8-9 a) By the virial theorem $T = -V/2$ for a circular orbit.

Firing the rocket does not change V, so $V_f = V_i$

$$T_f = \frac{1}{2} m (v^2 + v^2) = 2T_i$$

$$TME_f = 2T_i + V_i = -V_i + V_i = 0$$

Since $TME_f = 0$ the ratio $\frac{TME_f}{TME_i} = 0$

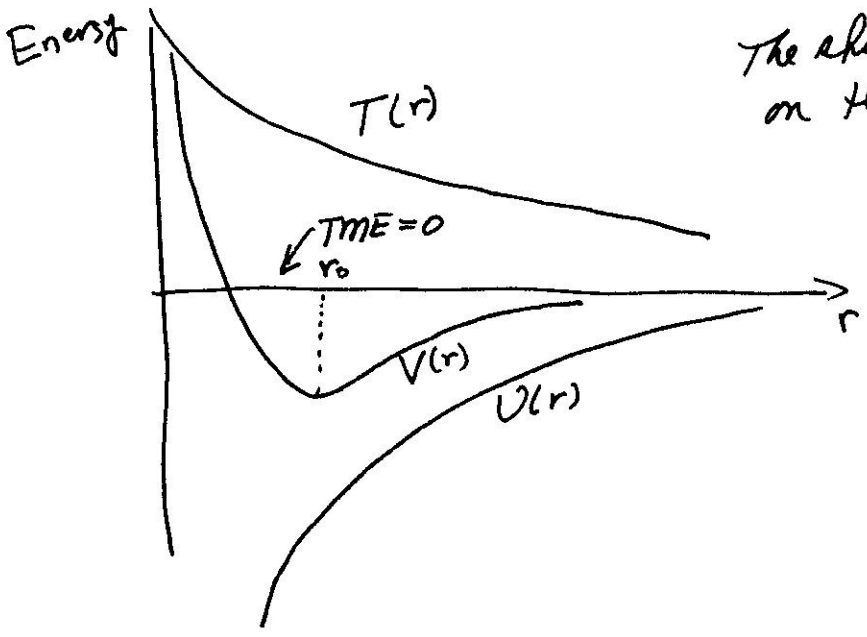
Firing the rocket is in the radial direction so there is no change in angular momentum.

$$\frac{l_f}{l_i} = 1$$

b) $TME = 0 \Rightarrow$ parabolic orbit so the satellite will be lost.

$$U(r) = -G\frac{m_e m_s}{r} \; ; \; T(r) = TME - U = G\frac{m_e m_s}{r}$$

$$V(r) = U(r) + \frac{l^2}{2\mu r^2} = -G\frac{m_e m_s}{r} + \frac{l^2}{2\mu r^2}$$



The shape of $V(r)$ depends on the magnitude of l.