CHAPTER TEST: HERON'S FORMULA

Mathematics | Class IX (2026/HERON/09/001)

Time: 1.5 Hours **Max. Marks: 40**

GENERAL INSTRUCTIONS

– All questions are compulsory.

– The question paper consists of **five sections: A, B, C, D, and E**.

– Section A contains **8 Multiple Choice Questions (MCQs)** of **1 mark each**.

– Section B contains **4 Very Short Answer questions** of **2 marks each**.

– Section C contains **3 Short Answer questions** of **3 marks each**.

– Section D contains **2 Long Answer questions** of **5 marks each**.

– Section E contains **1 Case Study–based question** of **5 marks**.

– Use of calculators or any electronic devices is **not permitted**, unless stated otherwise.

– All necessary working steps must be clearly shown for full marks.

– The use of appropriate units and correct mathematical symbols is compulsory.

Section A: Multiple Choice Questions ($8 \times 1 = 8$ Marks)

1. If the side of an equilateral triangle is tripled, then the new area becomes k times the original area. The value of k is:

2. The semi-perimeter of a triangle having sides 15 cm, 20 cm, and 25 cm is:

3. An isosceles right-angled triangle has an area of 8 cm^2. The length of its hypotenuse is:

4. The sides of a triangle are in the ratio $3 : 4 : 5$. If its perimeter is 36 cm, then its area is:

5. If the area of an equilateral triangle is $16\sqrt{3}$ cm^2, then its perimeter is:

6. The height of an equilateral triangle whose side is a units is:

7. If $s - a = 5$ cm, $s - b = 10$ cm, and $s - c = 1$ cm, where s is the semi-perimeter and a, b, c are sides, then the area of the triangle is:

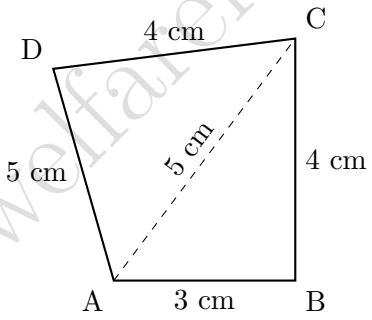
8. A floral design on a floor is made up of 16 triangular tiles. If the sides of one tile are 9 cm, 28 cm, and 35 cm, the semi-perimeter s used for Heron's formula calculation is:

Section B: Very Short Answer Questions ($4 \times 2 = 8$ Marks)

1. Find the area of a triangle, two sides of which are 8 cm and 11 cm and the perimeter is 32 cm.
2. The base of an isosceles triangle is 12 cm and its perimeter is 32 cm. Find its area using Heron's Formula.
3. Calculate the area of a triangle whose sides are 6 cm, 8 cm, and 10 cm. Verify if it is a right-angled triangle.
4. A triangular park has sides 120 m, 80 m, and 50 m. Find the semi-perimeter and the area of the park.

Section C: Short Answer Questions ($3 \times 3 = 9$ Marks)

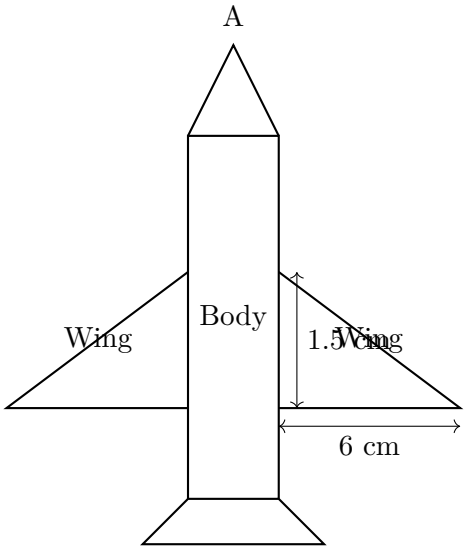
1. A triangular sign board, indicating 'SCHOOL AHEAD', is an equilateral triangle with side 'a'. Find the area of the signal board, using Heron's formula. If its perimeter is 180 cm, what will be the area of the signal board?
2. Find the area of a quadrilateral $ABCD$ in which $AB = 3$ cm, $BC = 4$ cm, $CD = 4$ cm, $DA = 5$ cm, and $AC = 5$ cm.



