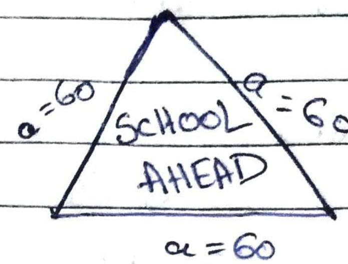
08.08.21 Ch - 12. Heron's Formula

Ex - 12.1

1 Ans,



Given,

Side of the Signal board = 3a = 180 cm

$\therefore$ 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

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

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

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

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

$= \frac{\sqrt{3}}{\cancel{4}} \times \cancel{60}^{15} \times 60 = 900\sqrt{3}\ cm^2$

2 Ans, The Sides of the triangle ABC are 122 m, 22 m & 120 m respectively.

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

Semi perimeter (s) $= 264/2 = 132$ m

using Heron's formula

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

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

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

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

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

$= 12 \times 11 \times 10$

$= 1320\ m^2$

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

$\therefore$ The rent of one wall for 3 months

$=$ ₹ $(1320 \times 5000 \times 3)/12$

$=$ ₹ 1650000

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

So, The semi perimeter of triangular wall $(s) = \frac{(15+11+6)m}{2} = 16m$

by using Heron's Formula

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

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

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

$= \sqrt{400 \times 2}\ m^2$

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

Date
Page

4Ans, Assume the third side of the triangle to be 'x'

Now,
The three Sides of the triangle are 18 cm, 10 cm & 'x' cm

It is given that the perimeter of Δ = 42 cm

So,
$x = 42 - (18+10)$ cm $= 14$ cm
$\therefore$ The semi perimeter of triangle $= 42/2 = 21$ cm

by using Heron's Formula
Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$
$= \sqrt{21(21-18)(21-10)(21-14)}$ cm^2
$= \sqrt{21 \times 3 \times 11 \times 7}$ cm^2
$= \sqrt{3 \times 7 \times 3 \times 7 \times 11}$ cm^2
$= \sqrt{3 \times 3 \times 7 \times 7 \times 11}$ cm^2
$= \sqrt{3 \times 7 \times 11}$ cm^2
$= 21\sqrt{11}$ cm^2

5Ans, The ratio of the sides of the triangle are given as 12 : 17 : 25.

Now,
let the common ratio between the sides of the triangle be 'x'

$\therefore$ The Sides are $12x$, $17x$ & $25x$

It is given that the perimeter of the triangle = 540

$12x + 17x + 25x = 540$ cm

$\Rightarrow 54x = 540$

$\Rightarrow x = 540/54$

$\Rightarrow x = 10$

Now the sides of the triangle are
120 cm, 170 cm & 250 cm.

So, the semi perimeter of the triangle $(S) = \frac{540}{2} = 270$

using Heron's Formula,

$$\text{Area} = \sqrt{S(S-a)(S-b)(S-c)}$$
$$= \sqrt{270(270-120)(270-170)(270-250)} \text{ cm}^2$$
$$= \sqrt{270 \times 150 \times 100 \times 20} \text{ cm}^2$$
$$= \sqrt{10 \times 9 \times 3 \times 50 \times 3 \times 50 \times 2 \times 10 \times 2} \text{ cm}^2$$
$$= \sqrt{10 \times 10 \times 9 \times 3 \times 3 \times 50 \times 50 \times 2 \times 2} \text{ cm}^2$$
$$\cancel{= \sqrt{10 \times 9 \times 9 \times 50 \times 50 \times 2 \times 2 \times 10}}$$
$$= \sqrt{10 \times 10 \times 9 \times 9 \times 50 \times 50 \times 2 \times 2} \text{ cm}^2$$
$$= 10 \times 9 \times 50 \times 2 \text{ cm}^2$$
$$= 9000 \text{ cm}^2$$

6Ans, Let,

The third side be x.

given,

the length of the equal sides is 12 cm
and its perimeter is 30 cm.

So,

$12+12+x = 30$

$\Rightarrow 24+x = 30$

$\Rightarrow x = 30-24$

$\Rightarrow x = 6$

Now,

Semi-perimeter, (s) = $\frac{30}{2}$ cm = 15cm

Using Heron's Foremulla

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

$\Rightarrow \sqrt{15(15-12)(15-12)(15-6)}\ cm^2$

$\Rightarrow \sqrt{15\times 3\times 3\times 9}\ cm^2$

$\Rightarrow \sqrt{15\times 3\times 3\times 3\times 3}\ cm^2$

$\Rightarrow \sqrt{15\times 3\times 3}\ cm^2$

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