Ex 12.1 Class 9 Maths(solved exercise)

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:

Let each side of the equilateral triangle be a.

Semi-perimeter of the triangle,

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

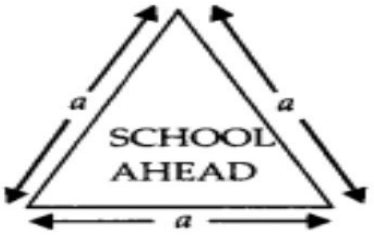
Area of the triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{s(s-a)(s-a)(s-a)} = \sqrt{s(s-a)^3}$

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

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

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



Now, its perimeter is 180 cm.

$\therefore \quad a + a + a = 180$ cm

$\Rightarrow \quad 3a = 180$ cm

$\Rightarrow a = \frac{180}{3}$ cm $= 60$ cm

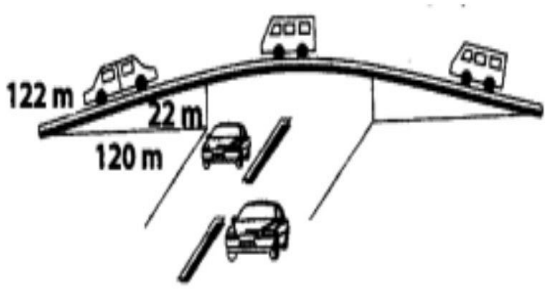
Thus, area of the triangle $= \frac{\sqrt{3}}{4}a^2$

$= \frac{\sqrt{3}}{4}(60)^2$ cm^2

$= 900\sqrt{3}$ 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 ₹5000 per m² per year. A company hired one of its walls for 3 months. How much rent did it pay?



Solution:

Let the sides of the triangular will be

a = 122m, b = 12cm, c = 22m

Semi-perimeter, s = a+b+c2

(122+120+224)m = 2642 m = 132m

The area of the triangular side wall

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

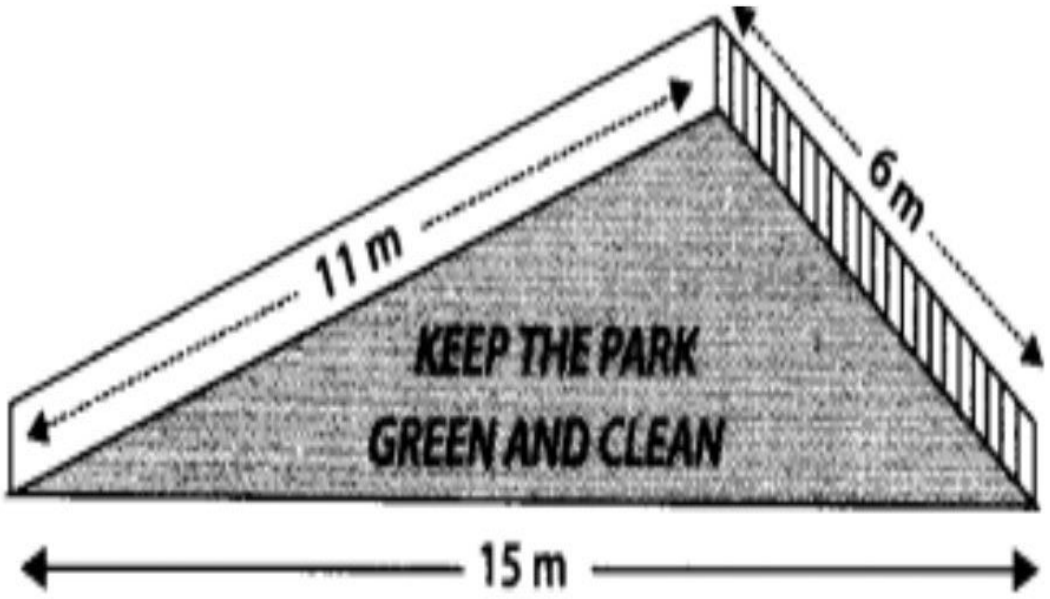
$$= \sqrt{132(132-122)(132-120)(132-22)}\ \text{m}^2$$

$$= \sqrt{132 \times 10 \times 12 \times 110}\ \text{m}^2$$

$$= \sqrt{12 \times 11 \times 10 \times 12 \times 11 \times 10}\ \text{m}^2 = 1320\ \text{m}^2$$

Rent for 1 year (i.e. 12 months) per m2 = Rs. 5000
∴ Rent for 3 months per m2 = Rs. 5000 x 312
= Rent for 3 months for 1320 m2 = Rs. 5000 x 312 x 1320 = Rs. 16,50,000..

Question 3.
There is a slide in a park. One of its side Company hired one of its walls for 3 months.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 6m, find the area painted in colour.



Solution:

Let the sides of the wall be a = 15m, b = 11m, c = 6m

Semi-perimeter

$$s = \frac{a+b+c}{2} = \left(\frac{15+11+6}{2}\right)\text{m} = \frac{32}{2}\text{m} = 16\,\text{m}$$

Now, area of the triangular surface of the wall

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

$$= \sqrt{16(16-15)(16-11)(16-6)}\ \text{m}^2$$

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

$$= \sqrt{2\times 400}\ \text{m}^2 = 20\sqrt{2}\,\text{m}^2$$