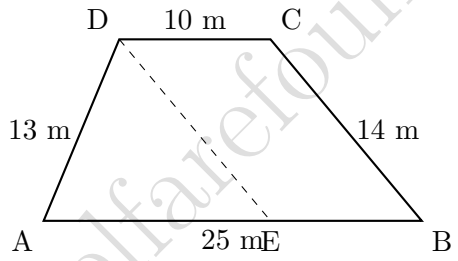
3. A park, in the shape of a quadrilateral $ABCD$, has $\angle C = 90°$, $AB = 9$ m, $BC = 12$ m, $CD = 5$ m and $AD = 8$ m. How much area does it occupy?

Section D: Long Answer Questions ($2 \times 5 = 10$ Marks)

1. Radha made a picture of an aeroplane with coloured paper as shown in the figure. Find the total area of the paper used (Specifically, calculate the area of the triangular wings and the central rectangular body). The wings are two identical right-angled triangles with base 6 cm and altitude 1.5 cm. The top is an equilateral triangle of side 2 cm.



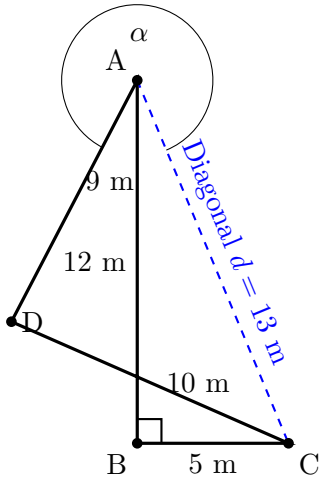
2. A field is in the shape of a trapezium whose parallel sides are 25 m and 10 m. The non-parallel sides are 14 m and 13 m. Find the area of the field. (Hint: Draw a line parallel to one of the non-parallel sides to form a triangle and a parallelogram).



Section E

Case Study 1: Solar Panel Array Design

An environmental engineer, Sarah, is designing a specialized solar-panel array for a remote research station. The array is shaped like a quadrilateral $ABCD$ to maximize sunlight absorption based on the local topography. To calculate the total energy output, Sarah first needs to find the exact surface area of the panel. Field measurements show that the edge AB is 12 meters long, while the perpendicular support BC measures 5 meters. The corner at point B is engineered to be a precise 90° angle. The remaining two boundaries, CD and DA, are 10 meters and 9 meters long, respectively. Sarah divides the quadrilateral into two triangular sections by installing a diagonal brace from A to C. This structural division allows her to apply Heron's formula to the irregular section, ensuring the solar capacity is calculated with high precision.



Multiple Choice Questions

1. **In the right-angled $\triangle ABC$, what is the length of the diagonal brace AC?**

   (a) 17 m
   (b) 13 m
   (c) 15 m
   (d) 14 m

   Answer: (b)

2. **What is the area of the triangular section ABC?**

   (a) 60 sq. m
   (b) 30 sq. m
   (c) 45 sq. m
   (d) 65 sq. m

   Answer: (b)

3. **What is the semi-perimeter (s) of the irregular triangular section ADC?**

   (a) 32 m
   (b) 20 m

(c) 16 m

(d) 15 m

Answer: (c)

4. **Using Heron's Formula, what is the area of the section ADC (to the nearest whole number)?**

   (a) 44 sq. m

   (b) 48 sq. m

   (c) 52 sq. m

   (d) 36 sq. m

   Answer: (a)

5. **What is the total surface area of the solar panel array $ABCD$?**

   (a) 74.12 sq. m

   (b) 78.50 sq. m

   (c) 75.36 sq. m

   (d) 82.00 sq. m

   Answer: (a) [Area ABC (30) + Area ADC ($\sqrt{16 \cdot 3 \cdot 6 \cdot 7} = \sqrt{2016} \approx 44.12$)]