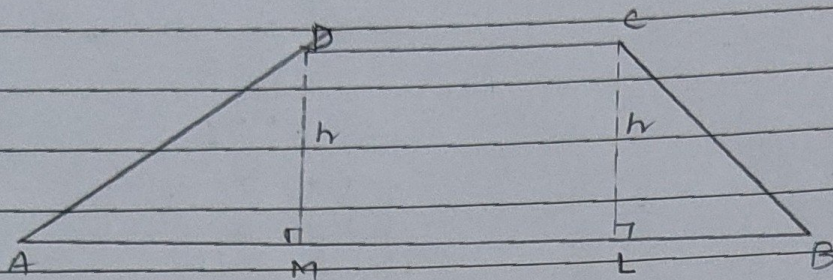# Area of trapezium and a polygon.

Trapezium:- A trapezium is a quadrilateral having one pair of parallel opposite side.

ABCD is a trapezium in which AB || DC.

$$\text{Area of trapezium} = \frac{1}{2} \times \{(AB + DC) \times h\}$$

$$\text{Area of trapezium} = \frac{1}{2} \times (\text{sum of parallel side}) \times \text{distance}$$

Qus:- Find the area of a trapezium whose parallel sides are 24 cm and 20 cm and the distance between them is 15 cm.
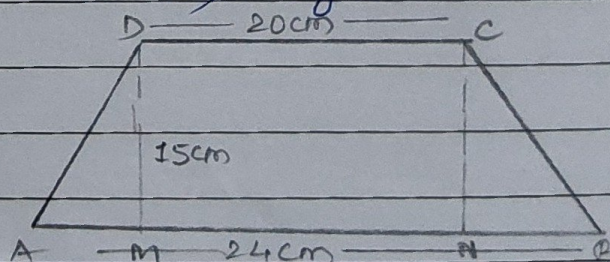
Sol:- Given that

Parallel side are 24 cm and 20 cm

distance = 15 cm.

$$\text{Area} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$$
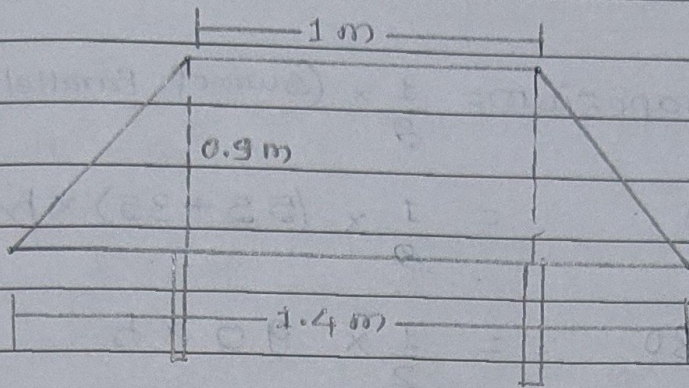

$$= \frac{1}{2} \times (24 + 20) \times 15$$

$$= \frac{1}{2} \times \overset{22}{44} \times 15$$

$$\text{Area} = 330 \ cm^2 \ \text{Ans}$$

Q.2 The shape of the top surface of a table is trapezium. It is parallel sides are 1m and 1.4 m and the perpendicular distance b/w them is 0.9 m. Find its area.

Given that Parallel side 1.4m and 1m.

$$height = 0.9m$$

Area of table $= \dfrac{1}{2} \times$ Sum of Parallel side $\times$ distance

$$= \dfrac{1}{2} \times (1.4 + 1) \times 0.9$$

$$= \dfrac{1}{2} \times 2.4 \times 0.9$$

$$= 1.2 \times 0.9 \qquad\qquad \dfrac{12}{10} \times \dfrac{9}{10} = \dfrac{108}{100}$$

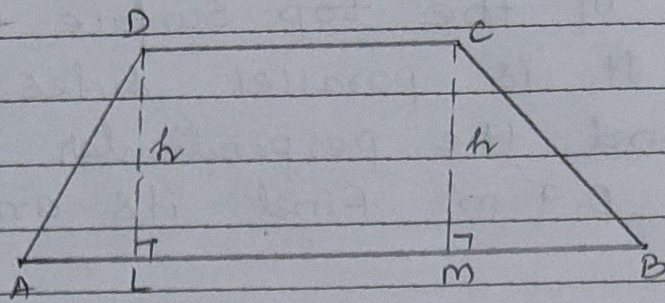Area of table $= 1.08 \ m^2 \qquad\qquad = 1.08 \ m^2$

Qus.3 The area of trapezium is 1080 cm². If the length of its parallel sides be 55 cm & 35 cm. find the distance between them.

