

INTEGRATED

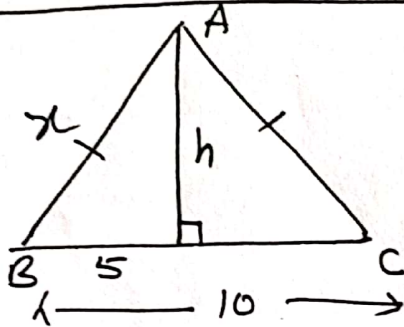
①

Class: IX, MATHEMATICS

4. HERON'S FORMULA

TEACHING TASK (JEE MAINS)

Q1.



$$\text{Area} = 24$$

$$\frac{1}{2} \times 10 \times h = 24$$

$$\Rightarrow h = \frac{48}{5}$$

From diagram

$$x^2 = h^2 + 5^2$$

$$= \left(\frac{24}{5}\right)^2 + 25$$

$$= 23.04 + 25 = 48.04$$

$$\therefore x = \sqrt{48.04} \sim 6.93 \text{ cm}$$

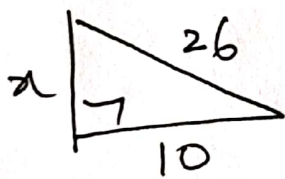
Ans: D

Q2

$$\text{Height} = \frac{\sqrt{3}}{2} a = \frac{\sqrt{3}}{2} \times 10 = 5\sqrt{3} \text{ cm}$$

Ans: B

Q3



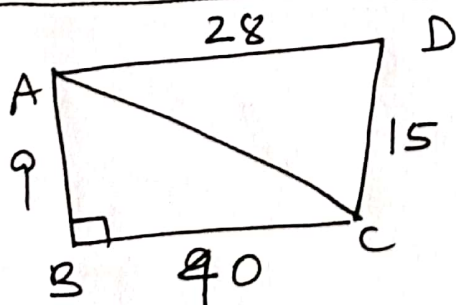
$$x^2 + 10^2 = (26)^2$$

$$x^2 = 576 \Rightarrow x = 24$$

$$\therefore \text{Area} = \frac{1}{2} \times 10 \times 24 = 120 \text{ cm}^2$$

Ans: B

Q4



$$AC^2 = 9^2 + 40^2$$

$$\therefore AC = 41 \text{ cm}$$

$$\text{Area of } \triangle ABC = \frac{1}{2} \times 40 \times 9 = 180$$

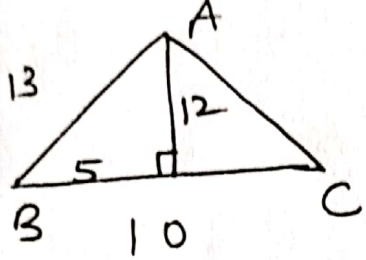
$$S = \frac{AD + DC + AC}{2} = \frac{28 + 15 + 41}{2} = 42$$

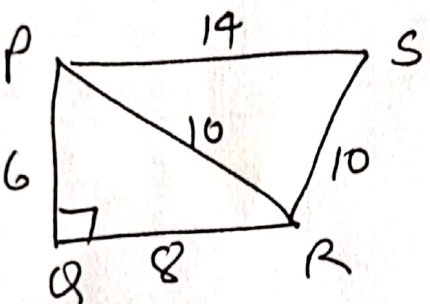
$$\text{Area of } \triangle ACD = \sqrt{42 \times 14 \times 27 \times 1} = 126$$

$$\therefore \text{Area of } \square ABCD = 180 + 126 = 306 \text{ cm}^2$$

Ans: D

05 perimeter = $3a = 30 \Rightarrow a = 10$ (2)
 Area = $\frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} \times 100 = 25\sqrt{3}$ Ans: A

