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CLASS – 9

MATHEMATICS

Chapter – 10

Heron's Formula

Part – 3

Exercise 10.1 (Question 4 - 6)

Vikas Saini

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4. Find the area of a triangle two sides of which are 18cm and 10cm and the perimeter is 42cm.

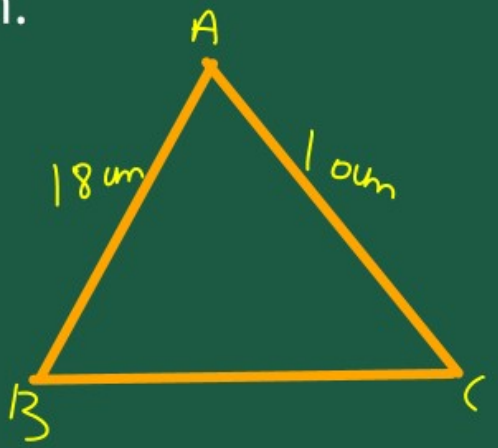
A·T·Q

In $\triangle ABC$,

$AB = 18cm$

$AC = 10cm$

& perimeter of $\triangle ABC = 42cm$.



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Now

Perimeter of $\Delta ABC = AB + BC + AC = 42$

$\Rightarrow 18 + BC + 10 = 42$

$\Rightarrow 28 + BC = 42$

$\Rightarrow BC = 42 - 28$

$\Rightarrow \boxed{BC = 14\text{cm}}$

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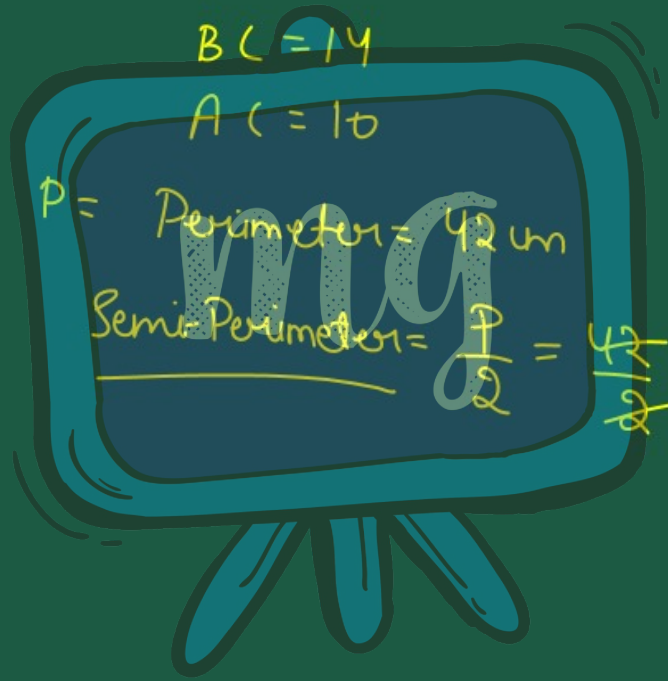

In $\triangle ABC$,

$AB = 18$

$BC = 14$

$AC = 10$

P = Perimeter = 42 cm

Semi-Perimeter $= \frac{P}{2} = \frac{42}{2} = 21$ cm

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In ΔABC

(a) — $AB = 18$ cm

(b) — $BC = 14$ cm

(c) — $AC = 10$ cm

$S = 21$ cm

So,

Area of $\Delta ABC = \sqrt{S \times (S-a) \times (S-b) \times (S-c)}$

$= \sqrt{21 \times (21-18) \times (21-14) \times (21-10)}$

$= \sqrt{21 \times 3 \times 7 \times 11}$

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$$= \sqrt{21 \times 3 \times 7 \times 11}$$

$$= \sqrt{21 \times 21 \times 11}$$

$$= \sqrt{(21)^2 \times 11}$$

$$= \sqrt{(21)^2} \times \sqrt{11}$$

$$= 21 \times \sqrt{11}$$

Area of $\triangle ABC = 21\sqrt{11}\ (m^2)$

$$(a \times b)^m = a^m \times b^m$$

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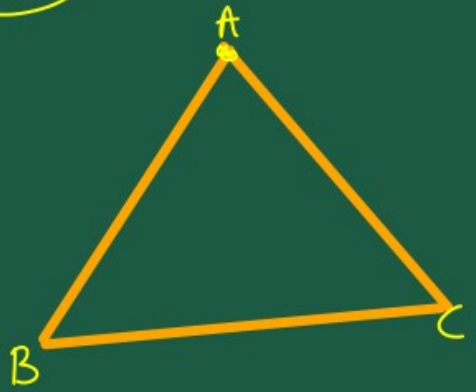
5. Sides of a triangle are in the ratio of 12 : 17 : 25 and its perimeter is 540cm. Find its area.



A-T-Q

In $\triangle ABC$,

$AB : BC : AC = 12 : 17 : 25$

& perimeter of $\triangle ABC = 540$ cm.

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$AB = 12 \times x = 12x = 12 \times x = 12 \times 10 = 120\ cm$

$BC = 17 \times x = 17x = 17 \times 10 = 170\ cm$

$AC = 25 \times x = 25x = 25 \times 10 = 250\ cm$

b. Perimeter of $\triangle ABC = AB + BC + AC = 540\ cm$

$12x + 17x + 25x = 540$

$29x + 25x = 540$

$54x = 540$

$x = \frac{540}{54} = 10\ cm$

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In ΔABC,

(a) $AB = 120$ cm

(b) $BC = 170$ cm

(c) $AC = 250$

Perimeter $= 540$ cm

Semiperimeter $= s = \frac{P}{2} = \frac{540}{2} = 270$ cm

$s = 270$ cm.

