

Q.1 Find the area, in square metres, of the trapezium whose bases and altitudes are under:

- (i) bases = 12 dm and 20 dm, altitude = 10 dm.
(ii) bases = 28 cm and 3 dm, altitude = 25 cm.
(iii) bases = 8 m, and 60 dm, altitude = 40 dm.
(iv) bases = 150 cm and 30 dm, altitude = 9 dm.

Solution:

(i) - bases = 12 dm, 20 dm, altitude = 10 dm

$$A = \frac{1}{2} \times (\text{sum of bases}) \times \text{height}$$

$$= \frac{1}{2} \times (12 + 20) \times 10$$

$$= 32 \times 5 = 160 \text{ dm}^2 = 1.6 \text{ m}^2$$

(ii) length of bases of trapezium = 28 cm and 3 dm
length of altitude = 25 cm = 0.25 m

$$\therefore 10 \text{ dm} = 1 \text{ m}$$

length of bases = 0.28 m and 0.3 m.

$$\text{Area} = \frac{1}{2} \times (\text{sum of lengths of Parallel sides}) \times \text{altitude}$$

$$= \frac{1}{2} \times (0.28 + 0.3) \times 0.25 = 0.0725 \text{ m}^2$$

(iii) Given, length of bases = 8 m. and 60 dm
= 8 m and 6 m

length of altitude = 40 dm = 4 m.

$$\therefore \text{Area} = \frac{1}{2} (8+6) \times 4 = 28 \text{ m}^2$$

(iv) Given bases = 150 cm and 30 dm
= 1.5 m and 3 m

altitude = 9 dm = 0.9 m.

$$\begin{aligned} \text{Area of Trap} &= \frac{1}{2} \times (1.5+3) \times 0.9 = \frac{1}{2} \times 4.5 \times 0.9 \\ &= 2.025 \text{ m}^2 \end{aligned}$$

Q.2 Find the area of trapezium with base 15 cm and height 8 cm. If the side parallel to the given base is 9 cm long.

Sol: length of bases = 15 cm and 9 cm.
height = 8 cm

$$\therefore \text{Area of Trapezium} = \frac{1}{2} \times (\text{Sum of Parallel bases}) \times \text{height}$$

$$\begin{aligned} &= \frac{1}{2} \times (15+9) \times 8 \\ &= 24 \times 4 = 96 \text{ cm}^2 \end{aligned}$$

Q.3 Find the area of trapezium whose parallel sides are of length 16 dm and 22 dm and whose height is 12 dm.

Sol:

Given, length of bases = 16 dm and 22 dm
= 1.6 m and 2.2 m.

length of altitude = 12 dm
= 1.2 m.

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

$$= \frac{1}{2} \times (1.6 + 2.2) \times 1.2$$

$$= \frac{1}{2} \times 3.8 \times 1.2 = 2.28 \text{ m}^2$$

Q.4 Find the height of trapezium, the sum of lengths of whose bases (parallel sides) is 60 cm and whose area is 600 cm².

Sol:

Sum of lengths of bases = 60 cm

Area = 600 cm²

$$\Rightarrow \frac{1}{2} \times (\text{sum of bases}) \times h = 600$$

$$= \frac{1}{2} \times 60 \times h = 600$$

$$\Rightarrow 30h = 600$$

$$h = \frac{600}{30}$$

$$\Rightarrow h = 20 \text{ cm.}$$

Q.5 Find the altitude of a trapezium whose area is 65 cm² and whose base are 13 cm and 26 cm.

Sol: Bases are 13 cm and 26 cm.

$$\text{Area} = 65 \text{ cm}^2$$

$$\Rightarrow \frac{1}{2} \times (13 + 26) \times h = 65$$

$$\Rightarrow 39 \times h = 65 \times 2$$

$$h = \frac{65 \times 2}{39}$$

$$\Rightarrow h = \frac{10}{3} \text{ cm.}$$

Q.6 Find the sum of lengths of the bases of a trap. whose area is 4.2 m^2 and whose height is 280 cm.

