Gravity Supplement

Kepler's third law:

$$T^2 = \frac{4\pi^2}{G\,M}\,r^3$$

Gravitational Potential Energy:

$$U(r) = -\frac{G\,M\,m}{r}\ .$$

Change in potential energy:

$$\triangle U = U(r_{\text{new position}}) - U(r_{\text{old position}})\ .$$

Velocity in a circular orbit:

$$v = \frac{2\pi\,r}{T} = \sqrt{\frac{G\,M}{r}}\ .$$

Kinetic Energy:

$$K = m\,\frac{v^2}{2}\ .$$