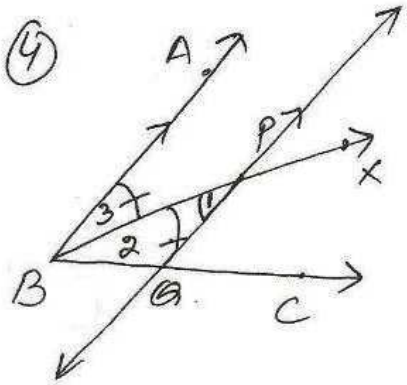
④



to prove - $\triangle BPQ$ is isosceles

proof $\angle 2 = \angle 3$ [BX bis. $\angle ABC$] ...(i)

$BA \parallel QP$

$\therefore \angle 3 = \angle 1$ (alternate interior angles) ...(ii)

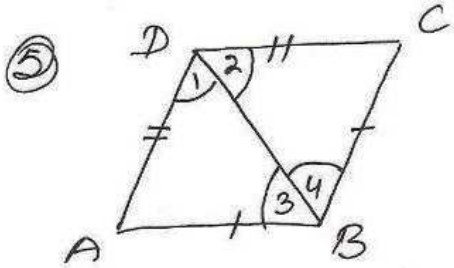
From (i), (ii)

$\angle 1 = \angle 2$

$\Rightarrow BQ = PQ$ [converse of isos. $\triangle$ prop]

$\therefore \triangle BPQ$ is isosceles

⑤



to show BD bisects $\angle B$ and $\angle D$

In $\triangle DAB$ and $\triangle DCB$

$AB = CB$ (given)

$AD = CD$ (do)

$DB = DB$ (common)

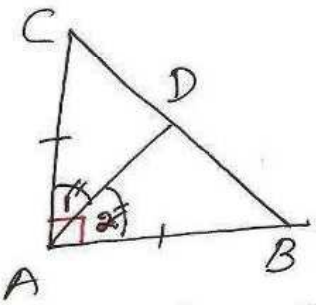
$\therefore \triangle DAB \cong \triangle DCB$ by SSS prop

$\angle 1 = \angle 2$ (cpct)

$\angle 3 = \angle 4$

$\Rightarrow$ DB bisects $\angle D$ and $\angle B$

⑥



To prove $BC = 2AD$

proof In rt $\triangle ABC$

$AB = AC$

$\Rightarrow$ BC is hypotenuse [$\because$ hyp. is longest side]

$\therefore \angle BAC = 90^\circ$

In $\triangle CAD$ and $\triangle BAD$

$AC = AB$ (given)

$\angle 1 = \angle 2$

$AD = AD$ (common)

$\therefore \triangle CAD \cong \triangle BAD$ by SAS prop

$\therefore CD = BD$ (cpct)