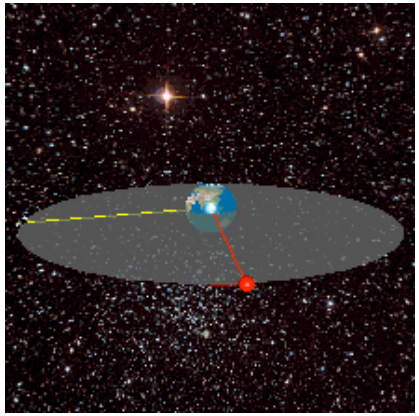
Satellite & Planetary Motion

Reminder: Universal Gravitation

$$F_g = \frac{Gm_1m_2}{r^2}$$

$$G = 6.67 \times 10^{-11} \frac{Nm^2}{kg^2}$$

Ex 1: A 150 kg satellite is launched into an orbit of 12,800 km above Earth's surface. What is the satellite's orbital speed?



What is the satellite's orbital period?

At a given radius, a satellite can only have one speed and one period. If you have either r, v, or T, you can find the other two.

Geosynchronus satellite is one that has the same period as the earth's rotation period.

Ex 2: Two identical stars rotate about their mutual center of mass. If $m = 2 \times 10^{22}$ kg and the separation is 50 km, find the orbital period of each star.