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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,

Side of the signal board = a

Perimeter of the signal board = 3a = 180 cm

∴ a = 60 cm

Semi perimeter of the signal board (s) = 3a/2

By using Heron's formula,

Area of the triangular signal board will be =

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

$= \sqrt{(3a/2)\ (3a/2 - a)\ (3a/2 - a)\ (3a/2 - a)}$

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

$= \sqrt{3a^4/16}$

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

$= \sqrt{3}/4 \times 60 \times 60 = 900\sqrt{3}\ cm^2$

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 Fig. 12.9). The advertisements yield an earning of ₹5000 per m^2 per year. A company hired one of its walls for 3 months. How much rent did it pay?

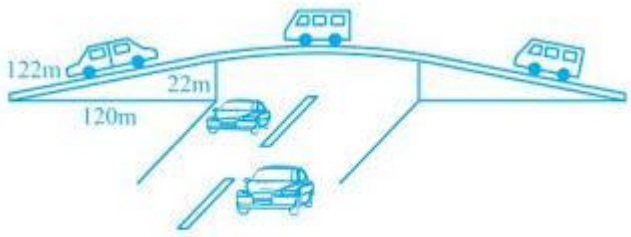

Fig. 12.9

Solution: The sides of the triangle ABC are 122 m, 22 m and 120 m respectively.

Now, the perimeter will be (122+22+120) = 264 m

Also, the semi perimeter (s) = 264/2 = 132 m

Using Heron's formula,

Area of the triangle =

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

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

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

$=1320\ m^2$

We know that the rent of advertising per year = ₹ 5000 per m^2

∴ The rent of one wall for 3 months = Rs. (1320×5000×3)/12 = Rs. 1650000

3. There is a 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 Fig. 12.10). If the sides of the wall are 15 m, 11 m and 6 m, find the area painted in colour.

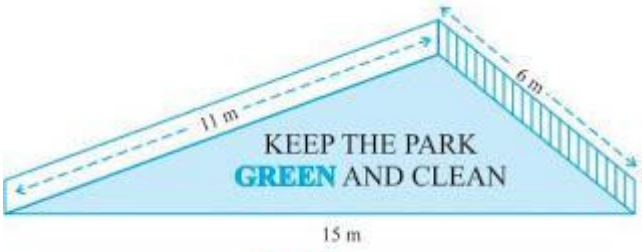

Fig. 12.10

Solution:

It is given that the sides of the wall as 15 m, 11 m and 6 m.

So, the semi perimeter of triangular wall (s) = (15+11+6)/2 m = 16 m

Using Heron's formula,

Area of the message =

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

= √[16(16-15)(16-11) (16-6)] m^2

= √[16×1×5×10] m^2 = √800 m^2

= 20√2 m^2

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