1. What is Heron’s Formula?

Heron’s Formula is used to find the area of a triangle when the lengths of all three sides are known.

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2. Heron’s Formula

If a triangle has sides of lengths a, b, and c, then the area is given by:

Area=s(s−a)(s−b)(s−c)\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}Area=s(s−a)(s−b)(s−c)

Where:

s=a+b+c2s = \frac{a + b + c}{2}s=2a+b+c

is the semi-perimeter of the triangle.

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3. Steps to Use Heron’s Formula

1. Find the semi-perimeter sss.

2. Substitute values of a,b,ca, b, ca,b,c into the formula.

3. Calculate the square root to find the area.

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4. Example

Question: Find the area of a triangle with sides 7 cm, 8 cm, and 9 cm.

Solution:

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a=7a = 7a=7, b=8b = 8b=8, c=9c = 9c=9

- s=7+8+92=12s = \frac{7+8+9}{2} = 12s=27+8+9=12

Area=12(12−7)(12−8)(12−9)=12×5×4×3=720\text{Area} = \sqrt{12(12-7)(12-8)(12-9)} = \sqrt{12 × 5 × 4 × 3} = \sqrt{720}Area=12(12−7)(12−8)(12−9)=12×5×4×3=720 Area□26.83 cm2\text{Area} □ 26.83 \, \text{cm}^2Area□26.83cm2

□ 5. Applications of Heron’s Formula

- To find the area of a triangle when height is not given.
- To find areas of quadrilaterals that can be divided into triangles.

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6. Area of a Quadrilateral using Heron’s Formula

If a quadrilateral can be split into two triangles, calculate the area of each triangle using Heron’s formula and then add both areas.

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7. Tips for Exams

 Always check the triangle inequality: Sum of any two sides > third side
 Write steps clearly: semi-perimeter, substitution, and final area
 Use approximate square root values if needed
 Practice solving for triangle with all sides given
 Remember: Heron’s Formula is only for triangles