Sol:

$$\text{Area of trap} = 4.2 \text{ m}^2$$

$$\text{height} = 280 \text{ cm} = 2.8 \text{ m.}$$

$$\therefore \text{Area} = \frac{1}{2} \times (\text{sum of || sides}) \times h.$$

$$\Rightarrow 4.2 = \frac{1}{2} \times (\text{sum of parallel sides}) \times 2.8$$

$$\Rightarrow \frac{8.4}{2.8} = \text{length of bases}$$

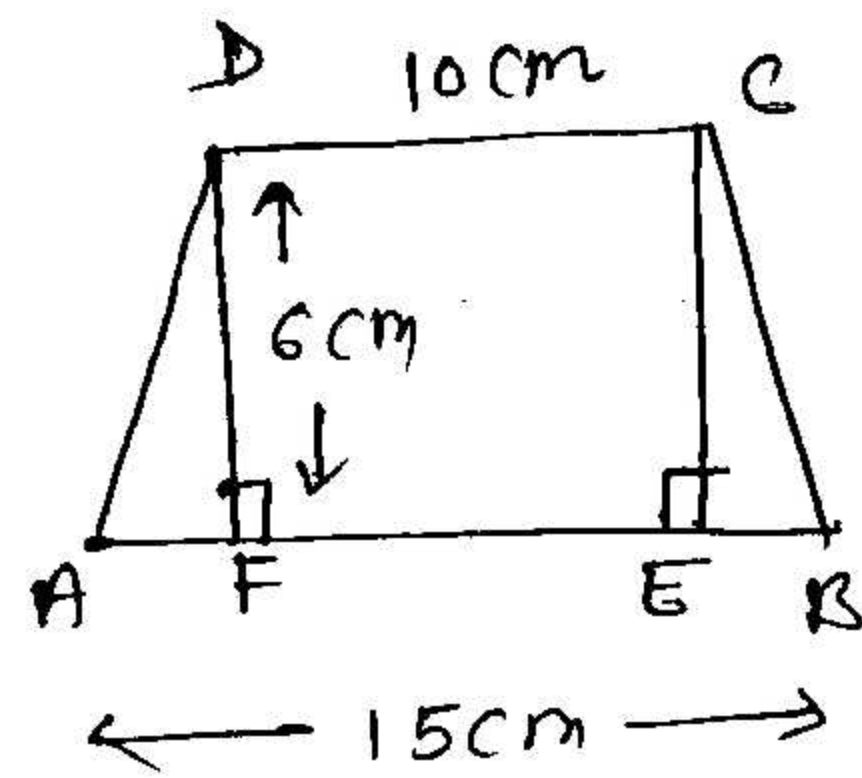
$$\Rightarrow \text{sum of lengths of bases} = 3 \text{ m}$$

Q.7 Find the area of a trapezium whose parallel sides of lengths 10 cm and 15 cm are at a distance of 6 cm from each other. Calculate this area.

(i) The sum of the areas of two triangles and one rectangle.

(ii) The difference of the area of rectangle and sum of the areas of two triangles.

Sol:



Area of Trapez ABCD

$$\begin{aligned} &= \text{Ar}(\triangle DFA) + \text{ar}(DFEC) + \text{ar}(CEB) \\ &= \frac{1}{2} \times AF \times h + (FE \times h) + \frac{1}{2} \times BE \times h \\ &= \frac{1}{2} h (AF + 2FE + BE) \\ &= \frac{1}{2} h (AF + FE + FE + BE) \\ &= \frac{1}{2} h (AF + FE + BE + FE) \\ &= \frac{1}{2} h (AB + CD) \quad (\because FE = CD) \\ &= \frac{1}{2} \times 6 \times (10 + 15) \\ &= 75 \text{ cm}^2 \end{aligned}$$

Q.8

The area of trapezium is 960 cm^2 . If the parallel sides are 34 cm and 46 cm . Find the distance between them.

