A3) A nucleus of rest mass $M_1$ moving at high speed with kinetic energy $K_1$ collides with a nucleus of rest mass $M_2$ at rest. A nuclear reaction occurs according to the scheme

nucleus 1 + nucleus 2 $\rightarrow$ nucleus 3 + nucleus 4.

The rest masses of nuclei 3 and 4 are $M_3$ and $M_4$. The rest masses are related by

$$(M_3 + M_4)c^2 = (M_1 + M_2)c^2 + Q,$$

where $Q > 0$.

(10 points) Find the minimum value of $K_1$ required to make the reaction occur, in terms of $M_1$, $M_2$, and $Q$. 