06  Area = $\frac{1}{2} \times 10 \times 12 = 60 \text{ cm}^2$
 Ans: A

07 
 Area of $\triangle PQR = \frac{1}{2} \times 8 \times 6 = 24 \text{ cm}^2$
 Area of $\triangle PRS = \frac{10+10+14}{2} = \frac{34}{2} = 17$
 Area of $\triangle PRS = \sqrt{17 \times 7 \times 7 \times 3} = 49.99$
 $\therefore$ Area DPQRS = $24 + 49.99 = 73.99$ (Ans: C)

08 Third side = $32 - (8 + 11) = 32 - 19 = 13$
 $\therefore a = 8, b = 11, c = 13$
 Area = $8\sqrt{30}$ Ans: A

09. We have $3x + 5x + 7x = 300$
 $\Rightarrow x = 20$
 $\therefore$ sides are 60, 100, 140.
 Area = $1500\sqrt{3}$ Ans: B

10. Given 9, 10, 17
 Area = 36 Ans: C

11. $\triangle ABC \rightarrow 8, 10, 12 \rightarrow \text{Area} = 39.69$
 $\triangle ACD \rightarrow 8, 15, 17 \rightarrow \text{Area} = 60$

Ans: C, D

12 $s = 15, b = 13, c = 14.$

$$s = \frac{15+13+14}{2} = \frac{42}{2} = 21$$

Area = 84

Ans:

$$\text{Area} = 84 = \frac{1}{2} \times 14 \times h$$

$$\Rightarrow h = 12$$

Ans: A, B, D

13 Statement I: We have $12^2 < 8^2 + 10^2$

The triangle is ~~Obtuse~~ ^{acute} angled triangle (False)

Statement II: $12^2 > 8^2 + 10^2$ (False)

Ans: B

14 Statement I: $a = 7, b = 6, c = 5$

$$\text{Area} = 6\sqrt{6} \text{ (True)}$$

Statement II: $a = 40, b = 60, c = 80$

$$\text{Area} = 1161.90 \text{ cm}^2 \text{ (True)}$$

Ans: A

15 Assertion: $3a = 24 \Rightarrow a = 8$

$$\text{Area} = \frac{\sqrt{3}}{4} \cdot a^2 = \frac{\sqrt{3}}{4} \times 64 = 16\sqrt{3} \text{ cm}^2 \text{ (False)}$$

Reason: $\text{Area} = 16\sqrt{3} \text{ cm}^2 \text{ (True)}$

Ans: D

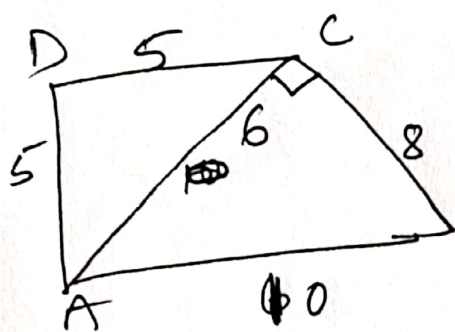
16. Assertion: $a = 9, b = 12, c = 15$

$$\text{Area} = 54 \text{ cm}^2 \text{ (True)}$$

Reason: Conceptual (True)

Ans: A

17.



$$\text{Area of } \triangle ABC = \frac{1}{2} \times 8 \times 6 \quad (4)$$

$$= 24 \text{ cm}^2$$

$$\text{Area of } \triangle ACD = 12$$

$$\therefore \text{Area of } \square ABCD = 24 + 12 = 36 \text{ cm}^2 \quad \text{Ans: A}$$

18

$\triangle ABC$ is right angled triangle

$$\text{Since } 6^2 + 8^2 = 10^2$$

Ans: A

19.

$$S = \frac{9 + 10 + 11}{2} = \frac{30}{2} = 15$$

Ans: B

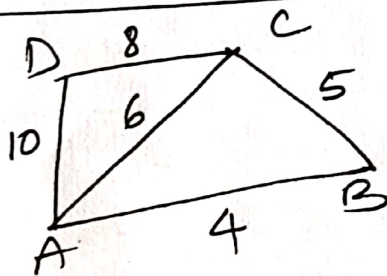
20.

