Answer on Question #63131, Physics / Mechanics

A hovering mosquito is hit by a raindrop that is 30 times as massive and falling at 8.1 m/s, a typical raindrop speed. How fast is the raindrop, with the attached mosquito, falling immediately afterward if the collision is perfectly inelastic?

Solution

According to the conservation of momentum,

$$m_m v_m + m_d v_d = (m_m + m_d) v;$$

$$v = \frac{m_m v_m + m_d v_d}{(m_m + m_d)};$$

$$v = \frac{m \times 0 + (30m) \times 8.1}{(m + 30m)} = \frac{243m}{31m} = 7.84 \text{ m/s}$$

Answer: 7.84 m/s.