NYU Physics I — 2017-11-16.

Agenda — Orbital elements.

— Exam 5.

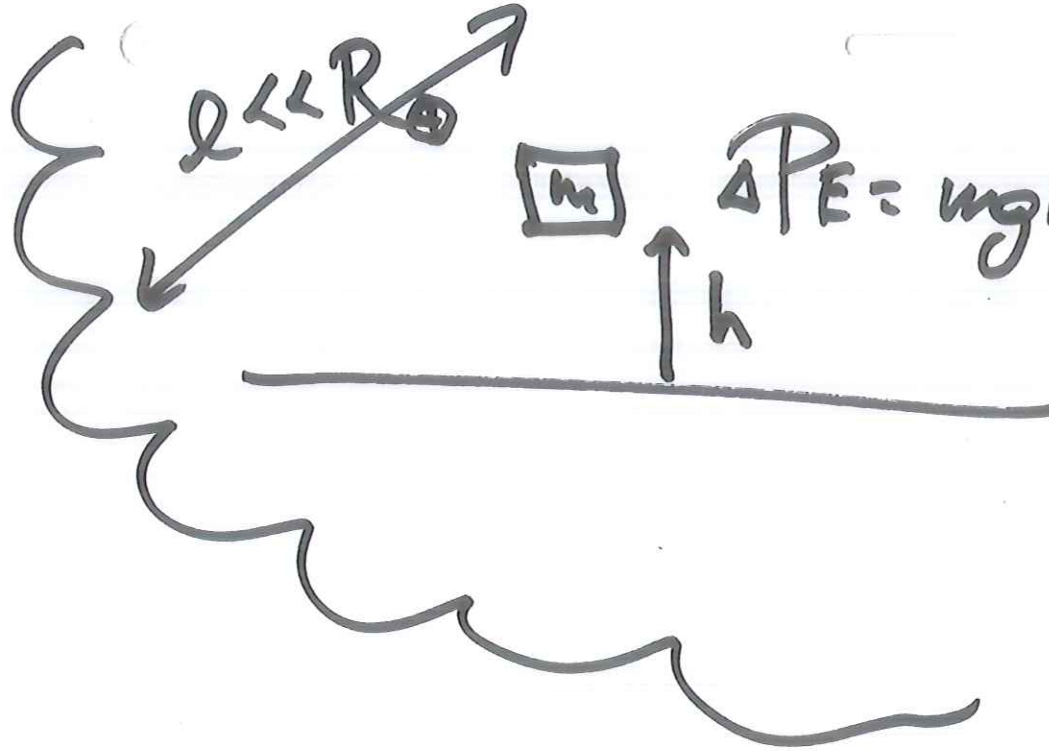
reading: Newtonian gravity

Kepler's laws.

