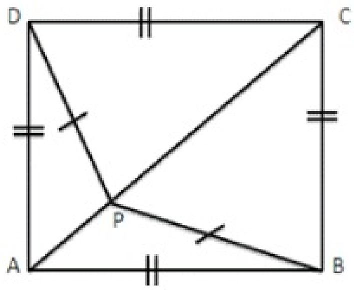
Exercise 5A

Question 27:

Given: ABCD is a sqaure and P is a point inside it such that PB =PD



To Prove: CPA is a straight line.

Proof : In ΔAPD and ΔAPB

DA= AB [$\therefore$ ABCD is a square]

AP =AP [Common]

and, PB =PD [Given]

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

$\Delta APD \cong \Delta APB$

The corresponding parts of the congruent triangles are equal.

$\therefore \angle APD = \angle APB$ ....(i)

Now consider the triangles, ΔCPD and ΔCPB.

CD = CB [$\therefore$ ABCD is a square]

CP = CP [Common]

and, PB = PD [Given]

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

$\Delta CPD \cong \Delta CPB$

The corresponding parts of the congruent triangles are equal.

Hence we have

$\angle CPD = \angle CPB$ ......(ii)

Adding both sides of (i) and (ii) we get

$\angle APD + \angle CPD = \angle APB + \angle CPB$ ......(iii)

Angles around the point P add upto 360°,

$\Rightarrow \angle APD + \angle CPD + \angle APB + \angle CPB = 360^\circ$

$\Rightarrow \angle APB + \angle CPB = 360^\circ - (\angle APD + \angle CPD)$ ...(iv)

Substituting (iv) in (iii) we get,

$\angle APD + \angle CPD = 360^\circ - (\angle APD + \angle CPD)$

i.e $2(\angle APD + \angle CPD) = 360^\circ$

$\angle APD + \angle CPD = \frac{360}{2} = 180^\circ$

This proves that CPA is a straight line.

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