Sol:

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

$$\Rightarrow 960 = \frac{1}{2} \times (34 + 46) \times h$$

$$= 960 = \frac{1}{2} \times 80 \times h$$

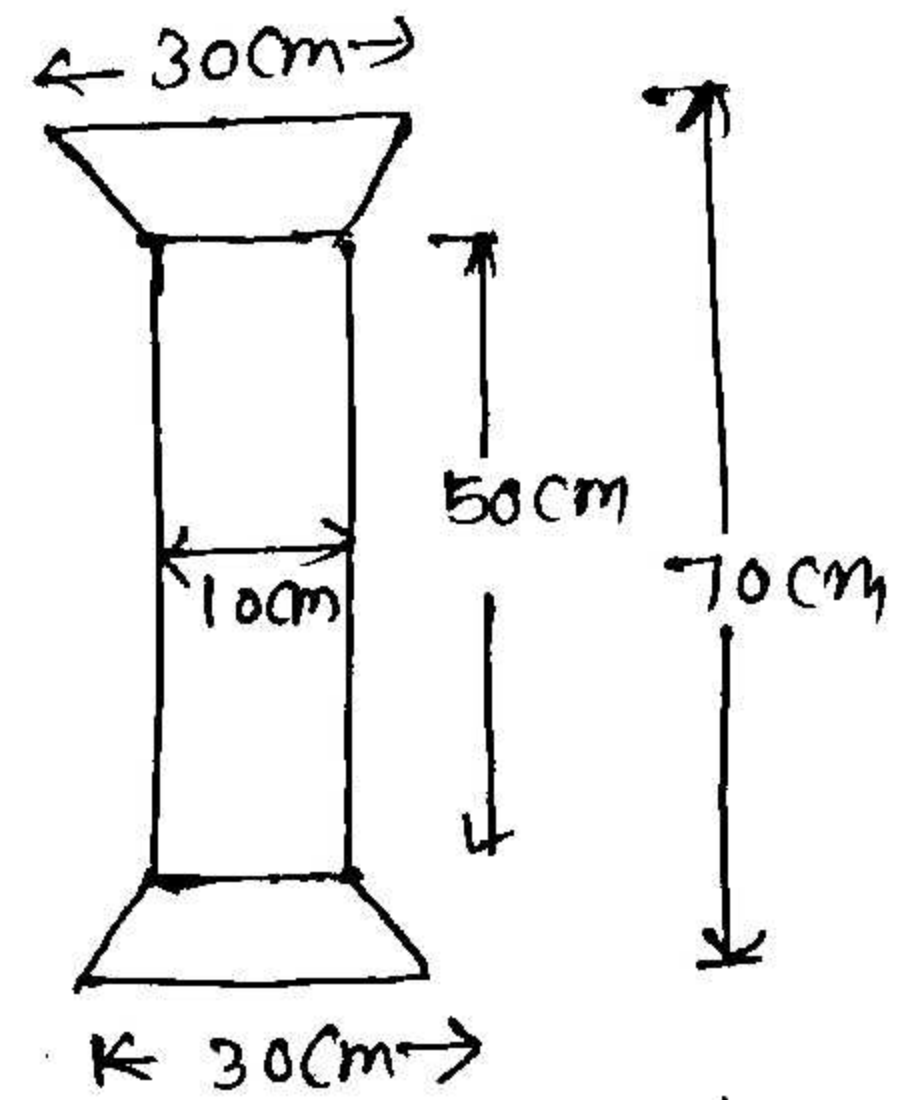
$$\Rightarrow h = \frac{960}{40} = 24 \text{ cm.}$$

Q.9 Find the area of fig, as the sum of the areas of two trapezium and a rectangle.

Sol:

Area of figure

= Area of two trapezium
+ Area of rectangle



here length of parallel sides = 30cm
and 10cm

$$\text{height} = \frac{(70-50)}{2} = \frac{20}{2} = 10 \text{ cm}$$

length of rectangle = 50cm
breadth = 10cm

$$\begin{aligned} \therefore \text{Area} &= 2 \left[\frac{1}{2} \times (30+10) \times 10 \right] + (50 \times 10) \\ &= 40 \times 10 + 50 \times 10 \\ &= 400 + 500 = 900 \text{ cm}^2 \end{aligned}$$

Q.10 Top surface of a table is trapezium in shape. Find its area if its parallel sides are 1m and 1.2m. and perpendicular distance between them is 0.8m.

