In ΔABC the following relationship holds:

$$\sum \frac{\sin\frac{A}{2}}{w_a} \cdot \sum \frac{1}{w_a \sin\frac{A}{2}} \geq \frac{4}{R^2}$$

Proposed by Marin Chirciu-Romania

Solution by Tapas Das-India

$$\sum \frac{\sin\frac{A}{2}}{w_a} \cdot \sum \frac{1}{w_a \sin\frac{A}{2}} = \sum \left(\sqrt{\frac{\sin\frac{A}{2}}{w_a}}\right)^2 \cdot \sum \left(\sqrt{\frac{1}{w_a \sin\frac{A}{2}}}\right)^2 \overset{C-S}{\geq} \left(\frac{1}{w_a}+\frac{1}{w_b}+\frac{1}{w_c}\right)^2 \geq$$

$$\overset{w_a \leq m_a}{\geq} \left(\frac{1}{m_a}+\frac{1}{m_b}+\frac{1}{m_c}\right)^2 \overset{CBS}{\geq} \left(\frac{(1+1+1)^2}{m_a+m_b+m_c}\right)^2 \overset{Gotman\ II}{\geq} \left(\frac{9}{\frac{9R}{2}}\right)^2 = \frac{4}{R^2}$$

Equality holds for an equilateral triangle.