

Q. A traffic signal board, indicating 'School Ahead', is an equilateral triangle with side 'a'. Find the area of signal board, using Heron's formula. If the perimeter is 180cm, what will the area of the school board?

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

$$\begin{aligned} \text{Area of } \Delta &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{\frac{3a}{2} \left(\frac{3a}{2} - a\right) \left(\frac{3a}{2} - a\right) \left(\frac{3a}{2} - a\right)} \\ &= \sqrt{3 \cdot \frac{a}{2} \cdot \frac{a}{2} \cdot \frac{a}{2} \cdot \frac{a}{2}} \\ &= \sqrt{3} \cdot \frac{a \cdot a}{2 \cdot 2} = \frac{\sqrt{3}}{4} a^2 \end{aligned}$$

ii) 180cm (Perimeter)

$$3 \text{ side} = 180$$

$$\text{side} = \frac{180}{3} = 60 \text{cm}$$

$$\text{Area of } \Delta = \frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} \times 60 \times 60 \text{ cm}^2$$

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

$$= 900\sqrt{3} \text{ cm}^2$$

### Exercise: 12.1

Q2. The triangular side walls of a ~~flower~~ Super have been used for advertisements. The sides of the walls are 122m, 22m and 120m. The advertisements yield an earning of Rs. 5000 per  $m^2$  per year. A Company hired one of its wall for 3 months. How much rent did it pay?

→ Sides of the two triangular walls below the bridge are 122m, 22m and 120m.

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

Area of one triangular wall

$$= \sqrt{132 \times (132 - 122) \times (132 - 22) \times (132 - 120)}$$

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

Company hired only one wall for 3 months. Thus, earning from advertisements for 3 months at the rate of Rs. 5000 per  $m^2$  per year.

$$\Rightarrow \text{Rs. } 5000 \times \frac{3}{12} \times 1320 = \text{Rs. } 16,50,000$$

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". If the sides

If walls are 15m, 11m and 6m, find the area painted in colour.

Ans → The sides of the triangular wall be 15m, 11m and 6m.

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

Area of the wall

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

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

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

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

$$a = 18cm,$$

$$b = 10cm$$

$$\text{Perimeter} = 42cm$$

$$\text{we have } a + b + c = 42$$

$$\Rightarrow c = 14cm$$

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

$$\begin{aligned} \text{Area of } \Delta &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{21(21-18)(21-10)(21-14)} \\ &= \sqrt{21 \times 3 \times 11 \times 7} \\ &= 3 \times 7 \times \sqrt{11} \\ &= 21\sqrt{11} cm^2 \end{aligned}$$

Q5. Sides of  $\Delta$  are in the ratio of  $12:17:25$  and its perimeter is  $540\text{cm}$ . Find its area.

$\rightarrow$  Let the sides of triangle be  $12k, 17k, 25k$

$$\text{Perimeter} = 12k + 17k + 25k = 54k$$

$$\Rightarrow 54k = 540$$

$$k = 10$$

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

$$\Rightarrow b = 17 \times k = 17 \times 10 = 170$$

$$\Rightarrow c = 25 \times k = 25 \times 10 = 250$$

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

$$\begin{aligned} \text{Area} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{270(270-120)(270-170)(270-250)} \\ &= \sqrt{270(150)(100)(20)} \\ &= 3 \times 30 \times 5 \times 20 \text{ cm}^2 = 9000 \text{ cm}^2 \end{aligned}$$

Q6. An equilateral triangle has perimeter  $30\text{cm}$  and each of the equal sides is  $12\text{cm}$ . Find the area of triangle.

Ans -  $a = 12\text{cm}$

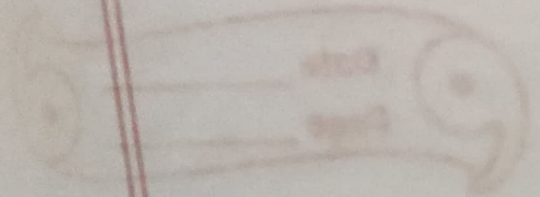
$b = 12\text{cm}$

Perimeter =  $30\text{cm}$

$$\Rightarrow c = 30 - 2 \times 12 = 6\text{cm}$$

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

$$\begin{aligned} \text{Area of } \Delta &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{15(15-12)(15-12)(15-6)} \end{aligned}$$


$$\Rightarrow \sqrt{15 \cdot 3 \cdot 3 \cdot 9} = 9\sqrt{15} \text{ cm}^2$$