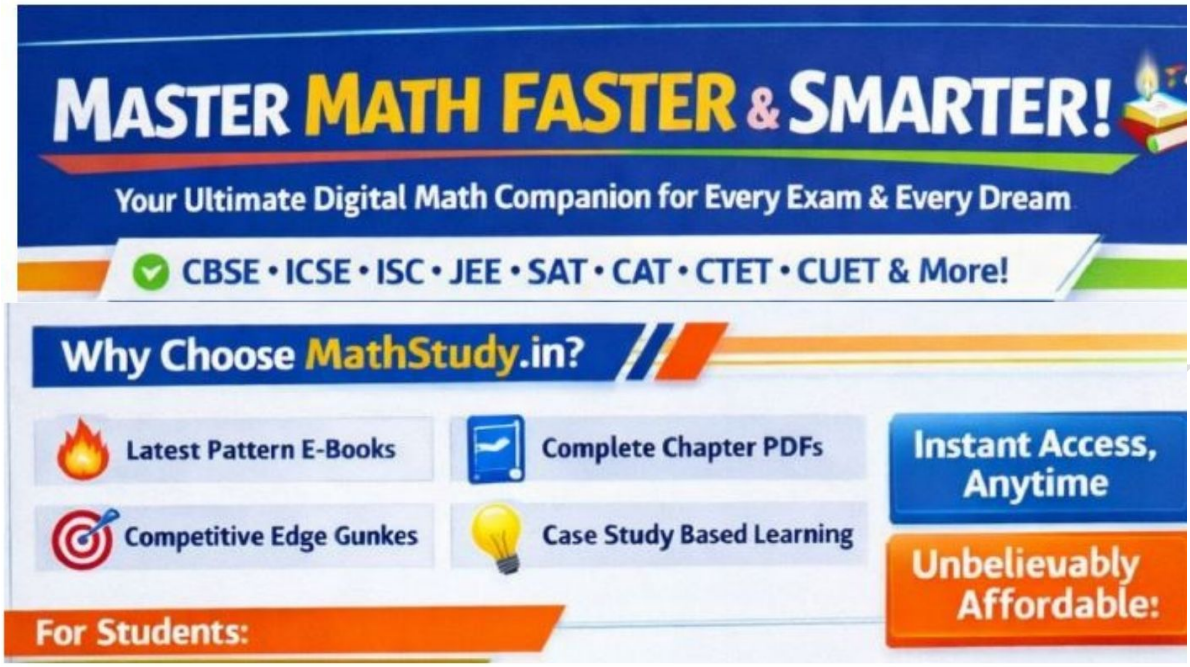
SOLUTIONS

www.udgamwelfarefoundation.com

For Best Mathematics E-Books, Visit:
www.mathstudy.in



Special Features

- **Board-Specific** – CBSE, ICSE, ISC, State Boards
- **Exam-Focused** – JEE, SAT, CAT, CTET, CUET, NTSE
- **Grade-Wise** – Class 6 to 12
- **Bilingual Options** – English & Hindi Medium Support
- **Printable & Shareable** – Use offline, anytime

How to Order:

Visit : https://www.mathstudy.in
Browse by Exam, Class, or Topic
Add to Cart & Checkout

Contact & Support:

Email: admin@mathstudy.in
WhatsApp Support Available : +91-+91 92118 65759

Why Wait? Empower your learning journey, save time, and achieve your dreams!

Explore & Start Learning Today:
https://www.mathstudy.in – Premium eBooks for success
https://www.udgamwelfarefoundation.com – Free PDFs, practice tests, & guida

MathStudy.in — Empowering Learners, Enabling Educators, Encouraging Excellence.
Digital Learning | Affordable Excellence | Trusted by Thousands

CHAPTER TEST: HERON'S FORMULA (HOTS)

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

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

Section A: Multiple Choice Questions

1. **(b) 1344 cm^2**
   $s = \frac{56+60+52}{2} = 84$. Area $= \sqrt{84(84-56)(84-60)(84-52)} = \sqrt{84 \times 28 \times 24 \times 32} = 1344$ cm^2.

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

3. **(c) 300%**
   Original Area $A_1 = \frac{\sqrt{3}}{4}a^2$. New side $= 2a$. New Area $A_2 = \frac{\sqrt{3}}{4}(2a)^2 = 4A_1$.
   Increase $= 4A_1 - A_1 = 3A_1$. Percentage $= \frac{3A_1}{A_1} \times 100 = 300\%$.

