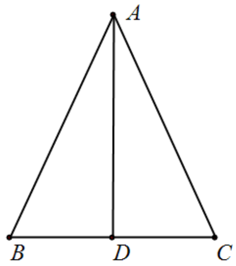
Example 2 : As shown in Figure 1 , *in* $\triangle ABC$, D is the midpoint of BC, $\angle ABC = \angle ACB$, to prove: $AD \perp BC$.



Proof: $$\left(\frac{A-\frac{B+C}{2}}{B-C}\right)^2+\frac{\frac{B-A}{B-C}}{\frac{C-B}{C-A}}=\frac{1}{4},$$

$$\left|\left(\frac{A-\frac{B+C}{2}}{B-C}\right)^2+\frac{\frac{B-A}{B-C}}{\frac{C-B}{C-A}}\right|=\frac{1}{4}\geq\left|\left(\frac{A-\frac{B+C}{2}}{B-C}\right)^2-\frac{\frac{B-A}{B-C}}{\frac{C-B}{C-A}}\right|\geq\left|\frac{\frac{B-A}{B-C}}{\frac{C-B}{C-A}}\right|-\left|\left(\frac{A-\frac{B+C}{2}}{B-C}\right)^2\right|,$$

$\frac{1}{4}\geq\frac{AB\cdot AC}{BC^2}-\frac{AD^2}{BC^2}$, that is $BD^2+AD^2\geq AB\cdot AC$, the equality sign holds if and only if $AB = AC$.

New proposition: In $\triangle ABC$, D is the midpoint of BC, to prove: $BD^2+AD^2\geq AB\cdot AC$, if and only when $AB = AC$ the equality sign holds.