36. This problem involves both mechanical energy conservation

$$U_i = K_1 + K_2$$

where $U_i = 60$ J, and momentum conservation

$$0 = m_1\vec{v}_1 + m_2\vec{v}_2$$

where $m_2 = 2m_1$. From the second equation, we find $|\vec{v}_1| = 2\,|\vec{v}_2|$ which in turn implies (since $v_1 = |\vec{v}_1|$ and likewise for v_2)

$$K_1 = \frac{1}{2}m_1v_1^2 = \frac{1}{2}\left(\frac{1}{2}m_2\right)(2v_2)^2 = 2\left(\frac{1}{2}m_2v_2^2\right) = 2K_2 \ .$$

(a) We substitute $K_1 = 2K_2$ into the energy conservation relation and find

$$U_i = 2K_2 + K_2 \quad \Longrightarrow \quad K_2 = \frac{1}{3}U_i = 20 \text{ J} \ .$$

(b) And we obtain $K_1 = 2(20) = 40$ J.