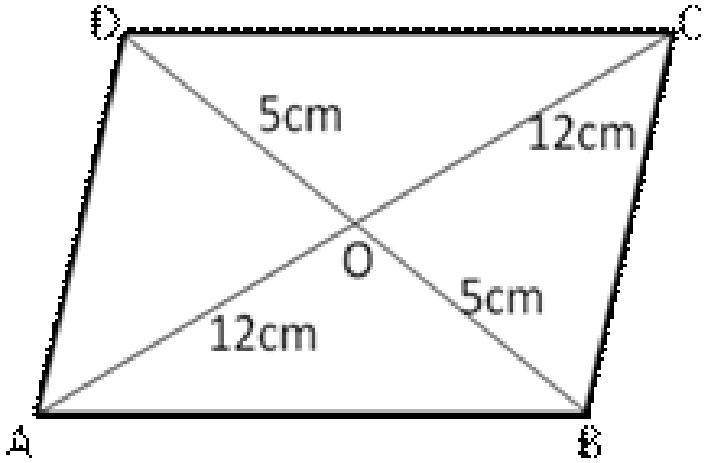
Exercise 4D

Question 15:
Let ABCD be the given rhombus whose diagonals intersect at O.
Then AC = 24 cm and BD = 10 cm



We know that the diagonals of a rhombus bisect each other at right angles.

$$OA = \frac{1}{2}AC = 12\,cm$$

$$OB = \frac{1}{2}BD = 5\,cm$$

and $\angle AOB = 90^\circ$

From right ΔAOB, we have

$$AB^2 = OA^2 + OB^2$$

$$\Rightarrow AB^2 = \left[(12)^2 + (5)^2\right] cm^2 = (144 + 25)\,cm^2 = 169\,cm^2$$

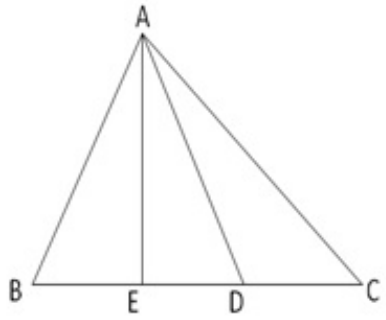
$$\Rightarrow AB = \sqrt{169}\ cm = 13\,cm$$

Hence, each side of a rhombus 13 cm

Question 16:
Given: ΔABC in which D is the midpoint of BC. AE $\perp$ BC and AC > AB.

Then, BD = CD and $\angle AED = 90^0$

Then, $\angle ADE < 90^0$ and $\angle ADC > 90^0$



In ΔAED,

$\angle AED = 90^0$

$\therefore AD^2 = AE^2 + DE^2$

$\Rightarrow AE^2 = \left(AD^2 - DE^2\right) - - (1)$

In ΔAEB, $\angle AEB = 90^0$

$\therefore \quad AB^2 = AE^2 + BE^2 \quad - - (2)$

Putting value of AE^2 from (1) in (2), we get

$$\therefore AB^2 = \left(AD^2 - DE^2\right) + BE^2$$

$$= \left(AD^2 - DE^2\right) + \left(BD^2 - DE^2\right) \left[\text{But } BD = \frac{1}{2}BC\right]$$

$$= AD^2 - DE^2 + \left(\frac{1}{2}BC - DE\right)^2$$

$$= AD^2 - DE^2 + \frac{1}{4}BC^2 + DE^2 - BC.DE$$

$$AB^2 = AD^2 - BC.\,DE + \frac{1}{4}BC^2$$

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