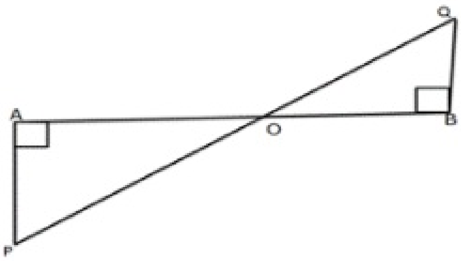
Exercise 5A

Question 9:

Given: $PA \perp AB$, $QB \perp AB$, and $PA = QB$
To Prove: $AO = OB$ and $PO = OQ$



Proof: In $\triangle APO$ and $\triangle BPO$,

$\angle PAO = \angle QBO = 90°$ [Given]

$PA = QB$ [Given]

$\angle PAO = \angle QBO$ [Since $PA \perp AB$, and $QB \perp AB$, $PA \parallel QB$, and thus PQ is a transversal, therefore, alternate angles are equal]

So, by Angle−Side−Angle criterion of congruence, we have

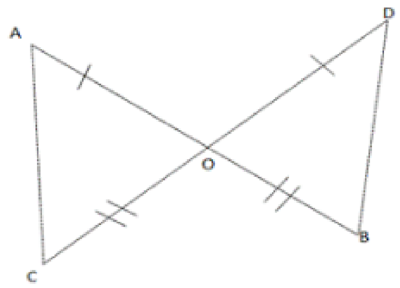
$\triangle APO \cong \triangle BPO$

$\Rightarrow AO = OB$ and $PO = OQ$ [Since corresponding parts of congruent triangles are equal]

Thus, we have
O is the midpoint of AB and PQ.

Question 10:

Given: Line segments AB and CD intersect at O such that OA = OD and OB = OC.



To prove: AC = BD

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

$AO = OD$ [Given]

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

$OC = OB$ [Given]

So, by Side−Angle−Side criterion of congruence, we have,

$\Rightarrow \triangle AOC \cong \triangle BOD$

$\Rightarrow AC = BD$ [Since the corresponding parts of the congruent triangles are equal]

$\Rightarrow \angle CAO = \angle BDO$ [by c.p.c.t]

Thus, we have, AC = BD

In case $\angle ODB = \angle OBD$, then $\angle CAO = \angle OBD$ which means alternate angles made by lines AC and BD with transversal AB are equal and then lines AC and BD will be parallel.

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