

Kap 13 Gravitasjon

Gravitasjonskraft

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

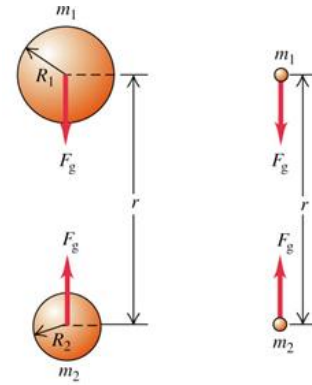
$$G = 6.67 \cdot 10^{-11} \frac{\text{Nm}^2}{\text{kg}^2}$$

Tyngde

$$w = F_g = G \frac{m_E m}{R_E^2}$$

Tyngdeakselerasjon

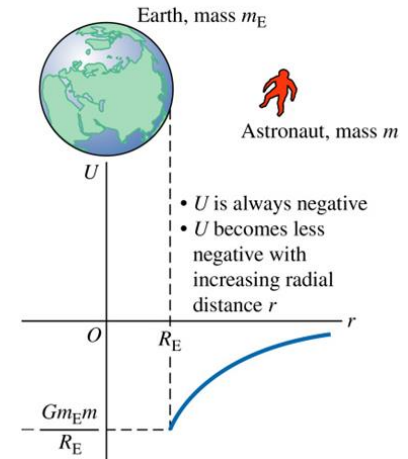
$$g = \frac{F_g}{m} = G \frac{m_E}{R_E^2}$$



Potensiell energi

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

Gravitational potential energy $U = -\frac{Gm_E m}{r}$



Kap 13 Gravitasjon - Satellitt

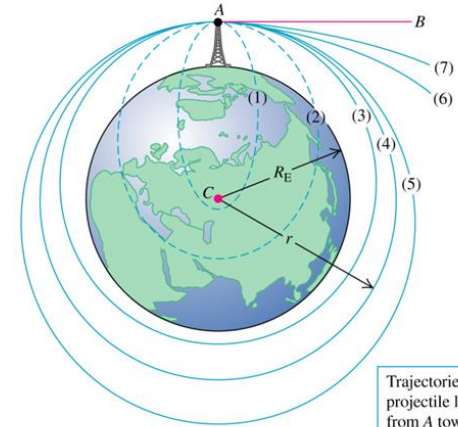
Satelitt – hastighet

$$v = \sqrt{G \frac{m_E}{r}}$$

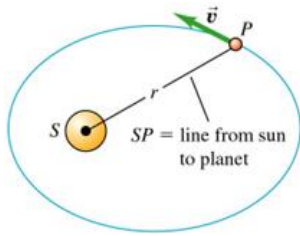
Satelitt – periode

$$T = \frac{2\pi r}{v} = 2\pi r \sqrt{\frac{r}{r G m_E}} = \frac{2\pi r^{\frac{3}{2}}}{\sqrt{G m_E}}$$

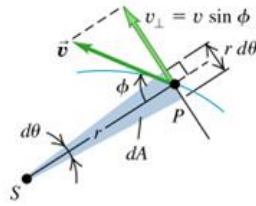
$$T = \frac{2 \cdot \pi \cdot a^{\frac{3}{2}}}{\sqrt{G(m_p + m_s)}}$$



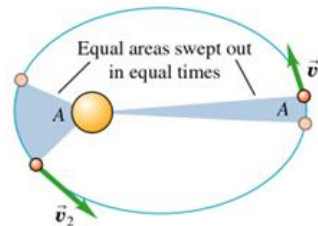
Trajectories (1) through (7): projectile launched from A toward B with increasing speed



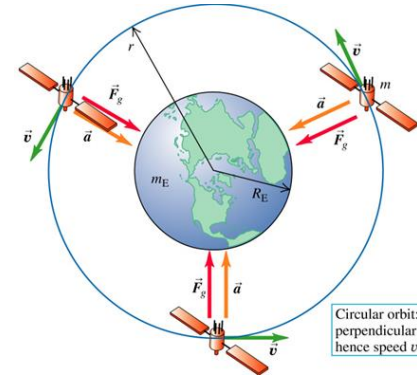
(a)



(b)



(c)



Circular orbit: acceleration \vec{a} perpendicular to velocity \vec{v} , hence speed v is constant

Kap 13 Gravitasjon - Sort hull

Schwarzschild radius (sort hull) $R_s = \frac{2GM}{c^2}$