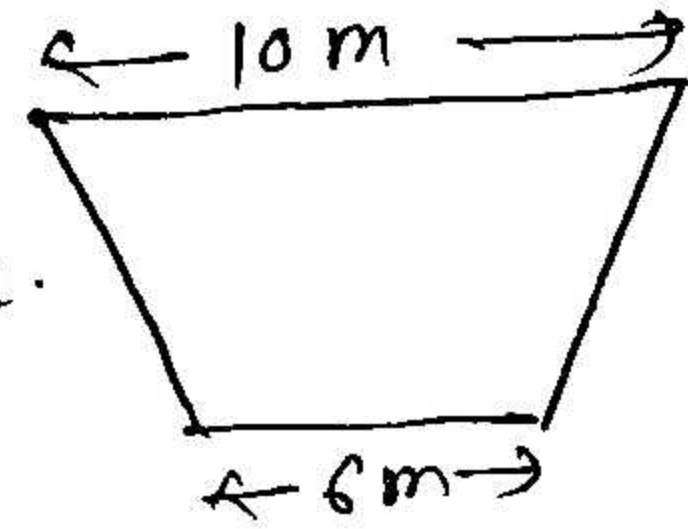
Sol: $\therefore$ length of parallel sides = 1m and 1.2m
Distance = 0.8m

$$\begin{aligned} A &= \frac{1}{2} \times (1+1.2) \times 0.8 = \frac{1}{2} \times 2.2 \times 0.8 \\ &= 0.88 \text{ m}^2 \end{aligned}$$

Q.11 The cross section of a canal is trapezium in shape. If the canal is 10 m wide at the top and 6 m wide at the bottom and the area of cross section is 72 m^2 . determine its depth. (19)

Sol:

Length of parallel sides = 10 m and 6 m.
Area = 72 m^2



$$\therefore \text{Area} = \frac{1}{2} \times (\text{Sum of parallel sides}) \times h$$

$$\Rightarrow 72 = \frac{1}{2} \times (10 + 6) \times h$$

$$\Rightarrow h = \frac{144}{16}$$

$$\Rightarrow h = 9 \text{ m.}$$

$\therefore$ depth of canal = 9 m.

Q.12 The area of a trapezium is 91 cm^2 and its height is 7 cm. If one of the parallel sides is longer than the other by 8 cm. Find the two parallel sides.

Sol: Let one parallel side = $x \text{ cm}$
other = $(x + 8) \text{ cm}$.
height = 7 cm.

$$\text{Area} = \frac{1}{2} \times (\text{Sum of ||-sides}) \times h$$

$$\Rightarrow 91 = \frac{1}{2} \times (x + x + 8) \times 7$$

$$\Rightarrow \frac{91 \times 2}{7} = 2x + 8$$

$$\Rightarrow 26 = 2x + 8$$

$$\Rightarrow 18 = 2x$$

$$\Rightarrow x = 9$$

$\therefore$ length of parallel sides = 9m

$$x + 8 = 9 + 8 = 17m.$$

Q.13 The area of a trapezium is 384 cm^2 . Its parallel sides are in the ratio 3:5 and the perpendicular distance between them is 12cm. Find the length of each one of parallel sides.

Sol: let parallel sides are $3x$ and $5x$

$$h = 12 \text{ cm}$$

$$A = 384 \text{ cm}^2$$

$$\therefore A = \frac{1}{2} \times (3x + 5x) \times 12$$

$$\Rightarrow 384 = \frac{1}{2} \times 8x \times 12$$

$$\Rightarrow \dots \dots \dots = x = \frac{384}{48}$$

$$x = 8$$

$$\therefore \text{Parallel sides} = 3x = 3 \times 8 = 24 \text{ cm}$$

$$5x = 5 \times 8 = 40 \text{ cm}$$

Q.14 Mohan wants to buy a trapezium shaped field. Its side along the river is parallel and twice the side along the road. If the area of the field is 10500 cm^2 and perpendicular distance between the