Sol:— Given that

Area of trapezium = 1080 cm²

Parallel sides are 55 cm and 35 cm

Area of trapezium = $\frac{1}{2} \times$ (Sum of Parallel Side) $\times$ distance

$\Rightarrow$ 1080 $= \frac{1}{2} \times (55 + 35) \times h$

$\Rightarrow$ 1080 $= \frac{1}{2} \times 90 \times h$

$\Rightarrow$ 1080 $= 45 \times h$

$\Rightarrow$ $h = \dfrac{\cancel{1080}^{\,24}}{\cancel{45}}$

$h = 24$ cm.

Hence, distance between them is 24 cm. Ans

Q.4 The parallel sides of a trapezium are 25 and 13 cm; its non-parallel sides are equal. each being 10 cm. find the area of trapezium.

Sol:- Let ABCD be the given trapezium in which AB||DC, AB = 25 cm, DC = 13 cm
AD = BC = 10 cm.
                    Draw CL ⊥ AB and CM||DA
AM = DC = 13 cm
MB = (AB − AM) = 25 − 13 = 12
CM = DA = 10 cm.

$ML = LB = \dfrac{1}{2} MB = \dfrac{1}{2} \times 12$

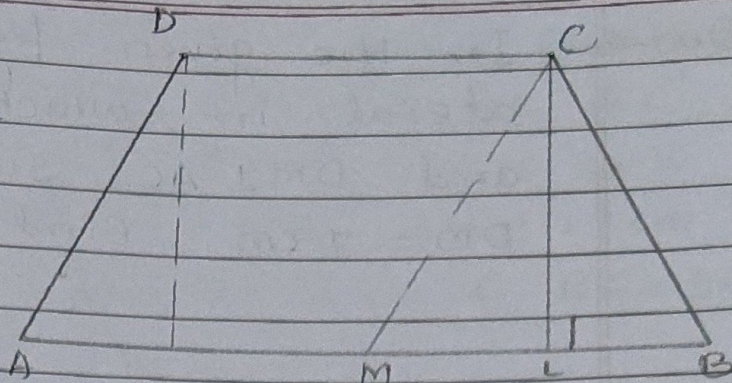$= 6$ cm.

For Right $\triangle CLM$

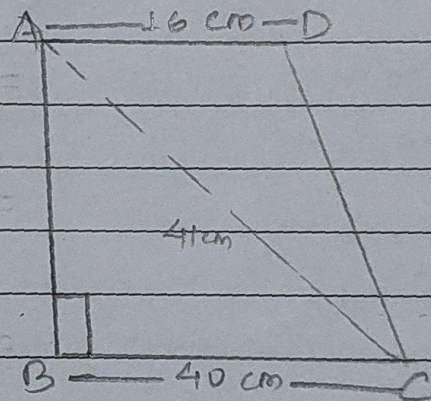$CL^2 = CM^2 - ML^2$

$= 10^2 - 6^2$

$= 100 - 36$

$CL^2 = 64$ cm²

$CL = \sqrt{64}$

$CL = 8$ cm.

height of the trapezium $= 8$ cm. **Ans**

Qus-5 In the given figure, ABCD is a trapezium in which $AD \parallel BC$, $\angle ABC = 90°$, $AD = 16$ cm $AC = 41$ cm and $BC = 40$ cm. find the area of trapezium.

Right triangle $\triangle ABC$

$AB^2 = AC^2 - BC^2$

$= 41^2 - 40^2$
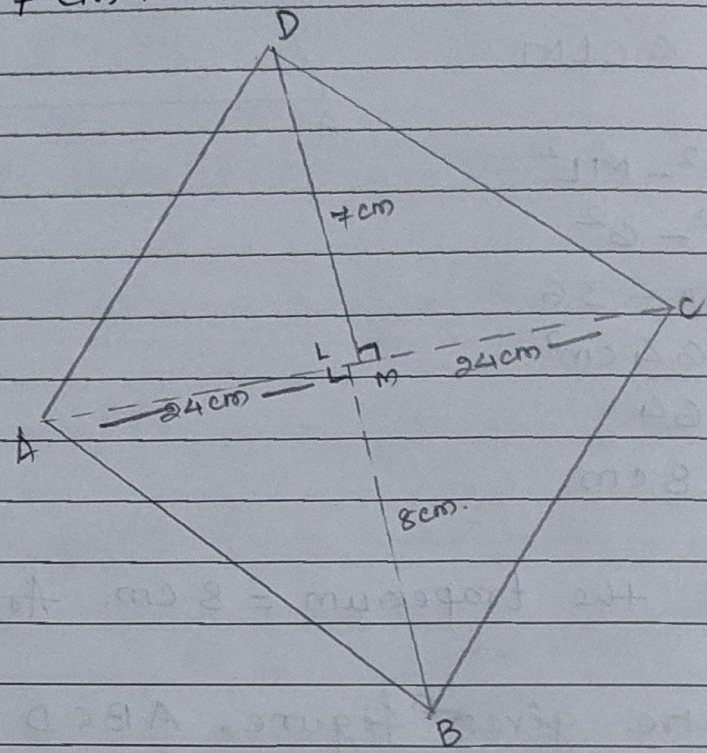
$= (41 + 40)(41 - 40)$

$AB^2 = 81 \times 1$

$AB = 9$ cm.