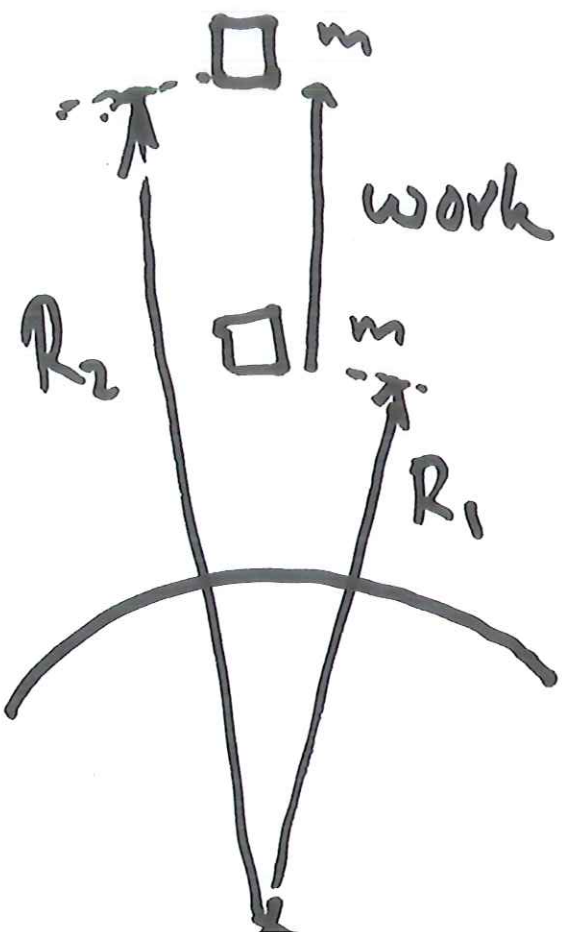
$$G\frac{Mm}{R^2}$$

$$F = \frac{G M_{\oplus} m}{R^2}$$

$$\Delta PE = \int_{R_1}^{R_2} \frac{G M_{\oplus} m}{R^2}\, dR$$



$\Delta PE = mgh$



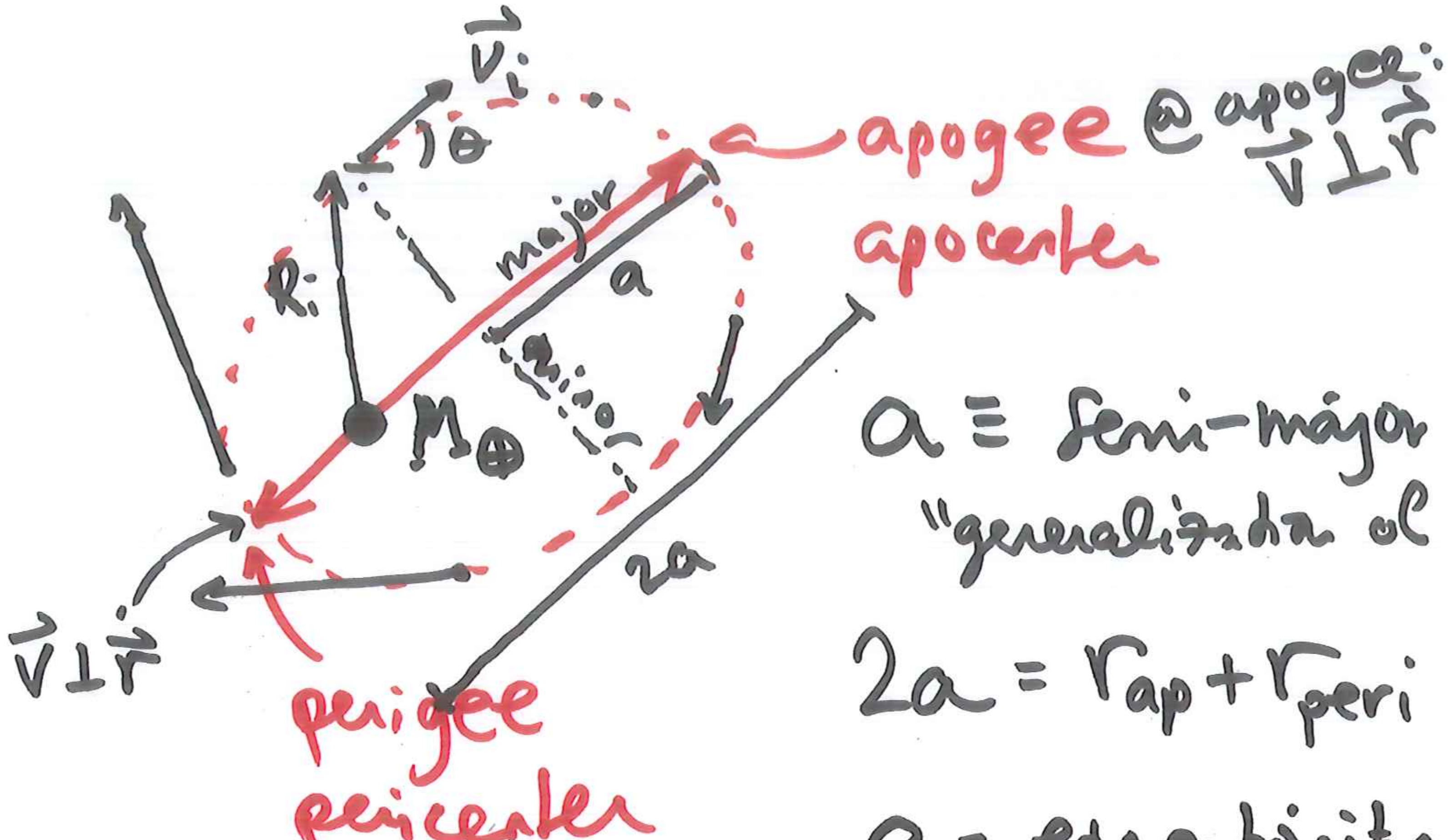
work done? $W = \int \vec{F} \cdot d\vec{R}$

$$\int_{R_1}^{R_2} \frac{GM_\oplus m}{R^2}\, dR = GM_\oplus m \int_{R_1}^{R_2} R^{-2}\, dR$$

$$\underline{\underline{\Delta PE}} = \left[-\frac{GM_\oplus m}{R}\right]_{R_1}^{R_2} = \boxed{-\frac{GM_\oplus m}{R_2}} + \underline{\frac{GM_\oplus m}{R_1}}$$

potential energy in Gravity.

"zero of P.E. is @ ∞"



$0 < e < 1$: ellipse
$e = 0$: circle
$e = 1$: parabola
($e > 1$: hyperbola)

$a \equiv$ semi-major axis.
"generalization of radius".

$2a = r_{ap} + r_{peri}$

$e \equiv$ eccentricity
"radial asymmetry"

$$e \equiv \frac{r_{ap} - r_{peri}}{r_{ap} + r_{peri}}$$

$$\boxed{\begin{aligned} T.M.E &= \frac{1}{2}m(v_r^2 + v_t^2) - \frac{GM_{\oplus} m}{r} \\ L &= m v_t r \end{aligned}}$$