4. **(a) 24 cm^2**
   Height $= \sqrt{10^2 - 8^2} = 6$. Area $= \frac{1}{2} \times 8 \times 6 = 24$ cm^2.

5. **(a) Rs 420**
   $s = 21$. Area $= \sqrt{21(8)(7)(6)} = 84$ cm^2. Cost $= 84 \times 5 = 420$.

6. **(a) $\sqrt{32}$ cm**
   $\frac{1}{2}x^2 = 8 \implies x^2 = 16$. Hypotenuse $= \sqrt{x^2 + x^2} = \sqrt{32}$ cm.

7. **(c) $100\sqrt{3}$ m^2**
   $a = 60/3 = 20$. Area $= \frac{\sqrt{3}}{4}(20)^2 = 100\sqrt{3}$ m^2.

8. **(a) $\frac{b}{4}\sqrt{4a^2 - b^2}$** (Standard formula derived from Heron's).

Section B: Short Answer Questions

1. $6x + 7x + 8x = 420 \implies 21x = 420 \implies x = 20$. Sides: $120, 140, 160$.
   $s = 210$. Area $= \sqrt{210(90)(70)(50)} = 2100\sqrt{15}$ m^2.

2. Third side $= 42 - (18 + 10) = 14$. $s = 21$.
   Area $= \sqrt{21(3)(11)(7)} = 21\sqrt{11}$ cm^2.

3. $192 = \frac{1}{2} \times 24 \times h \implies h = 16$ cm.
   Equal sides $= \sqrt{16^2 + 12^2} = 20$. Perimeter $= 20 + 20 + 24 = 64$ cm.

4. Altitude $h = \frac{\sqrt{3}}{2}a = 6 \implies a = \frac{12}{\sqrt{3}} = 4\sqrt{3}$.
   Area $= \frac{\sqrt{3}}{4}(4\sqrt{3})^2 = 12\sqrt{3}$ cm^2.

Section C: Short Answer Questions

1. Diagonal divides rhombus into two $\triangle$ with sides $30, 30, 48$.
   $s = 54$. Area of one $\triangle = \sqrt{54(24)(24)(6)} = 432$ m^2.
   Total area $= 864$ m^2. Area per cow $= 864/18 = 48$ m^2.

2. $\triangle ABC$ is right-angled $(6, 8, 10$ triplet). $\text{Area}_1 = \frac{1}{2} \times 6 \times 8 = 24$ cm^2.
   $\triangle ADC$ has sides $10, 12, 14$. $s = 18$.
   $\text{Area}_2 = \sqrt{18(8)(6)(4)} = 24\sqrt{6}$ cm^2. Total $= 24 + 24\sqrt{6}$ cm^2.

3. One tile $(9, 28, 35)$: $s = 36$. Area $= \sqrt{36(27)(8)(1)} = 36\sqrt{6}$ cm^2.
   Total Area $= 16 \times 36\sqrt{6} \approx 1411$ cm^2. Cost $= 1411 \times 0.50 =$ Rs 705.50.

Section D: Long Answer / HOTS Questions

1. Draw a line parallel to 13m side from the 10m vertex. This forms a $\triangle$ with sides $13, 14, (25 - 10) = 15$.
   $s = 21$, Area of $\triangle = 84$ m^2. Height of $\triangle = (2 \times 84)/15 = 11.2$ m.
   Area of trapezium $= \frac{1}{2}(25 + 10) \times 11.2 = 196$ m^2.

2. For $\triangle$ $(26, 28, 30)$: $s = 42$, Area $= \sqrt{42(16)(14)(12)} = 336$ cm^2.
   Area of parallelogram $=$ base $\times\, h \implies 336 = 28 \times h \implies h = 12$ cm.
   Altitude of $\triangle = (2 \times 336)/28 = 24$ cm. Ratio $= 24 : 12 = 2 : 1$.

3. $a + b + 50 = 120 \implies a + b = 70$. Also $a^2 + b^2 = 50^2 = 2500$.
   Solving $(a + b)^2 - 2ab = 2500 \implies 4900 - 2ab = 2500 \implies ab = 1200$.
   Area $= \frac{1}{2}ab = 600$ m^2. Using Heron's with $s = 60, a = 30, b = 40, c = 50$ also gives 600 m^2.