Exercise 20D

$$= 1344 \text{ cm}^2$$

(iii) Let $a = 91$ m, $b = 98$ m and $c = 105$ m

$$s = \left(\frac{a+b+c}{2}\right) = \left(\frac{91+98+105}{2}\right) = \left(\frac{294}{2}\right) \text{ m} = 147 \text{ m}$$

∴ Area of the triangle $= \sqrt{s(s-a)(s-b)(s-c)}$ sq. units

$$= \sqrt{147(147-91)(147-98)(147-105)} \text{m}^2$$
$$= \sqrt{147 \times 56 \times 49 \times 42} \text{ m}^2$$
$$= \sqrt{3 \times 49 \times 8 \times 7 \times 49 \times 6 \times 7} \text{ m}^2$$
$$= \sqrt{3 \times 7 \times 7 \times 2 \times 2 \times 2 \times 7 \times 7 \times 7 \times 2 \times 3 \times 7} \text{ m}^2$$
$$= (2 \times 2 \times 3 \times 7 \times 7 \times 7) \text{ m}^2$$
$$= 4116 \text{ m}^2$$

Q14

Answer :

Let $a = 33$ cm, $b = 44$ cm and $c = 55$ cm

Then, $s = \frac{a+b+c}{2} = \left(\frac{33+44+55}{2}\right)$ cm $= \left(\frac{132}{2}\right)$ cm $= 66$ cm

∴ Area of the triangle $= \sqrt{s(s-a)(s-b)(s-c)}$ sq. units

$$= \sqrt{66(66-33)(66-44)(66-55)} \text{ cm}^2$$
$$= \sqrt{66 \times 33 \times 22 \times 11} \text{ cm}^2$$
$$= \sqrt{6 \times 11 \times 3 \times 11 \times 2 \times 11 \times 11} \text{ cm}^2$$
$$= (6 \times 11 \times 11) \text{ cm}^2 = 726 \text{ cm}^2$$

Let the height on the side measuring 44 cm be h cm.

Then, Area $= \frac{1}{2} \times b \times h$

$\Rightarrow 726 \text{ cm}^2 = \frac{1}{2} \times 44 \times h$

$\Rightarrow h = \left(\frac{2 \times 726}{44}\right)$ cm $= 33$ cm.

∴ Area of the triangle $= 726 \text{ cm}^2$

Height corresponding to the side measuring 44 cm = 33 cm

Q15

Answer :

Let $a = 13x$ cm, $b = 14x$ cm and $c = 15x$ cm

Perimeter of the triangle = $13x + 14x + 15x = 84$ (given)

$\Rightarrow 42x = 84$

$\Rightarrow x = \frac{84}{42} = 2$

$\therefore a = 26$ cm , $b = 28$ cm and $c = 30$ cm

$s = \frac{a+b+c}{2} = \left(\frac{26+28+30}{2}\right)$ cm $= \left(\frac{84}{2}\right)$ cm = 42 cm

$\therefore$ Area of the triangle = $\sqrt{s(s-a)(s-b)(s-c)}$ sq. units

$= \sqrt{42(42-26)(42-28)(42-30)}$ cm^2

$= \sqrt{42 \times 16 \times 14 \times 12}$ cm^2

$= \sqrt{6 \times 7 \times 4 \times 4 \times 2 \times 7 \times 6 \times 2}$ cm^2

$= (2 \times 4 \times 6 \times 7)$ cm^2 = 336 cm^2

Hence, area of the given triangle is 336 cm^2.

Q16

Answer :

Let $a = 42$ cm, $b = 34$ cm and $c = 20$ cm

Then, $s = \frac{a+b+c}{2} = \left(\frac{42+34+20}{2}\right)$ cm $= \left(\frac{96}{2}\right)$ cm = 48 cm

$\therefore$ Area of the triangle = $\sqrt{s(s-a)(s-b)(s-c)}$ sq. units

$= \sqrt{48(48-42)(48-34)(48-20)}$ cm^2

$= \sqrt{48 \times 6 \times 14 \times 28}$ cm^2

$= \sqrt{6 \times 2 \times 2 \times 2 \times 6 \times 14 \times 2 \times 14}$ cm^2

$= (2 \times 2 \times 6 \times 14)$ cm^2 = 336 cm^2

Let the height on the side measuring 42 cm be h cm.

Then, Area $= \frac{1}{2} \times b \times h$

$\Rightarrow 336$ cm$^2 = \frac{1}{2} \times 42 \times h$

$\Rightarrow h = \left(\frac{2 \times 336}{42}\right)$ cm = 16 cm

$\therefore$ Area of the triangle = 336 cm^2

Height corresponding to the side measuring 42 cm = 16 cm

Q17

Answer :

Let each of the equal sides be a cm.

$b = 48$ cm

$a = 30$ cm

Area of the triangle = $\left\{\frac{1}{2} \times b \times \sqrt{a^2 - \frac{b^2}{4}}\right\}$ sq. units

$= \left\{\frac{1}{2} \times 48 \times \sqrt{(30)^2 - \frac{(48)^2}{4}}\right\}$ cm$^2 = \left(24 \times \sqrt{900 - \frac{2304}{4}}\right)$ cm^2

$= \left(24 \times \sqrt{900 - 576}\right)$ cm$^2 = \left(24 \times \sqrt{324}\right)$ cm$^2 = (24 \times 18)$ cm^2 = 432 cm^2

$\therefore$ Area of the triangle = 432 cm^2

Q18

Answer :

Let each of the equal sides be a cm.

$a + a + 12 = 32 \Rightarrow 2a = 20 \Rightarrow a = 10$

$\therefore b = 12$ cm and $a = 10$ cm

Area of the triangle = $\left\{\frac{1}{2} \times b \times \sqrt{a^2 - \frac{b^2}{4}}\right\}$ sq. units

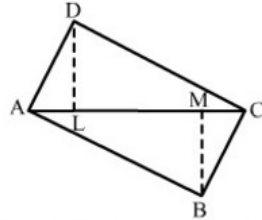$$= \left\{ \tfrac{1}{2} \times 12 \times \sqrt{100 - \tfrac{144}{4}} \right\} \text{cm}^2 = \left(6 - \sqrt{100 - 36}\right) \text{cm}^2$$
$$= \left(6 \times \sqrt{64}\right) \text{cm}^2 = (6 \times 8) \text{cm}^2$$
$$= 48 \text{ cm}^2$$

Q19

Answer :

We have:

$AC = 26$ cm, $DL = 12.8$ cm and $BM = 11.2$ cm

Area of $\triangle ADC = \tfrac{1}{2} \times AC \times DL$

$\qquad = \tfrac{1}{2} \times 26$ cm $\times 12.8$ cm $= 166.4$ cm^2

Area of $\triangle ABC = \tfrac{1}{2} \times AC \times BM$

$\qquad = \tfrac{1}{2} \times 26$ cm $\times 11.2$ cm $= 145.6$ cm^2

∴ Area of the quadrilateral $ABCD$ = Area of $\triangle ADC$ + Area of $\triangle ABC$

$\qquad\qquad = (166.4 + 145.6)$ cm^2

$\qquad\qquad = 312$ cm^2

********** END *********