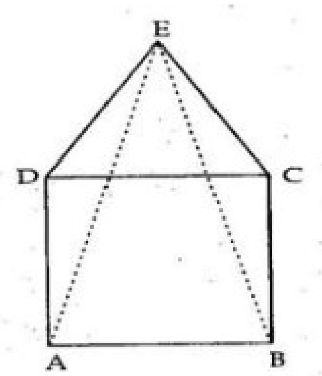
Exercise 9A

Question 4:

Given: ΔEDC is an equilatateral triangle and ABCD is a square



To Prove: AE = BE

and $\angle DAE = 15^0$

(i) Proof: Since ΔEDC is an equilateral triangle,

$\angle EDC = 60^0$ and $\angle ECD = 60^0$

Since ABCD is a square,

$\angle CDA = 90^0$ and $\angle DCB = 90^0$

In ΔEDA

$$\angle EDA = \angle EDC + \angle CDA$$
$$= 60^0 + 90^0$$
$$= 150^0 \quad \ldots\ldots(1)$$

In ΔECB

$$\angle ECB = \angle ECD + \angle DCB$$
$$= 60^0 + 90^0 = 150^0$$

$$\Rightarrow \quad \angle EDA = \angle ECB \quad \ldots\ldots(2)$$

Thus, in ΔEDA and ΔECB

$$ED = EC \quad \text{[sides of equilateral triangle } \Delta EDC]$$
$$\angle EDA = \angle ECB \quad \text{[from (2)]}$$
$$DA = CB \quad \text{[sides of square } \square ABCD]$$

Thus, by Side-Angle-Side criterion of congruence, we have

$\therefore \quad \Delta EDA \cong \Delta ECB \quad$ [By SAS]

The corresponding parts of the congruent triangles are equal.

$\therefore \quad AE = BE \quad$ [C.P.C.T]

(ii)Now in Δ EDA , we have

$ED = DA$

$\Rightarrow \quad \angle DEA = \angle DAE \quad$ [base angles are equal]

But $\quad \angle EDA = 150^0 \quad$ [from (1)]

So, by angle sum property in ΔEDA

$$\angle EDA + \angle DAE + \angle DEA = 180^0$$
$$\Rightarrow 150^0 + \angle DAE + \angle DAE = 180^0$$
$$\Rightarrow \quad 2\angle DAE = 180^0 - 150^0$$
$$\Rightarrow \quad 2\angle DAE = 30^0$$
$$\Rightarrow \quad \angle DAE = \frac{30}{2} = 15^0$$

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