

Similarity: $\frac{m_k |v_k|}{|q_i - q_j|} = \sqrt{\frac{m_1 m_2 m_3 K}{MI}} \Rightarrow \frac{m_i m_j (q_i - q_j)^2}{MI} = \frac{m_k v_k^2}{K}.$

Using the dual relation (identity): If $\sum_i m_i \eta_i = 0$,

$$m_i m_j (\eta_i - \eta_j)^2 + M m_k \eta_k^2 = (m_i + m_j) \sum_{\ell} m_{\ell} \eta_{\ell}^2.$$

Vertexes \Leftrightarrow Perimeters

We get: $\frac{m_k q_k^2}{I} = \frac{m_i m_j (v_i - v_j)^2}{MK} \Rightarrow \frac{m_k |q_k|}{|v_i - v_j|} = \sqrt{\frac{m_1 m_2 m_3 I}{MK}},$

$$\frac{m_k q_k^2}{I} + \frac{m_k v_k^2}{K} = \frac{m_i m_j (q_i - q_j)^2}{MI} + \frac{m_i m_j (v_i - v_j)^2}{MK} = \frac{m_i + m_j}{M}.$$