46. $r = 700\,000\text{ m} + 6.37\text{E}6\text{ m}$

$2V_{co} = ?$

$$V_{co} = \sqrt{\frac{GM}{r}}$$

$$= \sqrt{\frac{G(5.98\text{E}24)}{7.07\text{E}6}}$$

$$V_{co} = 7511\text{ m/s}$$

$$2V_{co} = 15\,022\text{ m/s}$$

44. $T = ?$ (lunar months)

$$r = \frac{1}{2} r_m$$

$$\frac{T^2}{r^3} = \frac{4\pi^2}{GM} = \frac{T^2}{r^3}$$

$$\frac{1^2}{r^3} = \frac{T^2}{(0.5r)^3} \qquad \frac{1}{1} = \frac{T^2}{0.125}$$

$$0.354_{lm} = T$$

61. Alt = ? $r - R_E$ = ?

$$K_f = \Delta U$$

$$K_f = U_f - U_{R_E}$$

$\left(K = G\frac{mM}{2r} \quad K = \frac{1}{2}mv^2 \quad K = -U/2 \right)$

$$\frac{-U_f}{2} = U_f - U_{R_E}$$

$$\frac{GMm}{2r_f} = \frac{-GMm}{r_f} - \left(-G\frac{Mm}{R_E}\right)$$

$$\frac{1}{2r_f} = -\frac{1}{r_f} + \frac{1}{R_E}$$

$$\frac{3}{2r_f} = \frac{1}{R_E}$$

$$3R_E = 2r_f$$

$$\frac{3}{2}R_E = r_f$$

Altitude $= \frac{R_E}{2}$