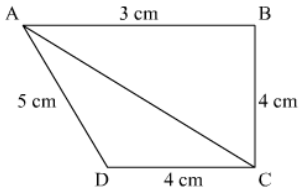
Herons Formula Ex 12.2 Q1

Answer :

The quadrilateral ABCD having sides AB, BC, CD, DA and diagonal AC=5 cm is given, where AC divides quadrilateralABCD into two triangles ΔABC and ΔADC. We will find the area of the two triangles separately and them to find the area of quadrilateral ABCD.



In triangle ΔABC, observe that,

$3^2+4^2=5^2$

$9+16=25$

$25=25$

So the triangle ΔABC is right angled triangle.

Area of right angled triangle ΔABC, is given by

$$\text{Area of } \Delta ABC = \frac{1}{2}(\text{base} \times \text{height})$$
$$= \frac{1}{2} \times AB \times BC$$
$$= \frac{1}{2} \times 3 \times 4$$
$$= 6 \text{ cm}^2$$

In ΔACD all the sides are known, so just use Heron's formula to find out Area of triangle ΔACD,

$s = \frac{AD+DC+AC}{2}$

$= \frac{5+4+5}{2}$

$= 7 \text{ cm}$

The area of the ΔACD is:

$$\text{Area of } \Delta ACD = \sqrt{s(s-AD)(s-DC)(s-CB)}$$
$$= \sqrt{7(7-5)(7-5)(7-4)}$$
$$= \sqrt{7(2)(2)(3)}$$
$$= \sqrt{84}$$
$$= 9.16 \text{ cm}^2$$

Area of quadrilateral ABCD will be,

Area = Area of triangle ABC + Area of triangle ADC

$Area = 6+9.16$

$= 15.16 \text{ cm}^2$

$\boxed{Area = 15.16 \text{ cm}^2}$

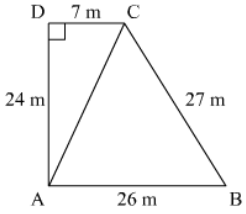
Herons Formula Ex 12.2 Q2

Answer :

We assume quadrilateral ABCD be the quadrangular field having sides AB, BC, CD, DA and $\angle CDA = 90^\circ$.

We take a diagonal AC, where AC divides quadrilateral ABCD into two triangles ΔABC and ΔADC

We will find the area of two triangles ΔABC and ΔADC separately and add them to find the area of the quadrangular ABCD.



In triangle ΔADC, we have

AD = 24 m; DC = 7 m

We use Pythagoras theorem to find side AC,

$AC^2 = AD^2 + DC^2$

$AC^2 = (24)^2 + (7)^2$

$AC^2 = 576 + 49$

$AC = \sqrt{625}$

$AC = 25 \text{ m}$

Area of right angled triangle ΔADC, say A_1 is given by

$$A_1 = \frac{1}{2}(\text{Base} \times \text{Height})$$

Where, Base = DA = 24 m; Height = DC = 7 m

$$A_1 = \frac{1}{2}(24 \times 7)$$

$$A_1 = 84 \text{ m}^2$$

Area of triangle ΔABC, say A_2 having sides a, b, c and s as semi-perimeter is given by

$$A_2 = \sqrt{s(s-a)(s-b)(s-c)}$$

Where, a = AC = 25 m; b = AB = 26 m; c = BC = 27 m

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

$$s = \frac{25+26+27}{2}$$

$$s = 39 \text{ m}$$

$$A_2 = \sqrt{39(39-25)(39-26)(39-27)}$$

$$A_2 = \sqrt{39(14)(13)(12)}$$

$$A_2 = \sqrt{85176}$$

$$A_2 = 291.84 \text{ m}^2$$

Area of quadrilateral ABCD, say A

A = Area of triangle ΔADC + Area of triangle ΔABC

$$A = A_1 + A_2$$

$$A = 84 + 291.84$$

$$A = \boxed{375.8 \text{ m}^2}$$

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