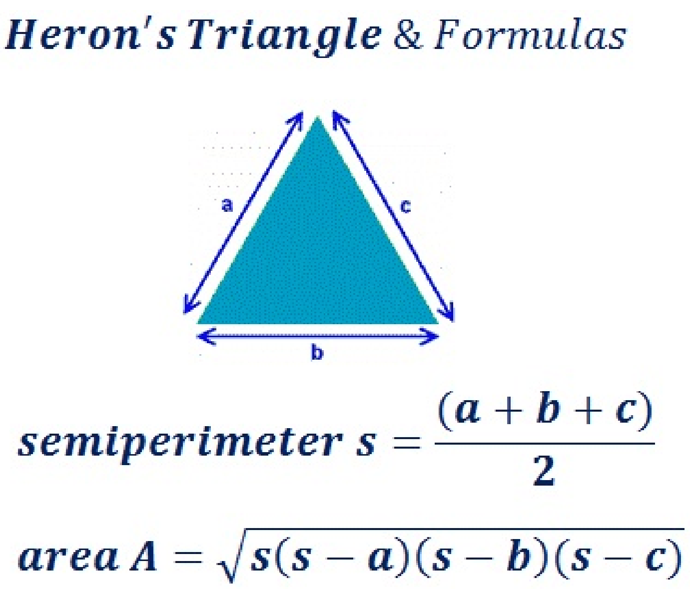
NCERT Class 9 Solutions: Heron’s Formula (Chapter 12) Exercise 12.2 Part 1



Q-1 A park, in the shape of a quadrilateral ABCD, has $\angle B = 90°, CA = 9m, AB = 12m, BD = 5m$ and $CD = 8m$. How much area does it occupy?

Solution:

Given a quadrilateral ABCD with, $\angle B = 90°, CA = 9m, AB = 12m, BD = 5m$and CD $= 8m$.

Construction: Join diagonal AD

To find the area of quadrilateral we can add the areas of two trianlges. In ΔABD , by applying Pythagoras theorem,

- $AD^2 = AB^2 + BD^2$
- $AD^2 = 122 + 52$
- $AD^2 = 169$
- $AD = 13m$

Also since triangle ΔABD is right triangle, Area of $\Delta ABD = \frac{1}{2} \times 12 \times 5 = 30m^2$ Now, semi perimeter of $\Delta CAD \frac{8+9+13}{2} m = \frac{30}{2} m = 15m$

Using heron’s formula, area of ΔCAD

- $\sqrt{s\,(s-a)\,(s-b)\,(s-c)}$
- $\sqrt{15\,(15-13)\,(15-9)\,(15-8)\,m^2}$
- $\sqrt{15 \times 2 \times 6 \times 7} m^2$
- $6\sqrt{35} m^2$
- $35.49m^2$ (approx.)

Area of quadrilateral $ABCD =$ Area of$\Delta ABD +$ Area of$\Delta CAD = 30m2 + 35.49m^2 = 65.49m^2$

Q-2 Find the area of a quadrilateral ABCD in which $CD = 3\ cm, CB = 4\ cm, CD = 4\ cm, AD =$ 5cm and BD $= 5\ cm.$

Solution:

Given a quadrilateral ABCD, $CD = 3\ cm, CB = 4\ cm, CD = 4\ cm, AD =$ 5cm and BD $= 5\ cm.$

We can calculate the area of the two triangles by using heroes’ formula on the two triangles. However we can make things simple by first proving that that ΔDCB is a right triangle. let’s see if it satisfies Pythagoras theorem,

- $BD^2 = DC^2 + CB^2$
- $5^2 = 3^2 + 4^2$
- $25 = 9 + 16$
- $25 = 25$

Thus, ΔDCB is a right angled at C. Area of ΔCBA

- $\frac{1}{2} \times 3 \times 4 = 6cm^2$

Now, semi perimeter of $\Delta DBA = \frac{5+5+4}{2} cm = \frac{14}{2} cm = 7m$

Using heron’s formula, area of ΔDCA

- $= \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$
- $= \sqrt{7\,(7-5)\,(7-5)\,(7-4)\ cm^2}$
- $= \sqrt{7 \times 2 \times 2 \times 3\ cm^2}$
- $= 2\sqrt{21} cm^2$

- $\approx 9.17cm^2$ (approx.)

Finally, area of quadrilateral

- $ABCD = \text{Area of}\Delta DCB + \text{Area of}\Delta DCA = 6cm^2 + 9.17cm^2 = 15.17cm^2$