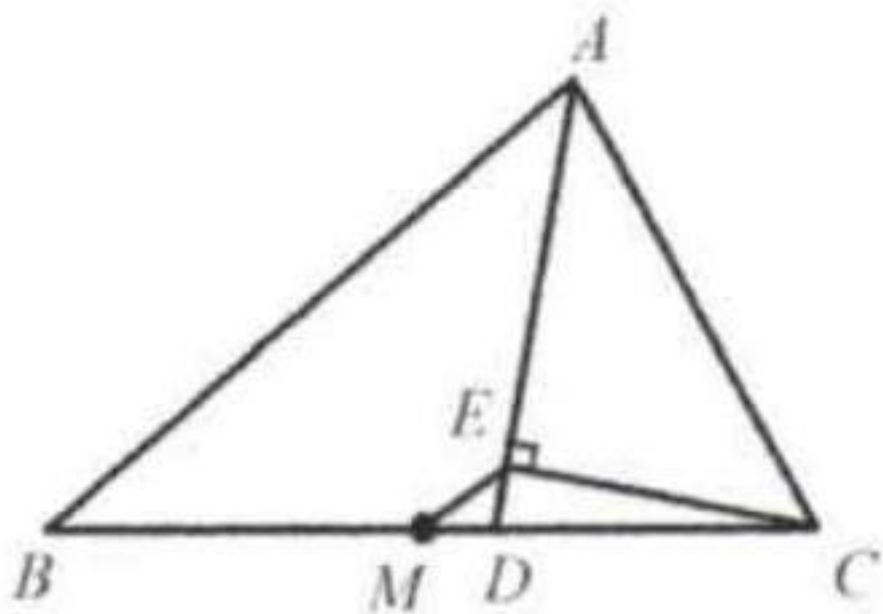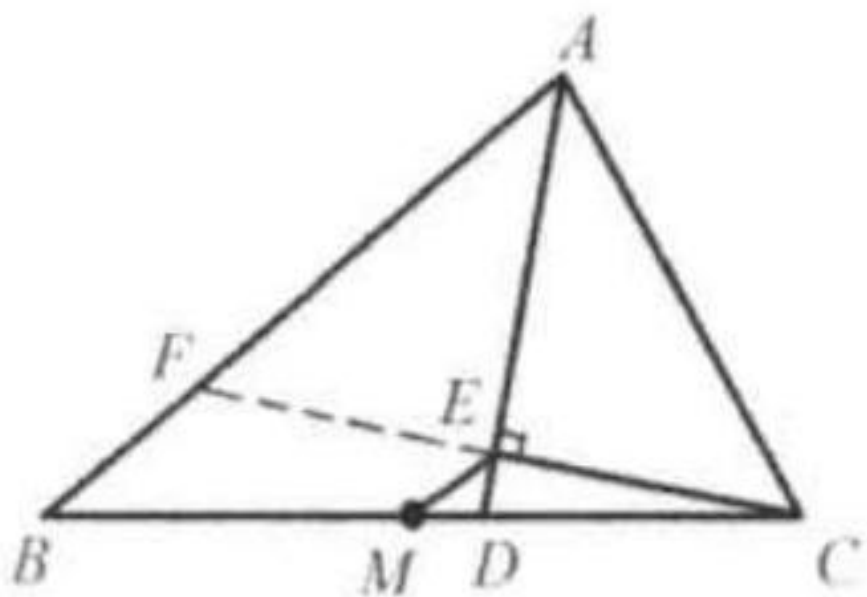# Example 7

In $\triangle ABC$, $AB > AC$. M is the midpoint of BC. AD is the angle bisector of $\angle A$. $CE \perp AD$ at E. Prove:

$$ME = \frac{1}{2}(AB - AC).$$

Solution: Extend CE to meet AB at F.

Since $AE \perp CF$ and AE is the angle bisector of $\angle A$, AE is the perpendicular bisector of CF. Thus $FE = EC$, $AC = AF$, and E is the midpoint of CF. Therefore, ME is the midline of $\triangle CBF$, and

$ME = \frac{1}{2}BF = \frac{1}{2}(AB - AF) = \frac{1}{2}(AB - AC).$