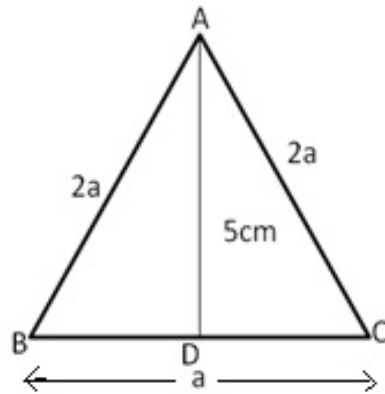Exercise 4D

Question 11:
Given: ΔABC in which AB = AC = 2a units and BC = a units
Const: Draw AD ⊥ BC then D is the midpoint of BC.

In ΔABC

$$BC = a$$

and $BD = \dfrac{BC}{2} = \dfrac{a}{2}$

In ΔADB,

$$(AB)^2 = AD^2 + BD^2$$

$$AD^2 = \left(AB^2 - BD^2\right)$$

$$AD^2 = \left[(2a)^2 - \left(\dfrac{a}{2}\right)^2\right]$$

$$AD^2 = \left[4a^2 - \dfrac{a^2}{4}\right] = \dfrac{15a^2}{4}$$

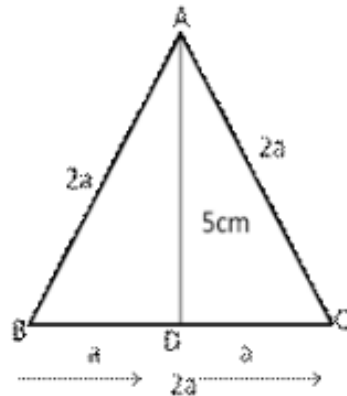$$\Rightarrow AD = \dfrac{a\sqrt{15}}{2}\,\text{units}$$

Question 12:

In an equilateral triangle all sides are equal.

Then, AB = BC = AC = 2a units

Const: Draw an altitude AD ⊥ BC

Given BC = 2a. Then, BD = a

In ΔABD,

∠ADB = 90⁰

$(AB)^2 = (AD)^2 + (BD)^2$

(by pythagoras theorem)

$(AD)^2 = (AB^2 - BD^2)$

$\qquad = \left[(2a)^2 - (a)^2\right]$ sq. units

$\qquad = (4a^2 - a^2)$ sq.unit = $3a^2$ sq.unit

$AD = \sqrt{3a^2}$ unit = $a\sqrt{3}$ unit

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