CLASS IX: MATHS
Chapter 10: Heron's formula

Questions and Solutions | Exercise 10.1 - NCERT Books

Q1. 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 ?

Sol. The equilateral triangle each side = a

Its semiperimeter = $\dfrac{a+a+a}{2} = \dfrac{3}{2}a$

By Heron's formula, the area of the triangle

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

When perimeter of the triangle is 180 cm, we have 3a = 180 cm i.e., a = 60 cm. Then the area of the triangle

$$= \frac{\sqrt{3}}{4}(60)^2 \text{ cm}^2 = 900\sqrt{3} \text{ cm}^2$$

Q2. 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.). The advertisements yield as earning of Rs. 5000 per m² per year. A company hired one of its walls for 3 months. How much rent did it pay ?
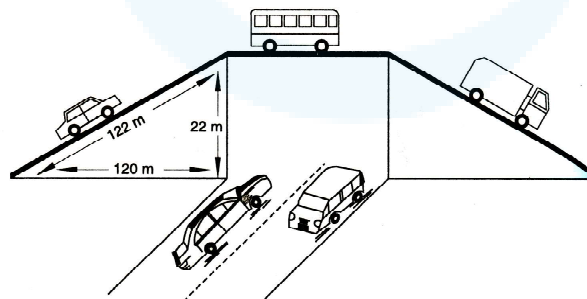
Sol. Sides of the two equal triangular walls below the bridge are 122m, 22m and 120m.

$$s = \frac{122m + 22m + 120m}{2} = 132m$$

Area of one triangular wall

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

$$= \sqrt{132 \times 10 \times 110 \times 12} \text{ m}^2 = 1320 \text{ m}^2$$

Company hired only one wall for 3 months. Thus, earning from advertisements for 3 months at the rate of Rs.5000 per m² per year.

$$= \text{Rs.}5000 \times \frac{3}{12} \times 1320 = \text{Rs.}16,500,00$$

Q3. 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.). If the sides of the wall are 15 m, 11 m and 6 m, find the area painted in colour.
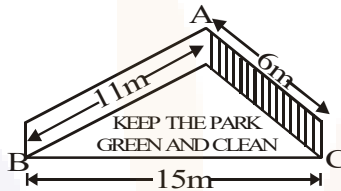
Sol. The sides of the triangular wall be 15m, 11m and 6m.

$$s = \frac{15m + 11m + 6m}{2} = 16m$$

Area of the wall $= \sqrt{16 \times (16-15) \times (16-11) \times (16-6)}\, m^2$

$$= \sqrt{16 \times 1 \times 5 \times 10}\, m^2 = 20\sqrt{2}\, m^2$$

Q4. Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.

Sol. a = 18 cm,

b = 10 cm

Perimeter = 42

we have a + b + c = 42

$\Rightarrow$ c = 14

$$s = \frac{a+b+c}{2} = \frac{42}{2} = 21$$

Area of

$$\Delta = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{21(21-18)(21-10)(21-14)}$$

$$= \sqrt{21(3)(11)(7)} = 3.7\sqrt{11}$$

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

Q5. Sides of a triangle are in the ratio of 12 : 17 : 25 and its perimeter is 540 cm. Find its area.

Sol. Let the sides of triangle be 12k, 17k, 25k

Perimeter = 12k + 17k + 25k = 54k.

$\Rightarrow$ 54k = 540

k = 10

$\Rightarrow$ a = 12 × k = 12 × 10 = 120

b = 17 × k = 17 × 10 = 170

c = 25 × k = 25 × 10 = 250

$s = \dfrac{a+b+c}{2} = \dfrac{540}{2} = 270$

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

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

$= \sqrt{270(150)(100)(20)}$

$= 3 \times 30 \times 5 \times 20 \text{ cm}^2 = 9000 \text{ cm}^2$

Q6. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of triangle.

Sol. a = 12 cm

b = 12 cm

Perimeter = 30 cm

$\Rightarrow$ c = 30 − 24 = 6 cm

$s = \dfrac{30}{2} = 15 \text{ cm}$

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

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

$= \sqrt{15.3.3.9} = 9\sqrt{15} \text{ cm}^2$