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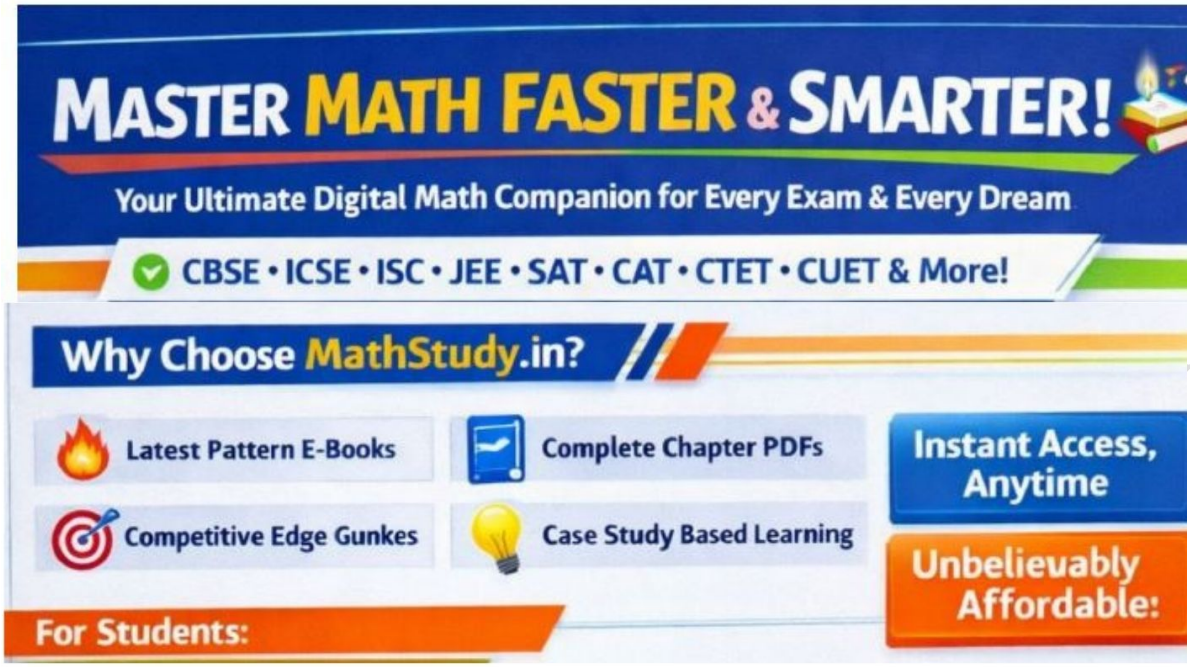

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CHAPTER TEST: HERON'S FORMULA

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

Section A: Multiple Choice Questions

1. **(b) $\frac{3a}{2}$**
   Perimeter $= a + a + a = 3a$. Semi-perimeter $s = \frac{\text{Perimeter}}{2} = \frac{3a}{2}$.

2. **(a) 864 cm^2**
   Let sides be $3x, 4x, 5x$. $3x + 4x + 5x = 144 \implies 12x = 144 \implies x = 12$.
   Sides are $36, 48, 60$. Since $36^2 + 48^2 = 60^2$, it is a right triangle.
   Area $= \frac{1}{2} \times 36 \times 48 = 18 \times 48 = 864$ cm^2.

3. **(a) $\sqrt{15}$ cm^2**
   $a = 4, b = 4, c = 2$. $s = \frac{4+4+2}{2} = 5$.
   Area $= \sqrt{5(5-4)(5-4)(5-2)} = \sqrt{5 \times 1 \times 1 \times 3} = \sqrt{15}$ cm^2.

4. **(b) 24 cm**
   $\frac{\sqrt{3}}{4}a^2 = 16\sqrt{3} \implies a^2 = 64 \implies a = 8$.
   Perimeter $= 3a = 3 \times 8 = 24$ cm.

5. **(c) Semi-perimeter**

Section B: Short Answer Questions

6. $a = 18, b = 10, P = 42$. Third side $c = 42 - (18 + 10) = 14$ cm.
   $s = 21$. Area $= \sqrt{21(21-18)(21-10)(21-14)} = \sqrt{21 \times 3 \times 11 \times 7} = 21\sqrt{11}$ cm^2.

7. **No.** In a triangle, the sum of any two sides must be greater than the third side. Here, $12 + 12 = 24$, which is less than 30. Thus, the triangle cannot be formed.

8. Let equal sides be x. $\frac{1}{2}x^2 = 8 \implies x^2 = 16 \implies x = 4$.
   Hypotenuse $= \sqrt{4^2 + 4^2} = \sqrt{32} = 4\sqrt{2}$ cm.

9. $13x + 12x + 5x = 450 \implies 30x = 450 \implies x = 15$.
   Sides: $195, 180, 75$. These are Pythagorean triplets ($75^2 + 180^2 = 195^2$).
   Area $= \frac{1}{2} \times 75 \times 180 = 75 \times 90 = 6750$ m^2.

Section C: Long Answer Questions

10. In $\triangle BCD$, $\angle C = 90°$. By Pythagoras: $BD = \sqrt{12^2 + 5^2} = 13$ m.
    Area$(\triangle BCD) = \frac{1}{2} \times 12 \times 5 = 30$ m^2.
    For $\triangle ABD$: $a = 9, b = 8, c = 13$. $s = \frac{9+8+13}{2} = 15$.
    Area$(\triangle ABD) = \sqrt{15(15-9)(15-8)(15-13)} = \sqrt{15 \times 6 \times 7 \times 2} = 6\sqrt{35} \approx 35.5$ m^2.
    Total Area $\approx 30 + 35.5 = 65.5$ m^2.

11. $s = \frac{120+80+50}{2} = 125$ m.
    Area $= \sqrt{125(125-120)(125-80)(125-50)} = \sqrt{125 \times 5 \times 45 \times 75} = 375\sqrt{15}$ m^2.
    Perimeter for fencing $= (250 - 3) = 247$ m.
    Cost $= 247 \times 20 =$ Rs 4940.

12. Side of rhombus $= 80/4 = 20$ m. Diagonal $= 24$ m.
The diagonal divides the rhombus into two congruent triangles with sides $20, 20, 24$.
$s = 32$. Area of one $\triangle = \sqrt{32(12)(12)(8)} = 12 \times 16 = 192$ m^2.
Total Area $= 2 \times 192 = 384$ m^2.

13. For one tile ($a = 9, b = 28, c = 35$): $s = 36$.
Area $= \sqrt{36(36-9)(36-28)(36-35)} = \sqrt{36 \times 27 \times 8 \times 1} = 36\sqrt{6}$ cm^2.
Total Area for 16 tiles $= 16 \times 36\sqrt{6} = 576\sqrt{6} \approx 1411$ cm^2.
Cost $= 1411 \times 0.50 =$ Rs 705.50.

Section D: NCERT Highlights

1. **Sides of the triangle**
2. **4** (Area $\propto$ side^2)
3. **Triangles**
4. **Height (or Altitude)**