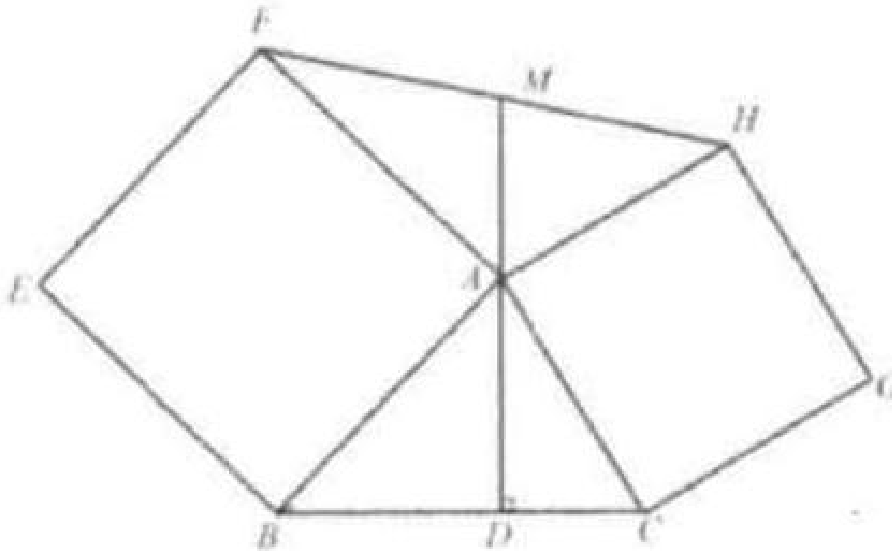
Example 16

In figure shown, ABC is a triangle with squares $ABEF$ and $ACGH$ drawn on sides AB and AC, respectively. AD is the altitude of triangle ABC. Prove that the extension of DA bisects FH.

Proof: Draw $FP \perp DA$ at $P, HQ \perp BC$ at Q.

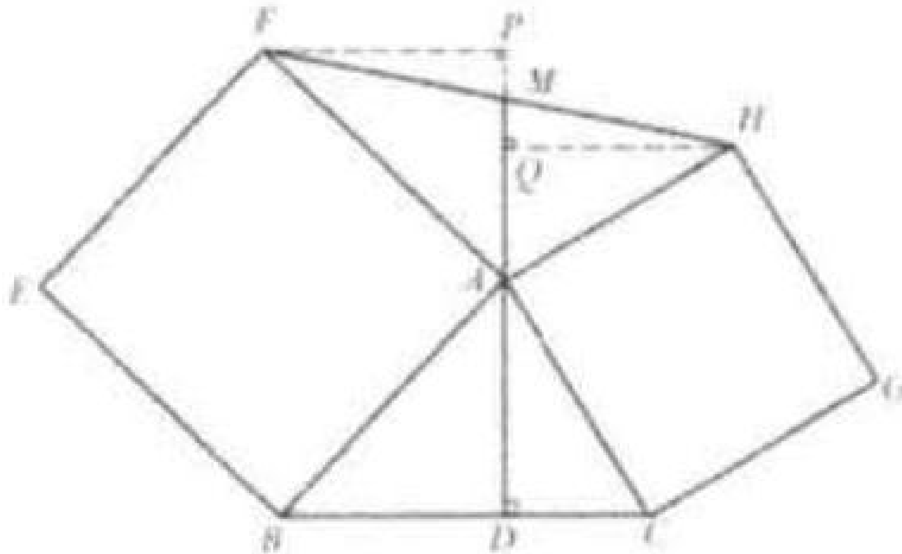


Since $\angle FAP + \angle BAD = 90°$, and $\angle FAP + \angle AFP = 90°, \angle BAD = \angle AFP$.

We also know that $HAF = AB, \angle APF = \angle ADB = 90°$.

Thus Rt $\triangle APF \cong$ Rt$\triangle BDA$.

Similarly, we can show that Rt $\triangle AHQ \cong$ Rt $\triangle CAD$.



So we have $FP = AD = HQ$.

We also know that $\angle FPM = \angle HQM = 90^\circ, \angle MFP = \angle MHQ$. Therefore $\triangle FPM \cong \triangle HMQ$ and $FM = MH$.