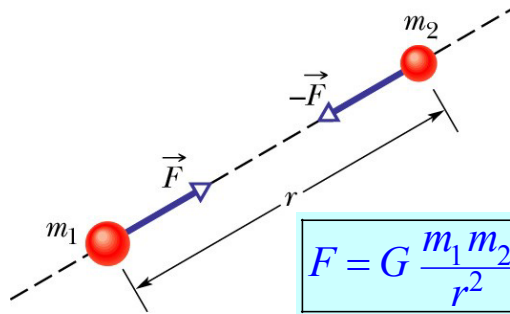# Gravitation – Chapter 14 - Summary

$$F = G\,\frac{m_1 m_2}{r^2}$$

$$a_g = \frac{G M}{r^2}$$

$$\frac{G M}{R^2} = g$$

$$F = \frac{G m M_{ins}}{r^2}$$
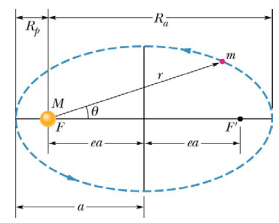
$$mg = ma_g - m(\omega^2 R)$$

$$g = a_g - \omega^2 R$$

$$U = -\frac{G M m}{r}$$

$$U = -\left(\frac{Gm_1 m_2}{r_{12}} + \frac{Gm_1 m_3}{r_{13}} + \frac{Gm_2 m_3}{r_{23}} \right)$$

$$v_{esc} = \sqrt{\frac{2 G M}{R}}$$

$$K_f + U_f = K_i + U_i$$

$$\frac{dA}{dt} = \frac{L}{2m} = \text{constant}$$

$$T^2 = \left(\frac{4\pi^2}{GM} \right) a^3$$

$$\frac{T^2}{a^3} = constant$$

$$K = -\frac{U}{2}$$

$$E = -\frac{GMm}{2r}$$

$$E = -K$$

(circular orbit)

$$E = -\frac{GMm}{2a}$$

(elliptical orbit, in general)

Lecture notes by Dr. M. S. Kariapper
KFUPM - PHYSICS