Now

Area of $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

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$$= \sqrt{270 \times (270-120) \times (270-170) (270-250)}$$

$$= \sqrt{270 \times 150 \times 100 \times 20}$$

$$= \sqrt{27 \times 10 \times 15 \times 10 \times 10 \times 10 \times 2 \times 10}$$

$$= \sqrt{3 \times 3 \times 3 \times 10 \times 3 \times 5 \times 10 \times 10 \times 10 \times 2 \times 10}$$

$$= \sqrt{3^2 \times 3^2 \times 10^2 \times 10^2 \times 10^2}$$

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$$= \sqrt{3^2 \times 3^2 \times 10^2 \times 10^2 \times 10^2}$$

$$= 3 \times 3 \times 10 \times 10 \times 10$$

$$= 9 \times 1000$$

Area of $\triangle ABC = 9000\ cm^2$

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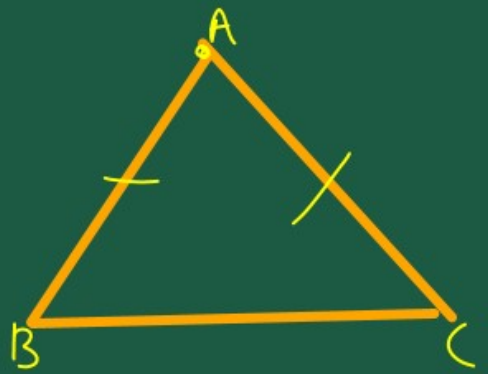
6. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.

A-T-Q

In $\triangle ABC$ is Isosceles $\triangle$

$AB = AC = 12$ cm

& perimeter of $\triangle ABC = 30$ cm.



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Perimeter = AB + BC + AC = 30 cm

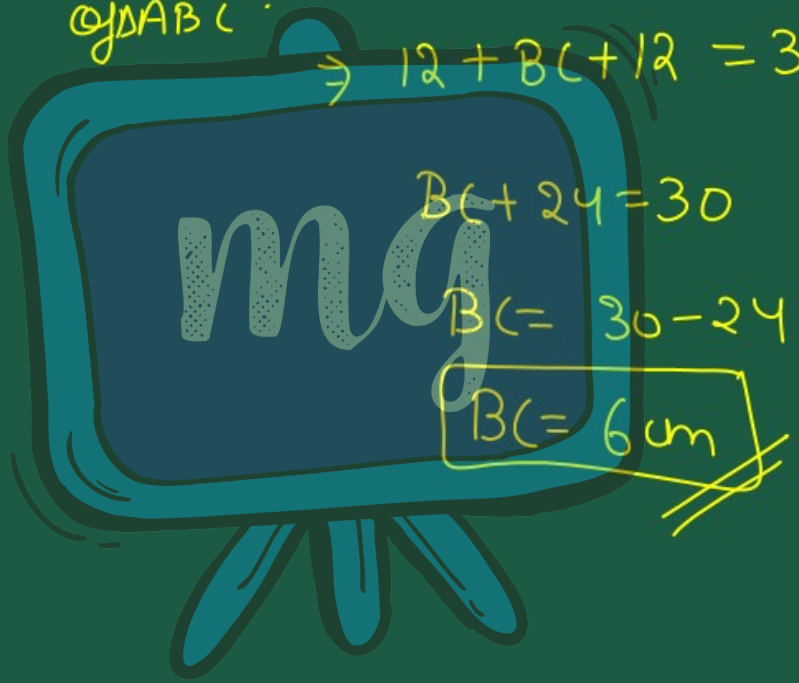
of $\triangle ABC$

$\Rightarrow 12 + BC + 12 = 30$

$BC + 24 = 30$

$BC = 30 - 24$

$\boxed{BC = 6 \text{ cm}}$



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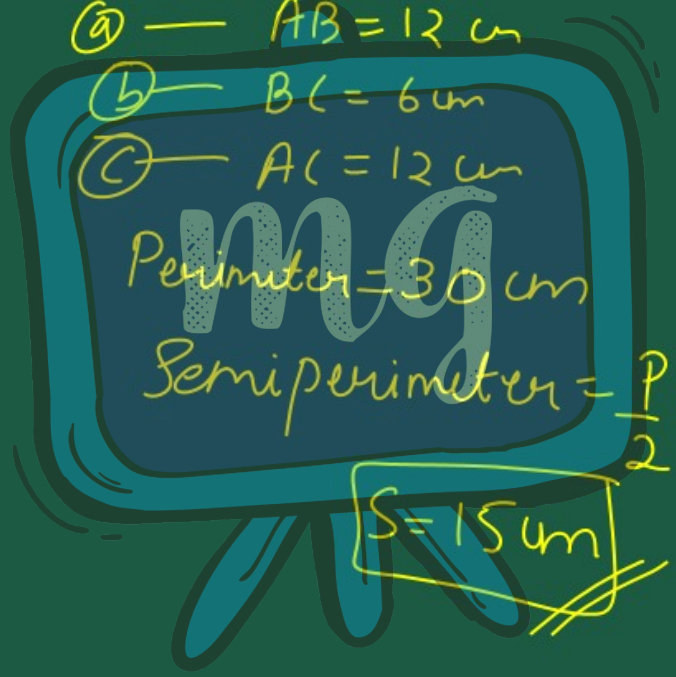

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Area of $\triangle ABC = \sqrt{s \times (s-a)(s-b)(s-c)}$

$= \sqrt{15 \times (15-12) \times (15-6) \times (15-12)}$

$= \sqrt{15 \times 3 \times 9 \times 3}$

$= \sqrt{15 \times 9 \times 9}$

$= \sqrt{15 \times 9^2} = \sqrt{15} \times \sqrt{9^2}$

$= \sqrt{15} \times 9$

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