$$a = 9, b = 10, c = 11$$

$$\text{Area} = 42.43$$

Ans: B

21



$$\text{Area of } \triangle ABC = 9.92$$

$$\text{Area of } \triangle ACD = 24$$

$$\text{Total Area} = 33.92$$

Ans: 33

22

$$(5, 5, 6) \text{ and } (6, 7, 8)$$

$$\text{Total area} = 12 + 20.35 = 32.35$$

Ans: 32

23

$$a) \text{Area} = \frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} \times 64 = 16\sqrt{3} \text{ cm}^2 (p)$$

$$b) \text{Sides, } 13, 13, 10 \Rightarrow \text{Area} = 60 (q)$$

$$c) \text{Area} = \frac{1}{2} \times 9 \times 12 = 54 (r)$$

$$d) \text{Sides } 6, 8, 10 \Rightarrow \text{Area} = \frac{1}{2} \times 6 \times 8 = 24 (s)$$

Ans: p, q, r, s

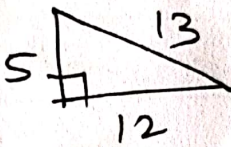
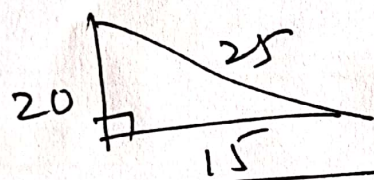
24. a) $(5, 5, 6) \Rightarrow \text{Area} = 12$
 $(6, 7, 8) \Rightarrow \text{Area} = 20.35$
 $\therefore \text{Total Area} = 32.35 (q)$
- b) $(4, 5, 6) \Rightarrow 9.92$
 $(6, 8, 10) \Rightarrow 24$
 $\therefore \text{Total area} = 33.92 (p)$
- c) Total area = $15 + 20 = 35 (r)$
- d) Total area = $2 \times 12 = 24 \text{ cm}^2 (s)$
- Ans: q, p, r, s

LEARNERS TASK (CUE'S)

01.	Conceptual	Ans: A
02.	Conceptual	Ans: A
03.	let the third side be x we have $x > 8-6 \Rightarrow x > 2$ and $x < 8+6 \Rightarrow x < 14$ $\therefore 2 < x < 14$	Ans: A
04	Conceptual	Ans: C
05	Conceptual	Ans: B
06	Conceptual	Ans: B
07	Conceptual	Ans: B
08	Conceptual	Ans: C
09.	Conceptual	Ans: C
10	Conceptual	Ans: B

JEE MAINS (LEVEL)

⑥

01. $S = \frac{8+6+10}{2} = \frac{24}{2} = 12$ Ans: A
02. $S = \frac{9+10+11}{2} = \frac{30}{2} = 15$ Ans: B
03. Sides 13, 14, 15 $\rightarrow$ Area = 84 cm^2 Ans: C
04. Area = $\frac{\sqrt{3}}{4} \cdot a^2 = \frac{\sqrt{3}}{4} \cdot 8^2 = 16\sqrt{3} \text{ cm}^2$ Ans: A
05. Height = $\frac{\sqrt{3}}{2} a$ Ans: B
06.  Area = $\frac{1}{2} \times 12 \times 5 = 30 \text{ cm}^2$ Ans: B
07. Sides, (10, 10, 12) $\rightarrow$ Area = 48 Ans: A
08. Sides (15, 20, 25) $\rightarrow$
 Area = $\frac{1}{2} \times 20 \times 15 = 150 \text{ cm}^2$ Ans: B
09. Sides (6, 8, 10) $\Rightarrow$ Area = $\frac{1}{2} \times 6 \times 8 = 24$
 Sides (6, 8, 10) $\Rightarrow$ Area = $\frac{1}{2} \times 6 \times 8 = 24$.
 $\therefore$ Total Area = 48 cm^2 Ans: B
10. Sides (13, 14, 15) $\Rightarrow$ Area = 84
 Area of Kite = $2 \times 84 = 168$ Ans: C

