Herons Formula Ex 12.1 Q11

Answer :

We are given the following figure with dimensions.

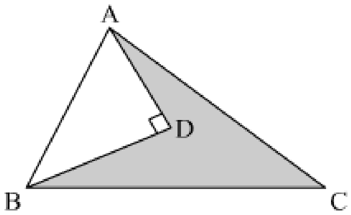

Figure:

Let the point at which angle is 90^0 be D.

AC = 52 cm, BC = 48 cm, AD = 12 cm, BD = 16 cm

We are asked to find out the area of the shaded region.

Area of the shaded region=Area of triangle ΔABC−area of triangle ΔABD

In right angled triangle ABD, we have

$$AB^2 = AD^2 + BD^2$$

$$AB^2 = (12)^2 + (16)^2$$

$$AB = \sqrt{144 + 256}$$

$$AB = 20 \text{ cm}$$

Area of the triangle ΔABD is given by

$$\begin{aligned}\text{Area of triangle } \Delta\text{ABD} &= \frac{1}{2}(\text{base} \times \text{height})\\ &= \frac{1}{2} \times \text{AD} \times \text{BD}\\ &= \frac{1}{2} \times 12 \times 16\\ &= 96 \text{ cm}^2\end{aligned}$$

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

Here a = 48 cm, b = 52 cm, c = 20 cm and

$$\begin{aligned}s &= \frac{a+b+c}{2}\\ &= \frac{48+52+20}{2}\\ &= \frac{120}{2}\\ &= 60 \text{ cm}\end{aligned}$$

Therefore the area of a triangle ΔABC is given by,

$$\begin{aligned}\text{Area of } \Delta ABC &= \sqrt{60(60-20)(60-48)(60-52)} \\ &= \sqrt{60(40)(12)(8)} \\ &= \sqrt{230400} \\ &= 480 \text{ cm}^2\end{aligned}$$

Now we have all the information to calculate area of shaded region, so

Area of shaded region = Area of ΔABC − Area of ΔABD

$$\begin{aligned}\text{Area of shaded region} &= \text{Area of } \Delta ABC - \text{Area of } \Delta ABD \\ &= 480 - 96 \\ &= 384 \text{ cm}^2\end{aligned}$$

The area of the shaded region is 384 cm^2.

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