Formulari Física: Camp Gravitatori

2n de Batxillerat

Curs 2020/2021

Llei de gravitació universal (N)

$$\vec{F} = -G\frac{Mm}{d^2}\hat{u}$$

Camp gravitatori $\left(\frac{N}{kg}\right)$

$$g = \frac{F}{m} = -G\frac{M\cancel{m}}{d^2\cancel{m}} = -G\frac{M}{d^2}$$

Energia potencial (J)

$$U = Fd = -G\frac{Mm\cancel{d}}{\cancel{d^2}^{\,d}} = -G\frac{Mm}{d}$$

Potencial Gravitatori $\left(\frac{J}{kg}\right)$

$$V = \frac{U}{m} = -G\frac{M\cancel{m}}{d\cancel{m}} = -G\frac{M}{d}$$

Velocitat d'escapament $\left(\frac{m}{s}\right)$

$$E_c + E_p = 0 = E_c + U \Rightarrow E_c = -U = \frac{1}{2}\cancel{m}v_e^2 = G\frac{M\cancel{m}}{d} \Rightarrow v_e = \sqrt{\frac{2GM}{d}}$$

Velocitat orbital $\left(\frac{m}{s}\right)$

$$F_c = F = \cancel{m}\frac{v^2}{\cancel{d}} = G\frac{M\cancel{m}}{\cancel{d^2}^{\,d}} \Rightarrow v = \sqrt{\frac{GM}{d}}$$

Període orbital (s)

$$v = \sqrt{\frac{GM}{d}} \Rightarrow \left(\frac{2\pi d}{T}\right)^2 = \frac{GM}{d} \Rightarrow T^2 = \frac{4\pi^2 d^3}{GM} \Rightarrow T = \sqrt{\frac{4\pi^2 d^3}{GM}}$$