Chapter 12

HERON'S FORMULA

Example- 6:

A field is in the shape of a trapezium whose parallel sides are 25 m and 10 m. The non-parallel sides are 14 m and 13 m. Find the area of the field.

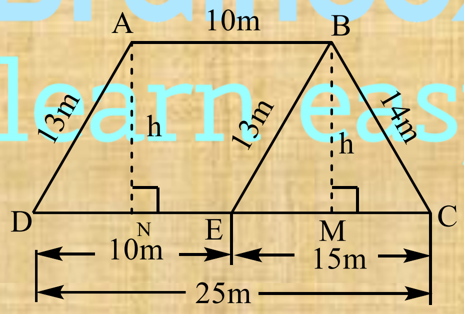
Solution:

Let the given field is in the form of a trapezium ABCD such that parallel sides are AB = 10 m and DC = 25 m.

Non parallel sides are 13 m and 14 m we draw BE||AD.

Such that BE = 13 m.

The given field is divided into two shapes.



(i) Area of ΔBCE

Sides of the triangle are $a = 13\text{ m}$, $b = 14\text{ m}$, $c = 15\text{ m}$

$$S = \frac{a+b+c}{2} = \frac{13+14+15}{2} = \frac{42}{2} = 21\text{ m}$$

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

Area of $\Delta BCE = \sqrt{21(21-13)(21-14)(21-15)}$.

$$= \sqrt{21(8)(7)(6)}$$

$$= \sqrt{7\times3\times4\times2\times7\times3\times2}$$

$$= 7\times3\times2\times2$$

$$= 84\ \mathrm{m}^2.$$

Let the height of the ΔBCE corresponding to the side 15 m be h metres.

Area of a triangle $= \frac{1}{2}\times \text{base}\times \text{height}$

$$84 = \frac{1}{2}\times15\times h$$

$$\Rightarrow \frac{\overset{28}{\cancel{84}}\times2}{\cancel{15}_5} = h$$

$$\therefore h = \frac{56}{5}\ \mathrm{m}$$

(ii) Area of parallelogram ABED = Base × height

$$= \cancel{10}^{2}\times\frac{56}{\cancel{5}}$$

Area of parallelogram ABED = 112 m^2.

So, area of the field = Area of $\Delta\, BCE$ +

Area of parallelogram $ABED$

$$= 84+112 = 196\ \mathrm{m}^2$$

$\therefore$ Required area of field $= 196\ \mathrm{m}^2$.