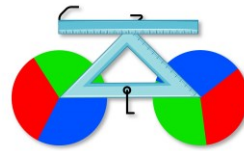


Triangles (Congruency)
ICSE
Class 9
CHAPTER 9
Ex 9B. Q2



MATHSGYM

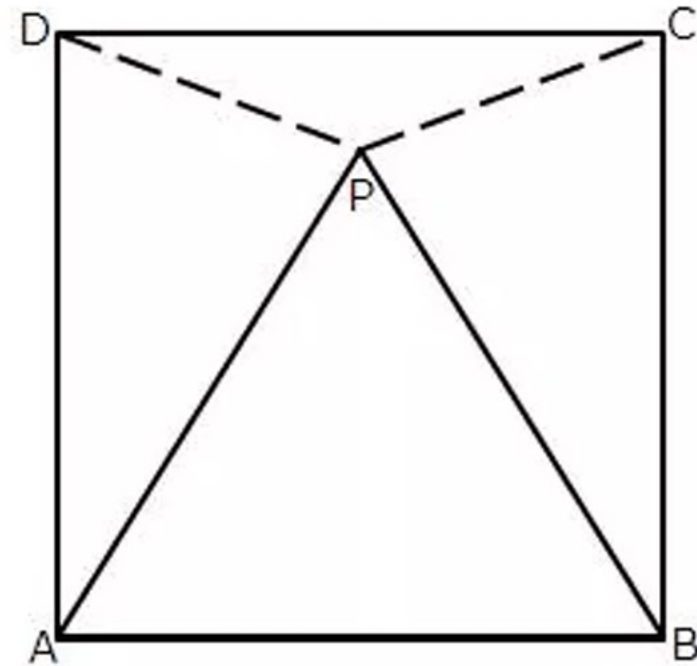
maths is fun

22/01/2023



Ex 9(B), Q2

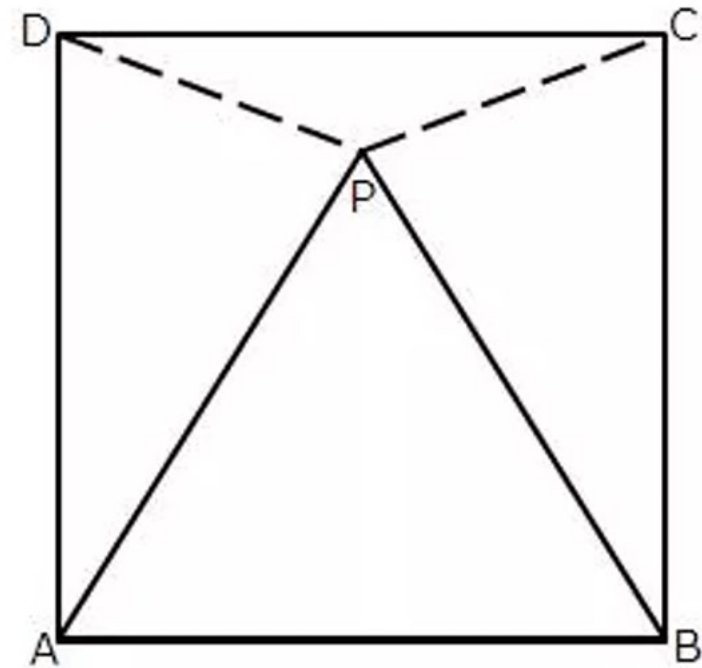
- Question
- ABCD is a square and APB is an equilateral triangle.
- Prove
- (i) $\triangle APD \cong \triangle BPC$
- (ii) Find the angles of $\triangle DPC$





Solution Q2(i)

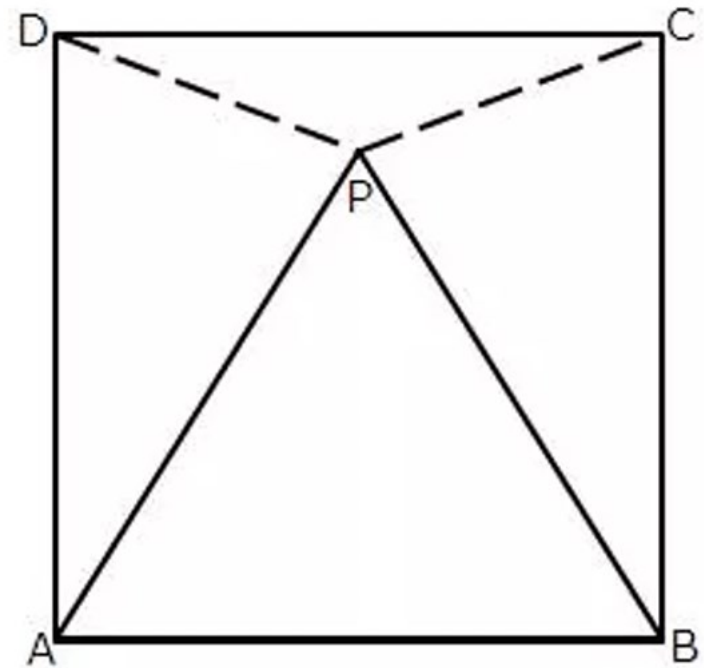
- Given $\triangle APB$ is an equilateral triangle.
- $\therefore AP = PB = BA$ &
- $\angle PAB = \angle ABP = \angle BPA = 60^\circ$ ----- (1)
- Since ABCD is a square
- $\therefore \angle A = \angle B = \angle C = \angle D = 90^\circ$ ----- (2)
- $\angle DAP = \angle A - \angle PAB$
- $\Rightarrow \angle DAP = 90 - 60$ (from (1) & (2))
- $\Rightarrow \angle DAP = 30^\circ$ ----- (3)
- Similarly
- $\angle CBP = \angle B - \angle PBA$
- $\Rightarrow \angle CBP = 90 - 60$
- $\Rightarrow \angle CBP = 30^\circ$ ----- (4)
- $\therefore \angle DAP = \angle CBP$ (from (3) & (4)) ----- (5)





