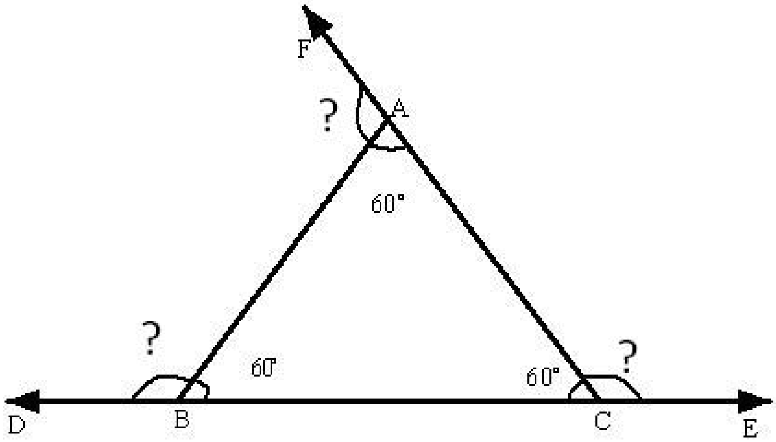
Exercise 5A

Question 7:



Let be an equilateral triangle.
Since it is an equilateral triangle, all the angles are equiangular and the measure of each angle is 60°
The exterior angle of ∠A is ∠BAF
The exterior angle of ∠B is ∠ABD
The exterior angle of ∠C is ∠ACE
We can observe that the angles ∠A and ∠BAF, ∠B and ∠ABD, ∠C and ∠ACE and form linear pairs.

Therefore, we have

$$\begin{aligned} &\angle A + \angle BAF = 180^\circ \\ \Rightarrow\ &60^\circ + \angle BAF = 180^\circ \\ \Rightarrow\ &\angle BAF = 180^\circ - 60^\circ \\ \Rightarrow\ &\angle BAF = 120^\circ \end{aligned}$$

Similarly, we have

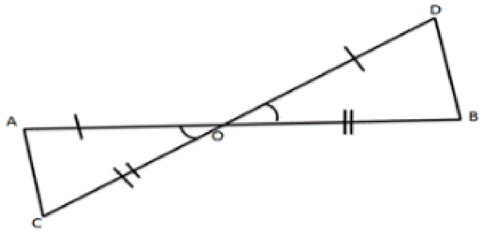
$$\begin{aligned} &\angle B + \angle ABD = 180^\circ \\ \Rightarrow\ &60^\circ + \angle ABD = 180^\circ \\ \Rightarrow\ &\angle ABD = 180^\circ - 60^\circ \\ \Rightarrow\ &\angle ABD = 120^\circ \end{aligned}$$

Also, we have

$$\begin{aligned} &\angle C + \angle ACE = 180^\circ \\ \Rightarrow\ &60^\circ + \angle ACE = 180^\circ \\ \Rightarrow\ &\angle ACE = 180^\circ - 60^\circ \\ \Rightarrow\ &\angle ACE = 120^\circ \end{aligned}$$

Thus, we have, ∠BAF = 120°, ∠ABD = 120°, ∠ACE = 120°
So, the measure of each exterior angle of an equilateral triangle is 120°.

Question 8:



Given: Two lines AB and CD intersect at O and O is the midpoint of AB and CD.

$\Rightarrow AO = OB$ and $CO = OD$

To prove: $AC = BD$ and $AC \parallel BD$

Proof: In $\triangle AOC$ and $\triangle BOD$, we have,

$AO = OB$ [Given: O is the midpoint of AB]

$\angle AOC = \angle BOD$ [Vertically opposite angles]

$CO = OD$ [Given: O is the mipoint of CD]

So, by Side−Angle−Side congruence, we have, $\triangle AOC \cong \triangle BOD$

The corresponding parts of the congruent triangles are equal.

Therefore, we have, $AC = BD$.

Similarly, by c.p.c.t, we have,

$\angle ACO = \angle BDO$ and

$\angle CAO = \angle DBO$

This implies that alternate angles formed by AC and BD with transversal CD are equal. This means that, $AC \parallel BD$.

Thus, $AC = BD$ and $AC \parallel BD$.

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