Exercise 12.3

Question 8:

The sides of a quadrilateral ABCD are 6 cm, 8cm, 12 cm and 14 cm (taken in order) respectively, and the angle between the first two sides is a right angle. Find its area.

Answer 8:

Given ABCD is a quadrilateral having sides AB = 6cm, BC = 8cm, CD = 12cm and DA = 14cm. Now, join AC.

We have, ABC is a right angled triangle at B.

Now, $AC^2 = AB^2 + BC^2$ [by Pythagoras theorem]

$= 6^2 + 8^2 = 36 + 64 = 100$

$\Rightarrow$ AC=10 cm [Taking positive square root]

$\therefore$ Area of quadrilateral ABCD = Area of ΔABC + Area of ΔACD

Now, area of $\Delta ABC = \frac{1}{2} \times AB \times BC$ [$\because$ area of triangle$= \frac{1}{2}(base \times hight)$]

$= \frac{1}{2} \times 6 \times 8 = 24\ cm^2$

In ΔACD, AC = a = 10cm, CD = b = 12cm and DA = c = 14 cm

Now, Semi - perimeter ΔACD, $s = \frac{a+b+c}{2} = \frac{10+12+14}{2} = \frac{36}{2} = 18\ cm$

$\therefore$In $\Delta ACD = \sqrt{s(s-a)(s-b)(s-c)}$ [by Heron's formula]

$= \sqrt{18(18-10)(18-12)\ (18-14)}$

$= \sqrt{18 \times 8 \times 6 \times 4}$

$= \sqrt{(3)^2 \times 2 \times 4 \times 2 \times 3 \times 2 \times 4}$

$= 3 \times 4 \times 2 \times \sqrt{3 \times 2} = 24\sqrt{6}\ cm^2$

Area of quadrilateral ABCD

= Area of ΔABC + Area of ΔACD

$= 24 + 24\sqrt{6}$

$= 24(1 + \sqrt{6})cm^2$

Hence, the area of quadrilateral is $24(1 + \sqrt{6})\ cm^2$.