Solution Q2(i)

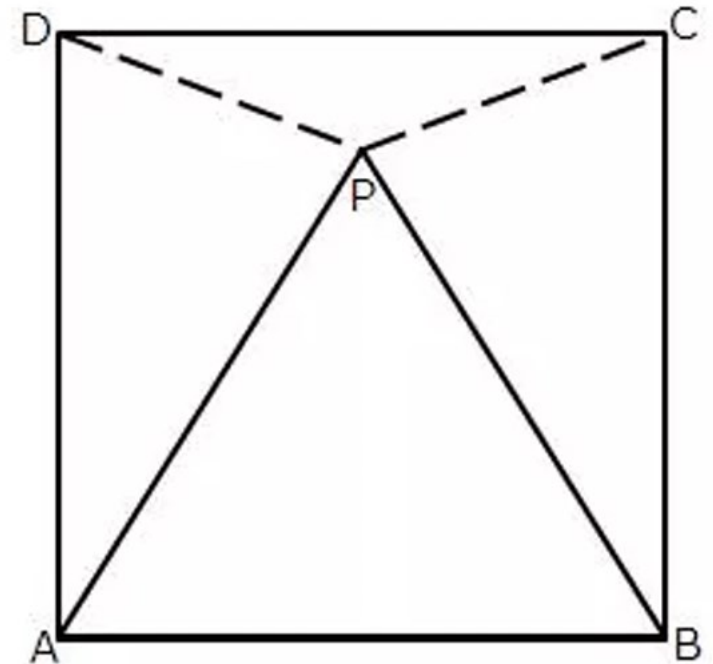
- In $\triangle APD$ & $\triangle BPC$
- $DA = CB$ (sides of square ABCD)
- $PA = PB$ (sides of equilateral $\triangle APB$)
- $\therefore \angle DAP = \angle CBP$ (from (5))
- $\therefore \triangle APD \cong \triangle BPC$ (SAS) Proved **Ans**





Solution Q2(ii)

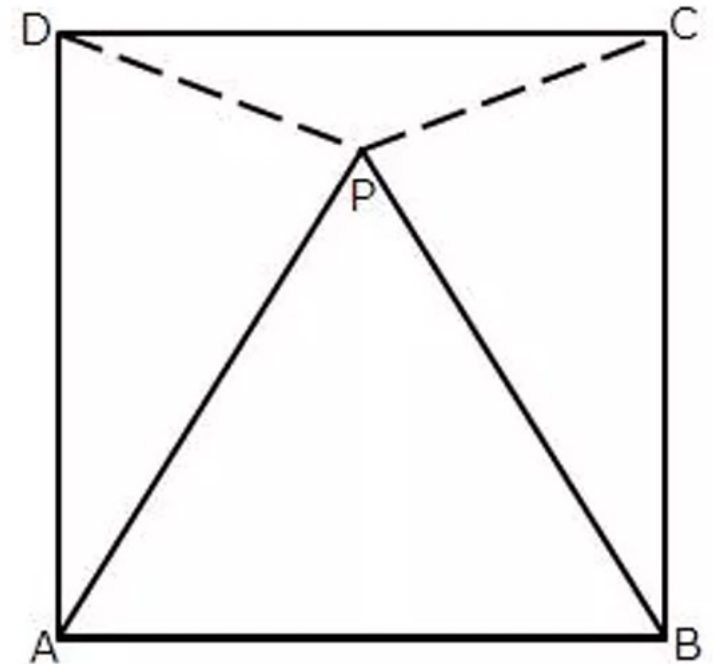
- Given $\triangle APB$ is an equilateral triangle.
- $\therefore AP = PB = AB$ (6)
- Also given ABCD is a square
- $\therefore AB = BC = CD = DA$ (7)
- $AP = DA$ (from (6) & (7)) ----- (8)
- & $PB = BC$ ----- (9)
- In $\triangle APD$
- $AP = DA$ (from (8))
- $\therefore \angle ADP = \angle APD$ (angles opposite to equal sides are equal)
- $\angle ADP + \angle APD + \angle PAD = 180^\circ$ (sum of angles of a triangle = 180°)
- $2\angle ADP + \angle PAD = 180^\circ$ (from (9))
- $2\angle ADP + 30 = 180^\circ$ (from (3))
- $2\angle ADP = 180^\circ - 30^\circ$
- $2\angle ADP = 150^\circ$
- $\angle ADP = \frac{150}{2} = 75^\circ$ ----- (10)





Solution Q2(ii)

- We know $\angle D = 90$ (angle of a square)
- $\angle D = \angle ADP + \angle PDC$
- $90 = 75 + \angle PDC$ (from (10))
- $\angle PDC = 90 - 75 = 15^\circ$ ----- (11)
- From (i) ,we know
- $\triangle APD \cong \triangle BPC$
- $\Rightarrow PD = PC$ (CPCTC)
- (angles opposite to equal sides are equal) ----- (12)
- $\therefore \angle PDC = \angle PCD = 15^\circ$ (from (11) & (12))





Solution Q2(ii)

- In $\triangle PDC$
- $\angle PDC + \angle PCD + \angle DPC = 180^\circ$
- $15 + 15 + \angle DPC = 180^\circ$
- $\angle DPC = 180^\circ - 30^\circ$
- $\angle DPC = 150^\circ$
- $\therefore$ Angles of $\triangle PDC$ are $15^\circ, 15^\circ$, & 150° **Ans.**