JEE ADVANCED

11. $a=5, b=5, c=8$ Height = $\frac{2 \times \text{Area}}{\text{Base}} = \frac{2 \times 12}{5} = 4.8$
 $S = \frac{5+5+8}{2} = 9$ It is isosceles triangle
 Area = 12 Ans: A, B, C, D

12. Triangles, $(5, 6, 7)$, Triangle $\Delta_2 (5, 12, 13)$ ⑦

Area of $\Delta_1 = 6\sqrt{6}$, Area of $\Delta_2 = \frac{1}{2} \times 12 \times 5 = 30$

A) Area of Quadrilateral = $30 + 6\sqrt{6}$ (X)

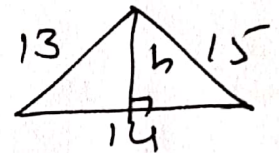
B) $S = \frac{5+6+7}{2} = \frac{18}{2} = 9$ ✓

C) Area of $\Delta_1 = 6\sqrt{6} = 14.697$ ✓

D) Total area = $30 + 14.7 = 44.7$ ✓

Ans: B, C, D

13 Statement I: Sides $(13, 14, 15)$.



Area = 84

$\therefore \text{Height} = \frac{2 \times \text{Area}}{\text{Base}} = \frac{2 \times 84}{14} = 12 \text{ cm (True)}$

Statement II: Mathematically (True) Ans: A

14. Statement I: Area = $\frac{1}{2} \times 5 \times 12 = 30 \text{ cm}^2$ (True)

Statement II: Conceptual (True) Ans: A

15 Assertion: Conceptual (True)

Reason: Conceptual (True) Ans: A

16 Assertion: $28 + 21 = 49 \text{ cm}^2$ (True)

Reason: Conceptual (True) Ans: A

17 $S = \frac{9+10+11}{2} = \frac{30}{2} = 15 \text{ cm}$

Ans: B

18 Sides $(9, 10, 11) \rightarrow \text{Area} = 42.43 \sim 42$ Ans: B

19. clearly, $8^2 + 15^2 = 17^2$ (8)
 $\therefore$ Right angled triangle Ans: C

20. $\text{Area} = \frac{1}{2} \times 8 \times 15 = 4 \times 15 = 60 \text{ cm}^2$ Ans: C

21. Sides (13, 13, 10) $\Rightarrow$ Area = 60 Ans: 60

22. Sides ratio: 3:4:5
 Sides $\rightarrow 3x, 4x, 5x$
 clearly $(3x)^2 + (4x)^2 = (5x)^2$
 $\Rightarrow 9x^2 + 16x^2 = 25x^2$
 $\Rightarrow 25x^2 = 25x^2 \rightarrow$ Right angled triangle

$\therefore$ perimeter $3x + 4x + 5x = 36$

$\Rightarrow 12x = 36$

$\Rightarrow x = 3$

$\therefore$ Sides $3(3), 4(3), 5(3) \rightarrow 9, 12, 15$

Area = $\frac{1}{2} \times 9 \times 12 = 54$ Ans: 54

23. a) $S = \frac{13+14+15}{2} = 21 (P)$ c) $S = \frac{10+10+12}{2} = 16 (Q)$
 b) $S = \frac{8+15+17}{2} = 20 (R)$ d) $S = \frac{6+6+6}{2} = 9 (S)$
Ans: P, R, Q, S

24. a) Sides (10, 10, 12) $\rightarrow$ Area = 48 (P)

b) Area = 54 (Q)

c) Sides (9, 10, 11) $\rightarrow$ Area = 42.43 (S)

d) Sides (5, 12, 13) $\rightarrow$ Area = $\frac{1}{2} \times 5 \times 12 = 30 (R)$ Ans: P, Q, R, S

$\Rightarrow$ THE END $\in$