

< Chapter 12_[Philoid-IN]



Example 1 : Find the area of a triangle, two sides of which are 8 cm and 11 cm and the perimeter is 32 cm (see Fig. 12.6).

Solution : Here we have perimeter of the triangle = 32 cm, $a = 8$ cm and $b = 11$ cm.

Third side $c = 32$ cm $- (8 + 11)$ cm = 13 cm

So, $2s = 32$, i.e., $s = 16$ cm,

$s - a = (16 - 8)$ cm = 8 cm,

$s - b = (16 - 11)$ cm = 5 cm,

$s - c = (16 - 13)$ cm = 3 cm.

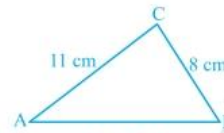


Fig. 12.6

$$\begin{aligned}\text{Therefore, area of the triangle} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{16 \times 8 \times 5 \times 3} \text{ cm}^2 = 8\sqrt{30} \text{ cm}^2\end{aligned}$$

Example 2 : A triangular park ABC has sides 120m, 80m and 50m (see Fig. 12.7). A gardener *Dhania* has to put a fence all around it and also plant grass inside. How much area does she need to plant? Find the cost of fencing it with barbed wire at the rate of ₹20 per metre leaving a space 3m wide for a gate on one side.

Solution : For finding area of the park, we have

$$2s = 50 \text{ m} + 80 \text{ m} + 120 \text{ m} = 250 \text{ m.}$$

i.e., $s = 125$ m

Now, $s - a = (125 - 120)$ m = 5 m,

$s - b = (125 - 80)$ m = 45 m,

$s - c = (125 - 50)$ m = 75 m.

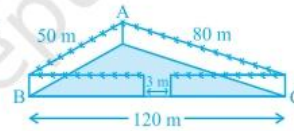


Fig. 12.7

$$\begin{aligned}\text{Therefore, area of the park} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{125 \times 5 \times 45 \times 75} \text{ m}^2 \\ &= 375\sqrt{15} \text{ m}^2\end{aligned}$$

Also, perimeter of the park = $AB + BC + CA = 250$ m

Therefore, length of the wire needed for fencing = 250 m $- 3$ m (to be left for gate)
= 247 m

And so the cost of fencing = ₹20 \times 247 = ₹4940



Example 3 : The sides of a triangular plot are in the ratio of 3 : 5 : 7 and its perimeter is 300 m. Find its area.

Solution : Suppose that the sides, in metres, are $3x$, $5x$ and $7x$ (see Fig. 12.8).

Then, we know that $3x + 5x + 7x = 300$ (perimeter of the triangle)

Therefore, $15x = 300$, which gives $x = 20$.

So the sides of the triangle are 3×20 m, 5×20 m and 7×20 m

i.e., 60 m, 100 m and 140 m.

Can you now find the area [Using Heron's formula]?

$$\text{We have } s = \frac{60 + 100 + 140}{2} \text{ m} = 150 \text{ m,}$$

$$\begin{aligned} \text{and area will be } & \sqrt{150(150 - 60)(150 - 100)(150 - 140)} \text{ m}^2 \\ & = \sqrt{150 \times 90 \times 50 \times 10} \text{ m}^2 \\ & = 1500\sqrt{3} \text{ m}^2 \end{aligned}$$

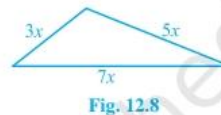


Fig. 12.8

EXERCISE 12.1

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?
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?

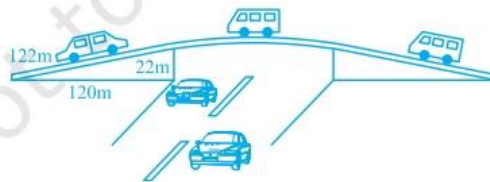


Fig. 12.9