

Mathematics

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(Chapter – 12) (Heron's Formula)(Exemplar Problems)

(Class – IX)

Exercise 12.4

Question 2:

The perimeter of a triangle is 50 cm. One side of a triangle is 4 cm longer than the smaller side and the third side is 6 cm less than twice the smaller side. Find the area of the triangle.

Answer 2:

Let the smaller side of a triangle be x cm.

According to the question,

One side = 4cm longer than the smaller side = $(x + 4)$ cm

Third side = 6cm less than twice the smaller side = $(2x - 6)$ cm

∴ Perimeter of a triangle = 50cm

$$\Rightarrow x + x + 4 + 2x - 6 = 50$$

$$\Rightarrow 4x - 2 = 50$$

$$\Rightarrow 4x = 52$$

$$\Rightarrow x = \frac{52}{4}$$

$$\therefore x = 13\text{cm}$$

Smaller side, $a = 13$ cm

Second side, $b = 13 + 4 = 17$ cm

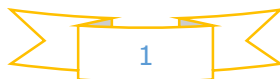
And third side, $c = 2 \times 13 - 6 = 26 - 6 = 20$ cm

$$\text{Now, Semi - Perimeter, } s = \frac{a+b+c}{2} = \frac{13+17+20}{2} = \frac{50}{2} = 25\text{cm}$$

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

[By Heron's formula]

$$= \sqrt{25(25-13)(25-17)(25-20)}$$



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$$\begin{aligned} &= \sqrt{25 \times 12 \times 8 \times 5} \\ &= \sqrt{5 \times 5 \times 2 \times 2 \times 3 \times 2 \times 2 \times 2 \times 5} \\ &= 5 \times 2 \times 2 \sqrt{30} \\ &= 20\sqrt{30} \end{aligned}$$

Hence, the area of triangle is $20\sqrt{30} \text{ cm}^2$

