NCERT Solutions for Class 9 Maths Chapter 1o Heron's Formula Ex 1o.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?

Solution.

Given:

Length of the side of the equilateral triangle = a

Perimeter of the signal board = perimeter of triangle

= 3a

= 180 cm

Hence,

3a = 180cm

a = 60 cm

Semi perimeter of the signal board (s),

= $\frac{3a}{2}$

Now,

Using Heron's formula,

Area of the signal board = $\sqrt{s(s-a)(s-b)(s-c)}$

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

$= \sqrt{\frac{3a}{2}\times\frac{a}{2}\times\frac{a}{2}\times\frac{a}{2}}$

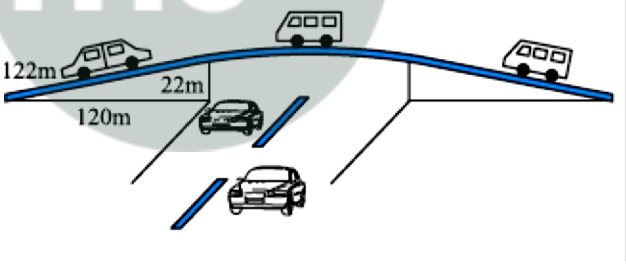
$= \sqrt{\frac{3a\hat{}4}{16}}$

$= \frac{\sqrt{3}}{4}\times 60 \times 60$

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

Question 2.

The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 122 m, 22 m and 120 m (see figure). The advertisements 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?



Solution.

The sides of the triangular side walls of flyover are 122m, 22m, and 120m.

Parameter of the triangle = 122 + 22 + 120

= 264m

Semi perimeter of triangle(s) = $\frac{264}{2}$

= 132m

Now,

Using Heron's formula,

Area of the advertisement = $\sqrt{s(s-a)(s-b)(s-c)}$

= $\sqrt{132(132-122)(132-22)(132-120)}$

= $\sqrt{132 \times 10 \times 110 \times 12}$

= $\sqrt{132 \times 132 \times 10 \times 10}$

= 1320 m^2

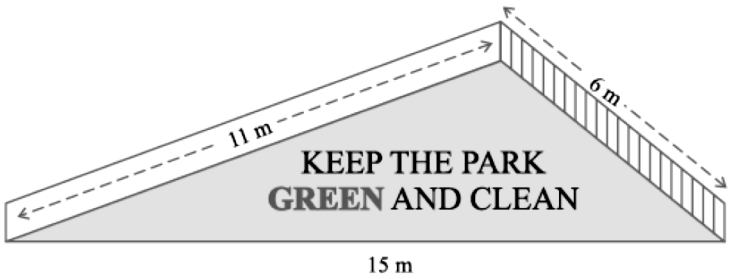
Rent of advertising per year = Rs. 5000 per m^2

Rent of one wall for 3 months = $\frac{1320 \times 5000 \times 3}{12}$

= Rs. 1650000

Question 3.

There is a slide in a park. One of its side walls has been painted in some color 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 color.



Solution.

The sides of the triangle are 15 m, 11 m and 6 m.

Parameter of the triangular walls = 3(side)

= 15 + 11 + 6

= 32 m

Semi perimeter of triangular walls(s) = $\frac{32}{2}$

= 16 m

Using Heron's formula,

Area of the advertisement = $\sqrt{s(s-a)(s-b)(s-c)}$

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

= $\sqrt{16 \times 1 \times 5 \times 10}$

= $\sqrt{16 \times 5 \times 10}$

= $20\sqrt{2}$ m^2

Question 4.

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

Solution.

Two sides of the triangle are 18cm and 10cm (Given)

Parameter of the triangle = 42 cm

Third side of triangle = 42 – (18 + 10)

= 14cm

Semi perimeter of triangle(s) = $\frac{42}{2}$

= 21cm

Using Heron's formula,

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

= $\sqrt{21(21-18)(21-10)(21-14)}$

= $\sqrt{21 \times 3 \times 11 \times 7}$

= $\sqrt{7 \times 3 \times 7 \times 3 \times 11}$

= $21\sqrt{11}$cm^2

Question 5.

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

Solution.

Let the common ratio of the sides of triangle be x and sides are 12x, 17x and 25x

Parameter of the triangle = 540 cm

12x + 17x + 25x = 540cm

x = 10

Sides of triangle:

12x = 12*10 = 120cm

17x = 17*10 = 170cm

25x = 25*10 = 250cm

Semi perimeter of triangle(s) = $\frac{540}{2}$

= 270cm

Now,

Using Heron's formula,

Area of the 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 cm^2

Question 6.

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

Solution.

Length of equal sides of the triangle = 12cm

Parameter of the triangle = 30 cm

Third side of triangle = 30 – (12 + 12)

= 6cm

Semi perimeter of triangle(s) = $\frac{30}{2}$

= 15cm

Now,

Using Heron's formula,

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

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

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

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

Hence, the area of triangle is $9\sqrt{15}$ cm^2