38. No mechanical energy is "lost" in this encounter, so we analyze it with the elastic collision equations, particularly Eq. 10-38. Thus,

$$v_{1f} = \frac{m_1 - m_2}{m_1 + m_2} v_{1i} + \frac{2m_2}{m_1 + m_2} v_{2i} \approx \ -v_{1i} + 2v_{2i}$$

where we have made the (certainly reasonable) approximation that $m_2 \gg m_1$ and simplified accordingly. Thus, $v_{1\,f} = -12 + 2(-13) = -38$, resulting in a final speed (relative to the Sun) of 38 km/s.