39. Energy conservation for this situation may be expressed as follows:

$$\begin{aligned} K_1 + U_1 &= K_2 + U_2 \\ \frac{1}{2}mv_1^2 - \frac{GmM}{r_1} &= \frac{1}{2}mv_2^2 - \frac{GmM}{r_2} \end{aligned}$$

where $M = 5.98 \times 10^{24}\,\text{kg}$, $r_1 = R = 6.37 \times 10^6\,\text{m}$ and $v_1 = 10000\,\text{m/s}$. Setting $v_2 = 0$ to find the maximum of its trajectory, we solve the above equation (noting that m cancels in the process) and obtain $r_2 = 3.2 \times 10^7$ m. This implies that its *altitude* is $r_2 - R = 2.5 \times 10^7$ m.