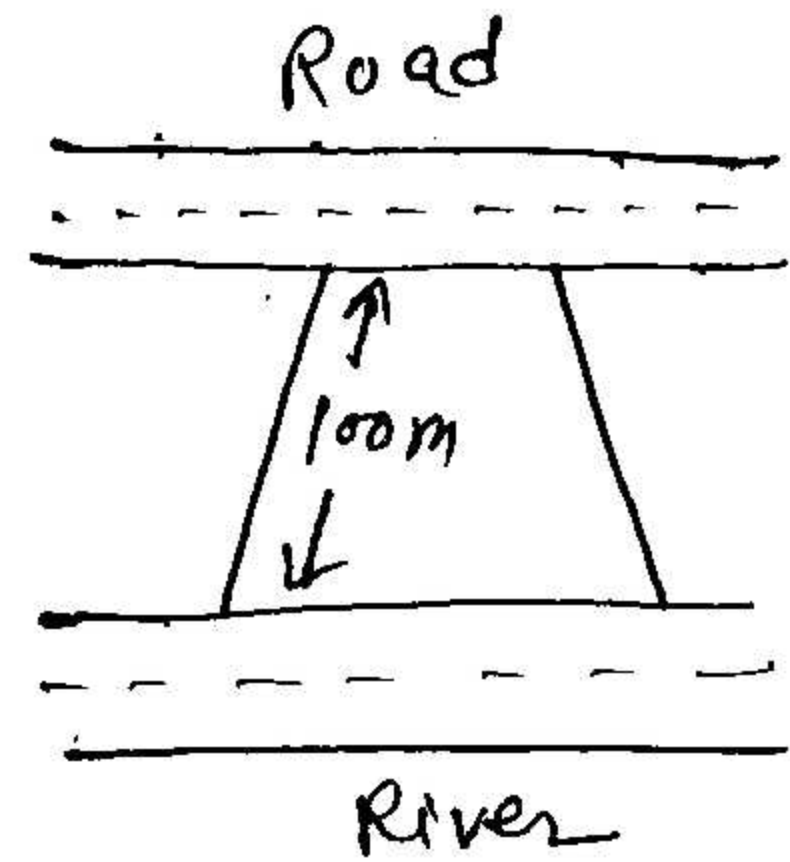
parallel sides is 100m. Find the length of the side along the river. (2)

Sol: let side along the road = x m

$\therefore$ side along the river = $2x$ m.

Distance = 100 m

Area = 10500 m^2



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

$$= 10500 = \frac{1}{2} \times (x + 2x) \times 100$$

$$\Rightarrow 210 = 3x$$

$$\Rightarrow x = 70 \text{ m.}$$

$$\therefore \text{side along the river} = 2x = 2 \times 70 = 140 \text{ m}$$

Q.15 The area of a trapezium is 1586 cm^2 and the distance between the parallel sides is 26 cm. If one of the parallel sides is 38 cm. Find the other.

Sol: Area of trapezium = 1586 cm^2

Dist. b/w parallel sides = 26 cm.

one parallel side = 38 cm

let other = x cm

$$\Rightarrow 1586 = \frac{1}{2} \times (38 + x) \times 26$$

$$\Rightarrow \frac{1586}{13} = 38 + x \Rightarrow 38 + x = 122$$

$$x = 122 - 38 = 84 \text{ cm.}$$

Q.16 The parallel sides of a trapezium are 25 cm and 13 cm; its non parallel sides are equal, each being 10 cm, find the area of trapezium.

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Sol:

