36. (a) We note that *height* $= R - R_{\text{Earth}}$ where $R_{\text{Earth}} = 6.37 \times 10^6$ m. With $M = 5.98 \times 10^{24}$ kg, $R_0 = 6.57 \times 10^6$ m and $R = 7.37 \times 10^6$ m, we have

$$K_i + U_i = K + U \implies \frac{1}{2}m\left(3.7 \times 10^3\right)^2 - \frac{GmM}{R_0} = K - \frac{GmM}{R}$$

Solving, we find $K = 3.8 \times 10^7$ J.

(b) Again, we use energy conservation.

$$K_i + U_i = K_f + U_f \implies \frac{1}{2}m\left(3.7 \times 10^3\right)^2 - \frac{GmM}{R_0} = 0 - \frac{GmM}{R_f}$$

Therefore, we find $R_f = 7.40 \times 10^6$ m. This corresponds to a distance of $1034.9 \approx 1.03 \times 10^3$ km above the earth's surface.