Area of trapezium $= \dfrac{1}{2} \times (16 + 40) \times 9$

$= \dfrac{1}{2} \times \overset{28}{\cancel{56}} \times 9$

$= 28 \times 9$

Area $= 252$ cm² **Ans**

Qus-6 In the given figure ABCD is a quad
ateral in which $AC = 24$ cm $BL \perp AC$
and $DM \perp AC$ such that $BL = 8$ cm and
$DM = 7$ cm. Find the area of quad. ABC

D

7cm

24cm — 24cm

8cm.

B

Sol:- Area of ABCD = Area of $\triangle ADC + \frac{1}{2} \triangle ABC$

$$= \frac{1}{2} \times Base \times height + \frac{1}{2} \times Base \times height$$

$$= \frac{1}{2} \times AC \times DM + \frac{1}{2} \times AC \times BL$$

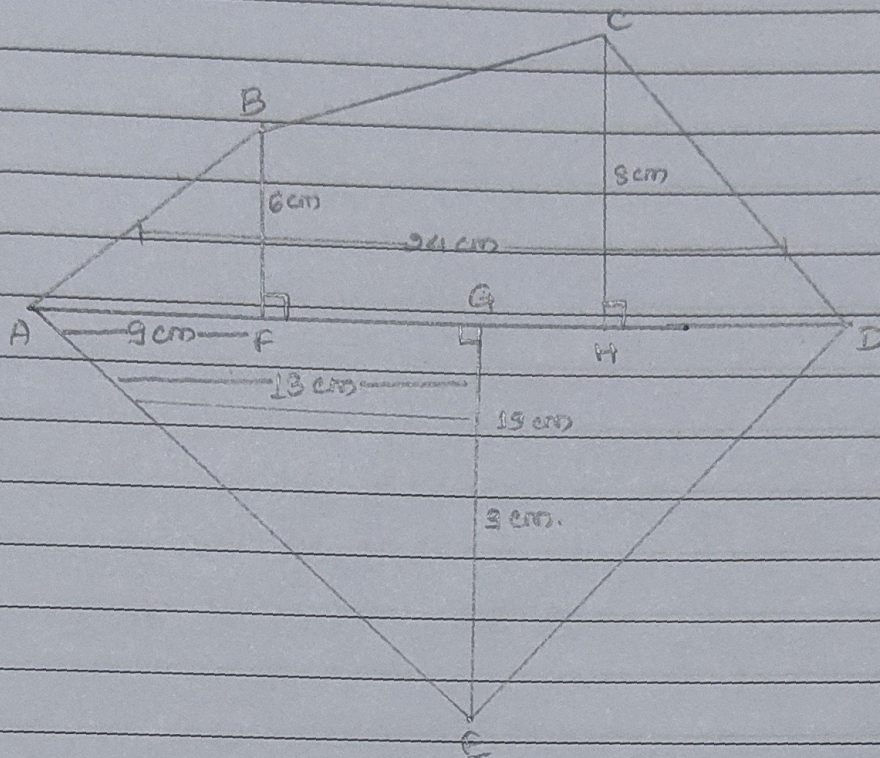$$= \frac{1}{2} \times 24 \times 7 + \frac{1}{2} \times 24 \times 8$$

$$= (12 \times 7 + 12 \times 8)\ cm^2$$

$$= 84 + 96$$

$$= 180\ cm^2$$

Thus, Area of quad. $ABCD = 180\ cm^2$ Ans

Qws:-7   Find the area of the given Pentagon ABCDE in which each one of BF, CH and EG is Perpendicular to AD Such that AF = 9 cm, AG = 13 cm, AH = 19 cm AD = 24 cm , BF = 6 cm . CH = 8 cm & EG = 9 cm.

Sol:-   Area of Pentagon = Area of $\triangle$ ABF + Area of trap. BCHF
                       + Area of CHD + Area of ADE

$$= \frac{1}{2} \times AF \times BF + \frac{1}{2} \times (BF+CH) \times FH + \frac{1}{2} \times HD \times CH$$

$$+ \frac{1}{2} \times AD \times EG$$

$$= \frac{1}{2} \times 9 \times 6 + \frac{1}{2} \times (6+8) \times (19-9) + \frac{1}{2} \times (24-19) \times 8 + \frac{1}{2} \times 24 \times 9$$

$$= (27 + 70 + 20 + 108) \, cm^2$$

Area of Pentagon = 225 cm² Ans