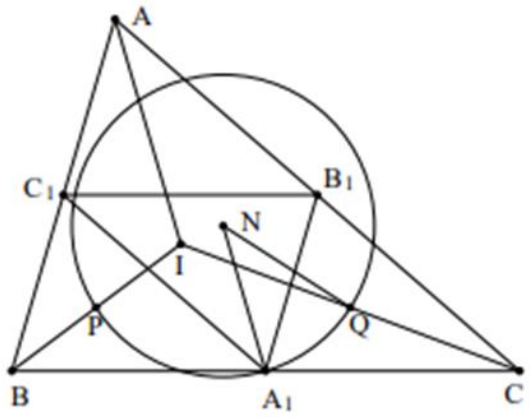
Example 149 : As shown in Figure 3, in $\triangle ABC$, I is the center, A_1, B_1, C_1 are the midpoints of BC, CA, AB respectively, P, Q are the midpoints of IB, IC respectively, and N is $\triangle PA_1Q$ The circumcenter of, to prove: A_1N is the bisector of $\angle C_1A_1B_1$.



$$\frac{\frac{A_1-C_1}{A_1-N}}{\frac{A_1-N}{A_1-B_1}}=\frac{A_1-C_1}{C-A}\frac{A_1-B_1}{A-B}\left(\frac{P-Q}{B-C}\right)^2\left(\frac{I-C}{P-A_1}\right)^2\left(\frac{I-B}{Q-A_1}\right)^2\left(\frac{P-A_1}{P-Q}\frac{A_1-Q}{A_1-N}\right)^2\frac{\frac{C-B}{C-I}\frac{B-A}{B-I}}{\frac{C-I}{C-A}\frac{B-I}{B-C}}$$