

Ex 10.1 Question 5.

Sides of a triangle are in the ratio of 12: $17 : 25$ and its perimeter is $540\ \text{cm}$. 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 $120\ \text{cm}, 170\ \text{cm}$ and $250\ \text{cm}$.

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

Now, Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$
$= \sqrt{270(270-120)(270-170)(270-250)}$
$= \sqrt{270 \times 150 \times 100 \times 20} = 9000\ \text{cm}^2$

Ex 10.1 Question 6.

An isosceles triangle has perimeter $30\ \text{cm}$ and each of the equal sides is $12\ \text{cm}$. Find the area of the triangle.

Answer.

Given: $a = 12\ \text{cm}, b = 12\ \text{cm}$
$\text{Since Perimeter } = 30\ \text{cm}$
$\Rightarrow a + b + c = 30$
$\Rightarrow 12 + 12 + c = 30$
$\Rightarrow c = 30 - 24 = 6\ \text{cm}$
$\therefore$ Semi-perimeter of triangle $= \frac{12+12+6}{2} = 15\ \text{cm}$
$\therefore$ Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$
$= \sqrt{15(15-12)(15-12)(15-6)}$
$= \sqrt{15 \times 3 \times 3 \times 9} = \sqrt{5 \times 3 \times 3 \times 3 \times 3 \times 3}$
$= 9\sqrt{15}\ \text{cm}^2$