Heron's Formula

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Comprehensive study notes for

Heron's Formula

by

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(Math King of Katargam). Master every concept with clear explanations, solved examples, and practice problems.

Key Concepts

Area of a Triangle

For a triangle with sides a, b, c, Heron's formula gives the area without needing the height.

Semi-perimeter:

s = (a + b + c)/2.

Heron's Formula

Area = ?[s(s-a)(s-b)(s-c)] where s is the semi-perimeter. This formula works for ALL types of triangles - scalene, isosceles, equilateral.

Area of Equilateral Triangle

For an equilateral triangle with side a: s = 3a/2. Using Heron's formula: Area = ?3/4 x a2.

Application to Quadrilaterals

To find the area of a quadrilateral using Heron's formula, divide it into two triangles by drawing a diagonal, find the area of each, and add them.

Important Formulas

Semi-perimeter

s = (a + b + c)/2

Heron's Formula

Area = ?[s(s-a)(s-b)(s-c)]

Equilateral Triangle

Area = (?3/4)a2

Isosceles Triangle

Area = (b/4)?(4a2 - b2) where a = equal sides, b = base

Solved Examples

Example 1:

Find the area of a triangle with sides 3 cm, 4 cm, 5 cm.

Solution:

s = (3+4+5)/2 = 6. Area = ?[6(6-3)(6-4)(6-5)] = ?(6x3x2x1) = ?36 =

6 cm2

. This is a 3-4-5 right triangle.

Example 2:

Find the area of an equilateral triangle with side 6 cm.

Solution:

Using direct formula: Area = (?3/4) x 62 = (?3/4) x 36 = 9?3 =

15.59 cm2

.

Example 3:

A triangular park has sides 120 m, 80 m, and 80 m. Find its area.

Solution:

s = (120+80+80)/2 = 140. Area = ?[140(140-120)(140-80)(140-80)] = ?(140x20x60x60) = ?(10080000) =

3175 m2

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Practice Questions

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

The sides of a triangle are in ratio 12:17:25 and its perimeter is 540 cm. Find its area.

Find the area of an equilateral triangle with perimeter 60 cm.

A rhombus has perimeter 40 cm and one diagonal 12 cm. Find its area.

The base of an isosceles triangle is 12 cm and perimeter is 32 cm. Find its area.

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