$$\therefore DC = AE = 13 \text{ cm}$$

$$BE = 25 - 13 = 12 \text{ cm}$$

$$\therefore EF = 6 \text{ cm}$$

In $\triangle CFE$

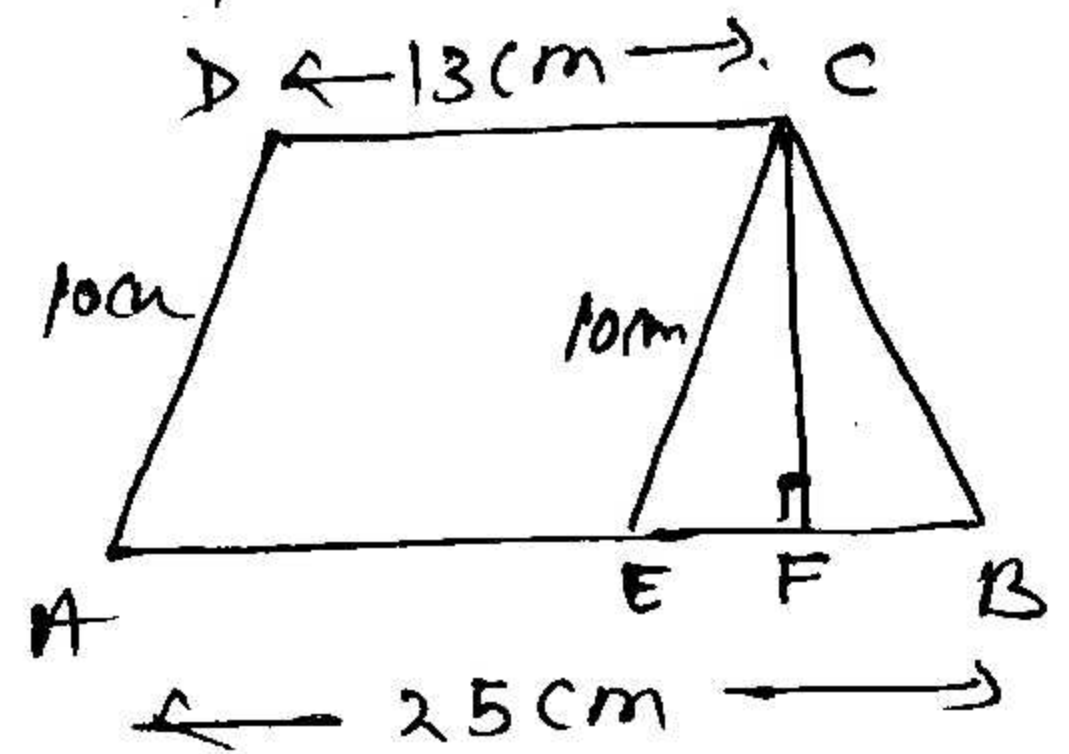
$$CF^2 = CE^2 - EF^2$$

$$= 10^2 - 6^2 = 100 - 36$$

$$= 64$$

$$CF = 8 \text{ cm}$$

$$\therefore \text{Area} = \frac{1}{2} \times (25 + 13) \times 8 = 38 \times 4 = 152 \text{ cm}^2$$



Q.17 Find the area of trapezium whose parallel sides are 25 cm, 13 cm and other sides are 15 cm each.

Sol:

$$\therefore DC = AE = 13 \text{ cm}$$

$$BE = 25 - 13 \text{ cm} = 12 \text{ cm}$$

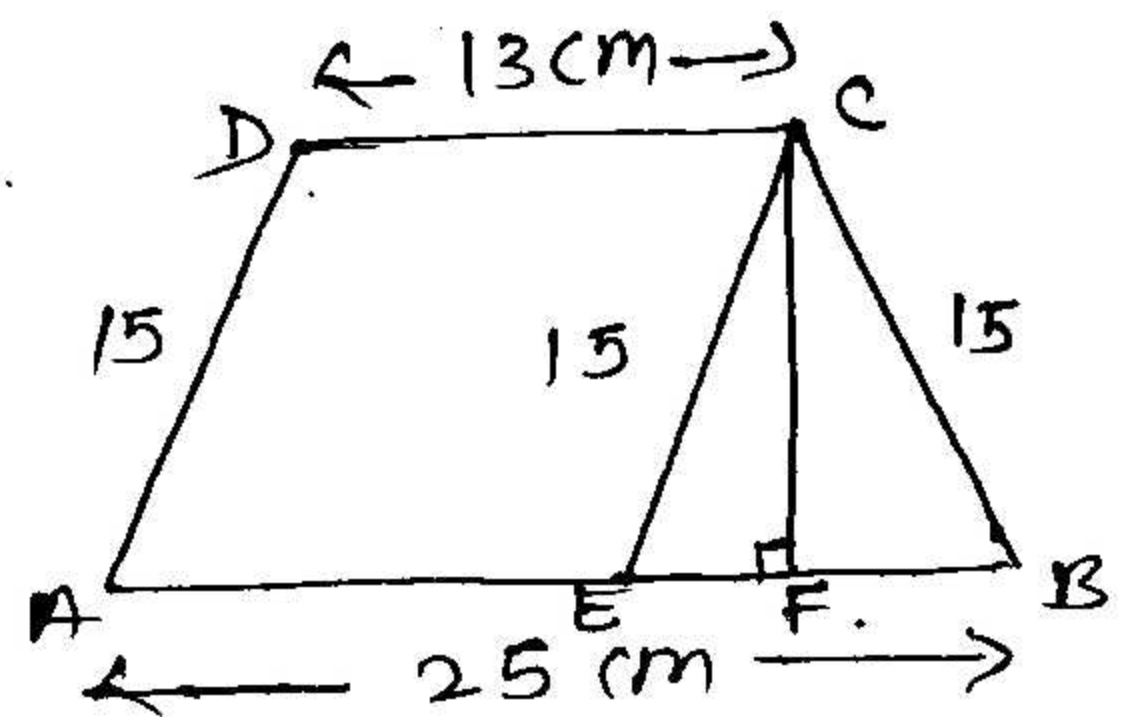
$$\therefore EF = \frac{1}{2} \times 12 = 6 \text{ cm}$$

