Exercise 7A

Question 11:

In an isosceles triangle, the lateral sides are of equal length.

Let the length of lateral side be x cm.

Then, base $= \frac{3}{2} \times x$ cm [given]

(i) Length of each side of the triangle :

Perimeter of an isosceles triangle = 42 cm

$\Rightarrow \quad x + x + \frac{3}{2}x = 42\,\text{cm}$

$\Rightarrow \quad 2x + 2x + 3x = 84\,\text{cm}$

$\Rightarrow \quad 7x = 84$

$\Rightarrow \quad x = \frac{84}{7} = 12\,\text{cm}$

$\therefore$ length of lateral side = 12 cm

And base $= \frac{3}{2}x = \frac{3}{2} \times 12 = 18\,\text{cm}$

$\therefore$ the length of each side of the triangle = 12 cm, 12 cm and 18 cm.

(ii) Area of the triangle :

Let a = 12 cm, b = 12 cm and c = 18 cm.

Now, $s = \frac{1}{2}(a + b + c)$

$= \left(\frac{12 + 12 + 18}{2}\right)\text{cm} = \left(\frac{42}{2}\right)\text{cm}$

$= 21$ cm

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

$= \sqrt{21(21-12)(21-12)(21-18)}$

$= \sqrt{21 \times 9 \times 9 \times 3}$

$= \sqrt{3 \times 7 \times 9 \times 9 \times 3}$

$= 27\sqrt{7} = 71.42\,\text{cm}^2 \quad \left(\sqrt{7} = 2.64\right)$

$\therefore$ area of the triangle = 71.42 cm^2.

(iii) Height of the triangle :

Area of a triangle $= \frac{1}{2} \times \text{base} \times \text{height}$

$71.42\,\text{cm}^2 = \frac{1}{2} \times 18 \times h$

$\Rightarrow \quad 71.42\,\text{cm}^2 = 9 \times h$

$\Rightarrow \quad h = \frac{71.42}{9} = 7.94\,\text{cm}$

$\therefore$ the height of the triangle = 7.94 cm.

********** END **********