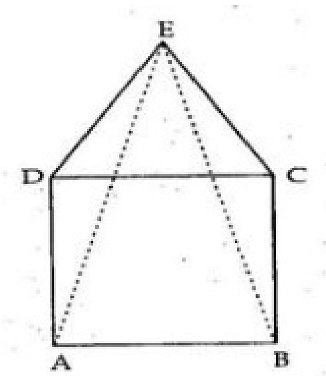
Exercise 9A

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

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

In ΔECB

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

$$\Rightarrow \quad \angle EDA = \angle ECB \qquad ......(2)$$

Thus, in ΔEDA and ΔECB

$ED = EC$ [sides of equilateral triangle ΔEDC]

$\angle EDA = \angle ECB$ [from (2)]

$DA = CB$ [sides of square $\square ABCD$]

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

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

The corresponding parts of the congruent triangles are equal.

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

(ii)Now in Δ EDA , we have

$ED = DA$

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

But $\quad \angle EDA = 150^0$ [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 **********