Herons Formula Ex 12.1 Q7

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

We are given two sides of the triangle and perimeter $= 240$ dm.

That is $a=78$ dm, $b=50$ dm

We will find third side c and then the area of the triangle using Heron's formula.

$$2s=\text{perimeter}$$
$$2s=240$$
$$s=120$$

Now,

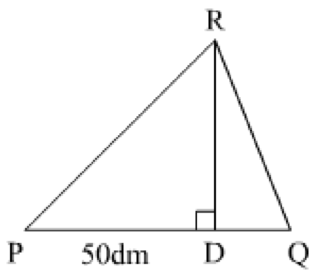
$$s=\frac{a+b+c}{2}$$
$$120=\frac{78+50+c}{2}$$
$$120\times 2=128+c$$
$$c=240-128$$
$$c=112\text{ dm}$$

Use Heron's formula to find out the area of the triangle. That is

$$A=\sqrt{120(120-78)(120-50)(120-112)}$$
$$A=\sqrt{120(42)(70)(8)}$$
$$A=\sqrt{2822400}$$
$$A=1680\text{ dm}$$

Consider the triangle ΔPQR in which

PQ=50 dm, PR=78 dm, QR=120 dm



Where RD is the desired perpendicular length

Now from the figure we have

$$\text{Area of } \Delta PQR = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 50 \times RD$$

$$1680 = \frac{1}{2} \times 50 \times RD$$

$$RD = \frac{1680 \times 2}{50}$$

$$\boxed{RD = 67.2 \text{ dm}}$$

Herons Formula Ex 12.1 Q8

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

We are given: $a = 35$ cm; $b = 54$ cm; $c = 61$ cm

$$s = \frac{35+54+61}{2}$$

$$s = \frac{150}{2}$$

$$s = 75 \text{ cm}$$

The area of the triangle is:

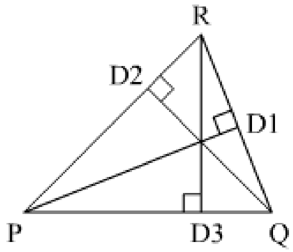
$$A = \sqrt{75(75-35)(75-54)(75-61)}$$

$$A = \sqrt{75(40)(21)(14)}$$

$$A = \sqrt{882000}$$

$$\boxed{A = 939.14 \text{ cm}^2}$$

Suppose the triangle is ΔPQR and focus on the triangle given below,



In which PD1, QD2 and RD3 are three altitudes

Where PQ=35 cm, QR=54 cm, PR=61 cm

We will calculate each altitude one by one to find the smallest one.

Case 1

In case of ΔPQR:

$$\begin{aligned}\text{Area of } \Delta PQR &= \frac{1}{2} \times QR \times PD1 \\ 939.14 &= \frac{1}{2} \times 54 \times PD1 \\ PD1 &= \frac{939.14 \times 2}{54} \\ &= 34.78 \text{ cm}\end{aligned}$$

Case 2

$$\text{Area of } \Delta PQR = \frac{1}{2} \times PR \times QD2$$

$$\begin{aligned}939.14 &= \frac{1}{2} \times 61 \times QD2 \\ QD2 &= \frac{939.14 \times 2}{61} \\ &= 30.79 \text{ cm}\end{aligned}$$

Case 3

$$\begin{aligned}\text{Area of } \Delta PQR &= \frac{1}{2} \times PQ \times RD3 \\ 939.14 &= \frac{1}{2} \times 35 \times RD3 \\ RD3 &= \frac{939.14 \times 2}{35} \\ &= 53.66 \text{ cm}\end{aligned}$$

The smallest altitude is QD2.

The smallest altitude is the one which is drawn on the side of length 61 cm from apposite vertex.

$$\boxed{\text{smallest altitude} = 30.79 \text{ cm}}$$

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