

A sphere of mass m_1 moving with speed u collides with a stationary sphere of mass m_2 . The first sphere is brought to rest by the collision. Prove that $m_1 \leq m_2$



Using Newton's law of impact, that:

Speed of separation = e (speed of approach)

Where ' e ' is the coefficient of restitution, gives:

$$v_1 - v_2 = e (u_1 - u_2)$$

As we know both u_2 and v_1 to be 0:

$$v_2 = eu_1$$

Using the conservation of momentum:

$$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$$

So substituting eu_1 for v_2 gives:

$$m_1u_1 = em_1u_1$$

u_1 cancel to give:

$$m_1 = em_1$$

As we know from Newton's law of impact $e \leq 1$,

$$m_1 \leq m_2$$