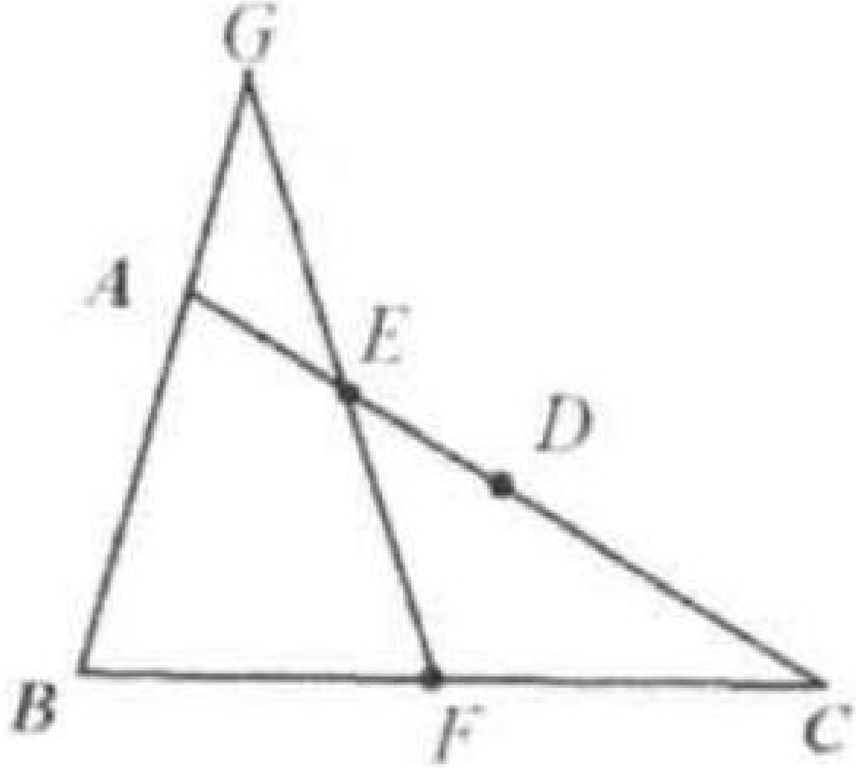
Problem

In $\triangle ABC, AC > AB. D$ is on AC such that $CD = AB. E$ and F are the midpoints of AD, BC, respectively. Connect EF and extend it to meet the extension of BA at G. Prove: $AE = AG$.

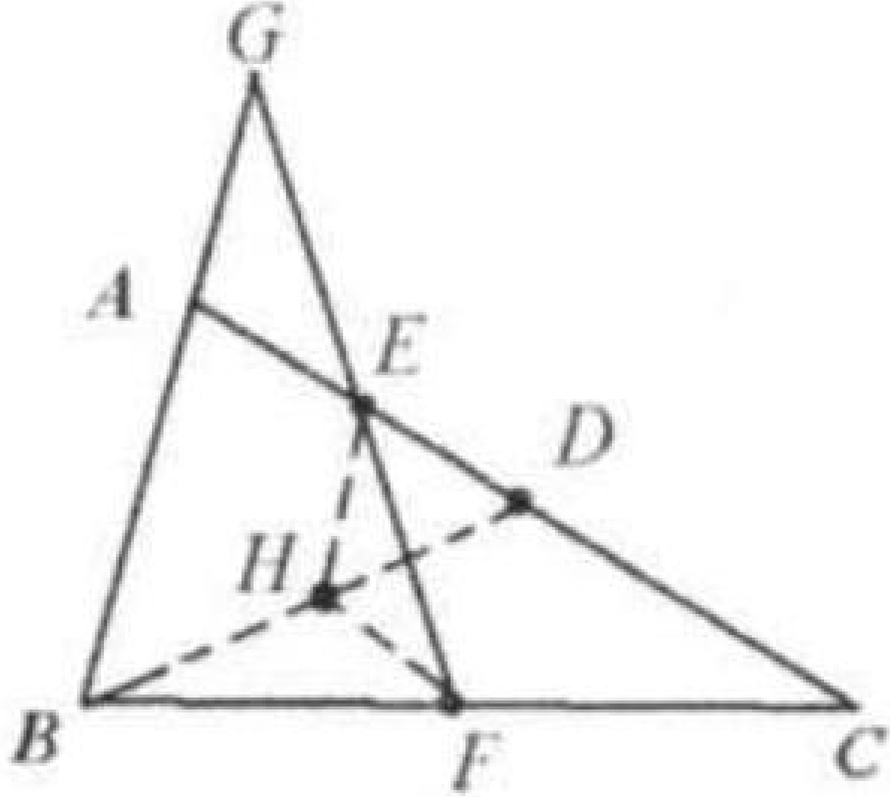


Solution

Take H, the midpoint of BD.
Connect EH, FH.
Since E and H are midpoints of AD, BD, respectively, by Theorem 2.1, $EH//$

$$AB, EH = \frac{1}{2}AB$$

Since F and H are midpoints of BC, BD, respectively, by Theorem 2.1, $HF//CD, HF = \frac{1}{2}DC$



Since $CD = AB, EH = HF. \angle HEF = \angle HFE$.
Since $KF // AC, \angle AEG = \angle KFG$ or $\angle AEG = \angle HFE$.
Since $EH // GK, \angle G = \angle HEF$
Thus $\angle G = \angle AEG, AE = AG$.