# CHAPTER TEST: HERON'S FORMULA

**Mathematics | Class IX (2026/HERON/09/002)**

**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 Marks)

1. The sides of a triangle are in the ratio $3 : 4 : 5$. If its perimeter is 24 cm, what is its area?

   (a) $12$ cm$^2$

   (b) $24$ cm$^2$

   (c) $48$ cm$^2$

   (d) $96$ cm$^2$

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

   (a) $48$ cm

   (b) $24$ cm

   (c) $12$ cm

   (d) $36$ cm

3. Let $s$ be the semi-perimeter and $a, b, c$ be the sides of a triangle. The expression $\sqrt{s(s-a)(s-b)(s-c)}$ represents:

   (a) Perimeter

   (b) Volume

   (c) Area

(d) Semi-perimeter

4. Each side of an equilateral triangle is doubled. The new area will be $k$ times the original area. The value of $k$ is:

    (a) 2
    (b) 3
    (c) 4
    (d) 8

5. The sides of a triangular plot are 50 m, 65 m and 65 m. The semi-perimeter ($s$) of this plot is:

    (a) 90 m
    (b) 180 m
    (c) 65 m
    (d) 115 m

6. The base of an isosceles right triangle is 30 cm. Its area is:

    (a) 225 cm$^2$
    (b) 450 cm$^2$
    (c) 500 cm$^2$
    (d) 900 cm$^2$

7. In Heron's formula, the value of $(s - a) + (s - b) + (s - c)$ is equal to:

    (a) $s$
    (b) $2s$
    (c) $3s$
    (d) 0

8. A rhombus has diagonals of length 10 cm and 24 cm. The area of the rhombus is:

    (a) 240 cm$^2$
    (b) 120 cm$^2$
    (c) 60 cm$^2$
    (d) 480 cm$^2$

## Section B: Very Short Answer Questions (8 Marks)

1. Find the area of a triangle whose sides are 13 cm, 14 cm and 15 cm.

2. The perimeter of an isosceles triangle is 32 cm. The ratio of the equal side to its base is $3 : 2$. Find the sides of the triangle.

3. If the semi-perimeter of a triangle is $s = 15$ cm and $(s - a) = 5$ cm, $(s - b) = 7$ cm, find the third side $c$.

4. Calculate the area of an equilateral triangle whose altitude is 6 cm. (Leave your answer in $\sqrt{3}$ form).

## Section C: Short Answer Questions (9 Marks)

1. A triangular park $ABC$ has sides 120m, 80m and 50m. A gardener Dhania has to put a fence all around it and also plant grass inside. How much area does she need to plant?

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.
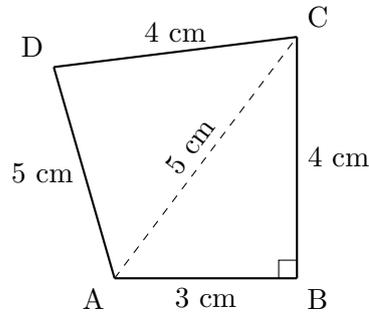


3. An umbrella is made by stitching 10 triangular pieces of cloth of two different colours, each piece measuring 20 cm, 50 cm and 50 cm. How much cloth of each colour is required for the umbrella?

## Section D: Long Answer Questions (10 Marks)

1. 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?
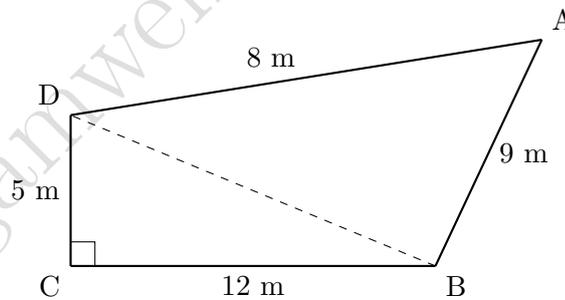


2. A field is in the shape of a trapezium whose parallel sides are 25 m and 10 m. The non-parallel sides are 14 m and 13 m. Find the area of the field.
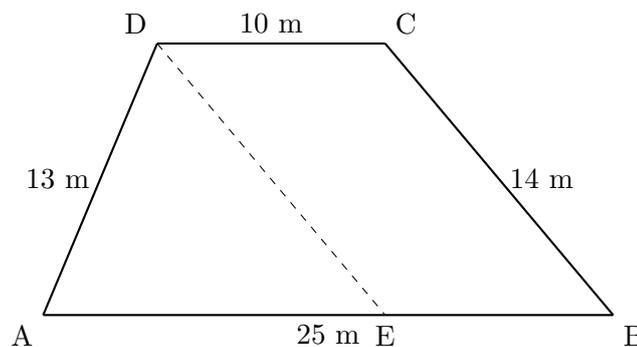
**Section E**

## Case Study 2: Urban Park Plaza Design

A landscape architect, Ishaan, is drafting the blueprints for a modern stone plaza within a new urban park. The plaza is designed as a quadrilateral $ABCD$, where different types of granite will be used for two distinct triangular zones. Ishaan records that the distance $AB$ is 24 meters and the distance $BC$ is 7 meters. The construction plan specifies that the junction at point $B$ must be a perfect 90° angle to accommodate a central fountain. Furthermore, the outer boundary $CD$ measures 20 meters, while the final side $DA$ is 15 meters. To determine the exact quantity of granite needed, Ishaan calculates the area by splitting the plaza with a diagonal $AC$. He uses Heron's formula for the irregular portion, ensuring every square meter of the premium stone is accounted for accurately.
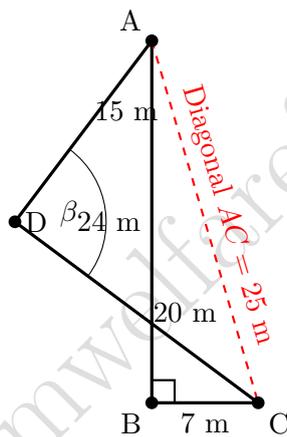


**Multiple Choice Questions**

1. **Given the right-angled corner at $B$, what is the calculated length of the diagonal $AC$?**

    (a) 25 m
    (b) 26 m
    (c) 31 m
    (d) 28 m

    *Answer: (a)*

2. **What is the area of the right-angled triangular region $ABC$ planned for the fountain?**

   (a) 168 sq. m

   (b) 84 sq. m

   (c) 100 sq. m

   (d) 124 sq. m

   *Answer: (b) [Area = 0.5 * 24 * 7]*

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

   (a) 60 m

   (b) 45 m

   (c) 30 m

   (d) 25 m

   *Answer: (c) [s = (25 + 20 + 15) / 2]*

4. **Using Heron's Formula, find the area of the triangular region $ADC$.**

   (a) 150 sq. m

   (b) 200 sq. m

   (c) 120 sq. m

   (d) 180 sq. m

   *Answer: (a) [Area = sqrt(30 * 5 * 10 * 15) = 150]*

5. **What is the total area of the urban park plaza $ABCD$ that Ishaan must pave?**

   (a) 284 sq. m

   (b) 214 sq. m

   (c) 234 sq. m

   (d) 250 sq. m

   *Answer: (c) [Total = 84 + 150 = 234 sq. m]*