$$CF^2 = CE^2 - EF^2$$

$$= 15^2 - 6^2 = 225 - 36$$

$$= 189$$

$$CF = \sqrt{189} = 3\sqrt{21} \text{ cm}$$



$$\therefore \text{Area of trap} = \frac{1}{2} \times (25+13) \times 3\sqrt{21}$$

$$= 57\sqrt{21} \text{ cm}^2$$

Q.18 If the area of trapezium is 28 cm^2 and one of its parallel sides is 6 cm , find the other parallel side if the altitude is 4 cm .

Sol: $A = \frac{1}{2} \times (\text{sum of ||-sides}) \times h$

$$\Rightarrow 28 = \frac{1}{2} (6+x) \times 4$$

$$\Rightarrow 28 = 12 + 2x \Rightarrow 2x = 16$$

$$x = 8$$

Q.19 In fig 20.38, a parallelogram is drawn in a trapezium, the area of the parallelogram is 80 cm^2 . Find the area of the trapezium.

Sol:

$$\text{Area} = 80 \text{ cm}^2$$

$$\text{let height of ||gm} = h \text{ cm}$$

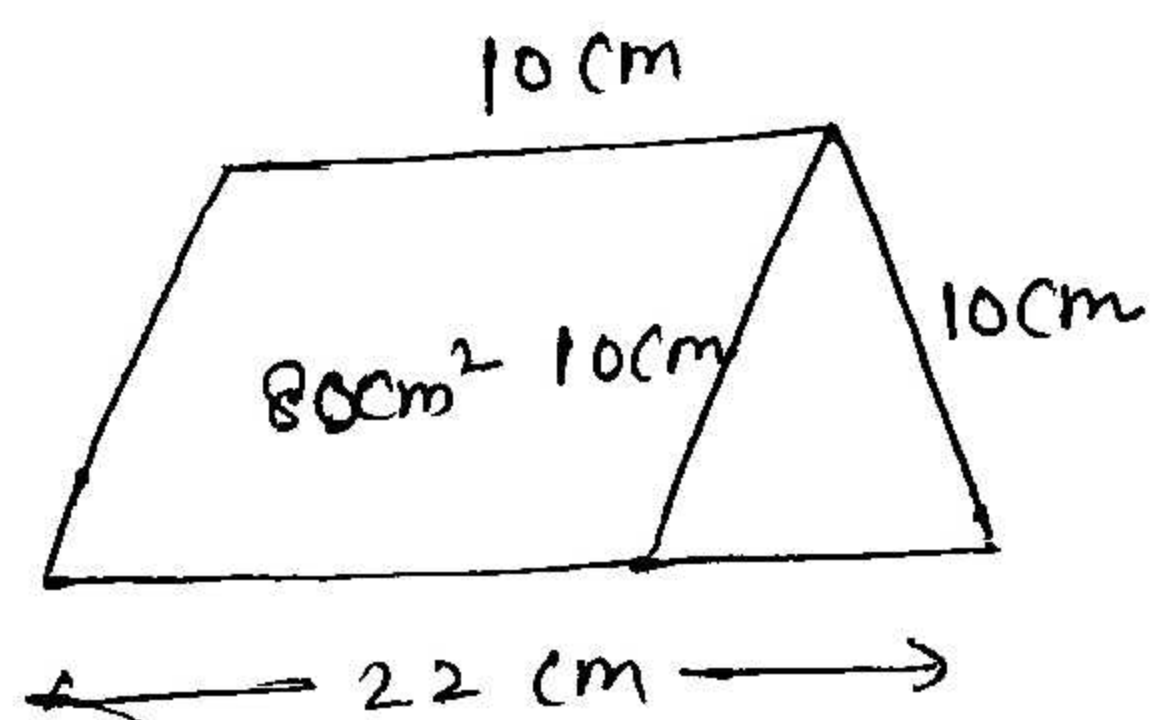
$$80 = 10 \times h$$

$$h = \frac{80}{10} = 8 \text{ cm}$$

$$\text{Area of Trap} = \frac{1}{2} \times (10+22) \times 8$$

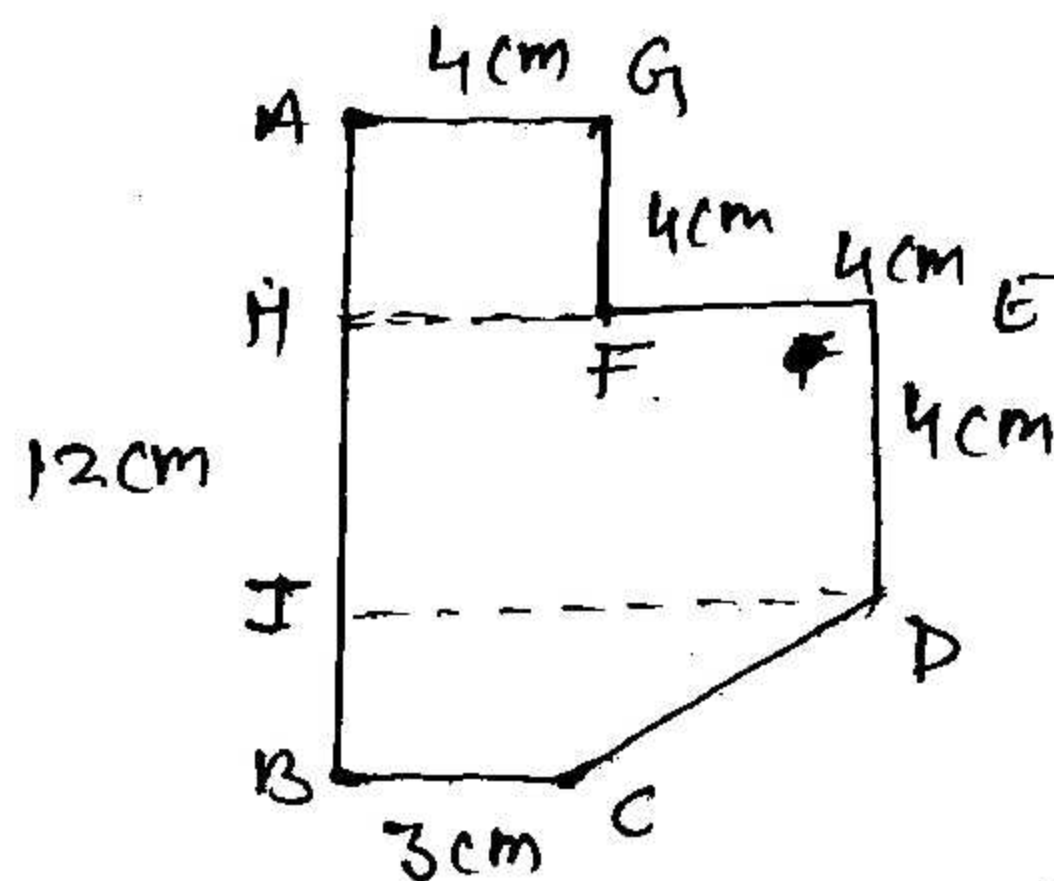
$$= 32 \times 4$$

$$= 128 \text{ cm}^2$$



Q.20 Find the area of the field by dividing it into a square, a rectangle and a Trapezium. (24)

Sol.



$$\text{Area of square AGFH} = 4 \times 4 = 16 \text{ cm}^2$$

$$\begin{aligned} \text{Area of rectangle HEDI} &= HE \times DE \\ &= (4+4) \times 4 = 8 \times 4 = 32 \text{ cm}^2 \end{aligned}$$

$$\text{Area of Trap} = BC DI = \frac{1}{2} \times (3+8) \times 4 = 22 \text{ cm}^2$$

$$\begin{aligned} \text{Total area} &= 16 + 32 + 22 \\ &= 70 \text{ cm}^2 \end{aligned}$$