Herons Formula Ex 12.1 Q9

Answer :

Whenever we are given the measurement of all sides of a triangle, we basically look for Heron's formula to find out the area of the triangle.

If we denote area of the triangle by A, then the area of a triangle having sides a, b, c and s as semi-perimeter is given by;

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

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

We are given, $a:b:c=3:4:5$ and perimeter $=144$ cm

Here,

$$s=\frac{\text{perimeter}}{2}$$
$$=\frac{144}{2}$$
$$=72 \text{ cm}$$

Using these data we will find the sides of the triangle. Suppose the sides of the triangle are as follows,

$a=3x$

$b=4x$

$c=5x$

Since $2s=144$, so

$$2s=a+b+c$$
$$144=3x+4x+5x$$
$$144=12x$$
$$x=12$$

Now we know each side that is,

$$a=3x$$
$$=3\times12$$
$$=36 \text{ cm}$$
$$b=4x$$
$$=4\times12$$
$$=48 \text{ cm}$$
$$c=5x$$
$$=5\times12$$
$$=60 \text{ cm}$$

Now we know all the sides. So we can use Heron's formula.

The area of the triangle is;

$$A=\sqrt{72(72-36)(72-48)(72-60)}$$
$$A=\sqrt{72(36)(24)(12)}$$
$$A=\sqrt{746496}$$

$\boxed{A = 864\ \text{cm}^2}$

We are asked to fin out the height corresponding to the longest side of the given triangle. The longest side is c and supposes the corresponding height is H then,

$$\text{Area of given triangle} = \frac{1}{2} \times c \times H$$

$$864 = \frac{1}{2} \times 60 \times H$$

$$H = \frac{864}{30}$$

$$= 28.8\ \text{cm}$$

$\boxed{H = 28.8\ \text{cm}}$

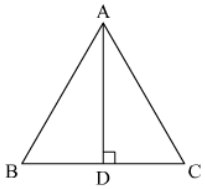
Herons Formula Ex 12.1 Q10

Answer :

We are given that $\text{perimeter} = 42\ \text{cm}$ and its base is (3/2) times each of the equal sides. We are asked to find out the length of each side, area of the triangle and height of the triangle. In this case 'height' is the perpendicular distance drawn on the base from the apposite vertex.

In the following triangle ΔABC

BC = a, AC = b, AB = c and AB = AC



Let the length of each of the equal sides be x and a, b and c are the side of the triangle. So,

$$a = \frac{3}{2}x$$

$$b = x$$

$$c = x$$

Since $\text{perimeter} = a + b + c$ .This implies that,

$$42 = \frac{3}{2}x + x + x$$

$$42 = \frac{7}{2}x$$

$$x = \frac{42 \times 2}{7}$$

$$x = 12\ \text{cm}$$

Therefore all the sides of the triangle are:

$$a = \frac{3}{2}x$$

$$= \frac{3}{2} \times 12$$

$$= 18\ \text{cm}$$

$$b = 12\ \text{cm}$$

$$c = 12\ \text{cm}$$

All the sides of the triangle are 18 cm, 12 cm, and 12 cm.

Whenever we are given the measurement of all sides of a triangle, we basically look for Heron's formula to find out the area of the triangle.

If we denote area of the triangle by *Area,* then the area of a triangle having sides a, b, c and s as semi-perimeter is given by;

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

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

To calculate area of the triangle we need to find *s:*

$$s = \frac{a+b+c}{2}$$
$$= \frac{12+12+18}{2}$$
$$= 21\,\text{cm}$$

The area of the triangle is:

$$Area = \sqrt{21(21-12)(21-12)(21-18)}$$
$$Area = \sqrt{21(9)(9)(3)}$$
$$Area = \sqrt{5103}$$
$$\boxed{Area = 71.43\,\text{cm}^2}$$

Now we will find out the height, say H. See the figure, in which AD = H

So,

$$\text{Area of the } \Delta ABC = \frac{1}{2} \times \text{base} \times \text{height}$$
$$71.43 = \frac{1}{2} \times 18 \times H$$
$$H = \frac{71.43 \times 2}{18}$$
$$= 7.94\ \text{cm}$$
$$\boxed{\text{height} = 7.94\,\text{cm}}$$

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