38. Our notation (and, implicitly, our choice of coordinate system) is as follows: the mass of the original body is m; its initial velocity is $\vec{v}_0 = v\,\hat{\mathrm{i}}$; the mass of the less massive piece is m_1; ; its velocity is $\vec{v}_1 = 0$; and, the mass of the more massive piece is m_2. We note that the conditions $m_2 = 3m_1$ (specified in the problem) and $m_1 + m_2 = m$ generally assumed in classical physics (before Einstein) lead us to conclude

$$m_1 = \frac{1}{4}\,m \quad \text{and} \quad m_2 = \frac{3}{4}\,m\ .$$

Conservation of linear momentum requires

$$\begin{aligned} m\vec{v}_0 &= m_1\vec{v}_1 + m_2\vec{v}_2 \\ mv\,\hat{\mathrm{i}} &= 0 + \frac{3}{4}\,m\,\vec{v}_2 \end{aligned}$$

which leads to

$$\vec{v}_2 = \frac{4}{3}\,v\,\hat{\mathrm{i}}\ .$$

The increase in the system's kinetic energy is therefore

$$\begin{aligned} \Delta K &= \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2 - \frac{1}{2}mv_0^2 \\ &= 0 + \frac{1}{2}\left(\frac{3}{4}\,m\right)\left(\frac{4}{3}\,v\right)^2 - \frac{1}{2}mv^2 \\ &= \frac{1}{6}\,m\,v^2\ . \end{aligned}$$