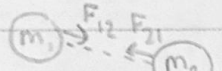
Non-Contact Forces PH 111

Newton's Universal Law of Gravitation

$\vec{F}_G = G(m_1 m_2 / r_{12}^2)\hat{r}_{12}$

Limits on Newton's second law

1. Only works in non inertial reference frames, not accelerating
2. Only applies when v<<<c=speed of light

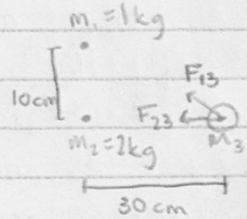


$F_{12} = -F_{21}$

G = gravitational constant = $6.67 \times 10^{-11}\ Nm^2/kg^2$

↙ Field

$G(M_E/R_E^2)\hat{r} = 9.8\ m/s^2 \downarrow$



Find F_G on m_3

$F_{13} = G^{(1)(3)}/_{0.1^2 + 0.3^2}$

$F_{23} = G^{(2)(3)}/_{0.3^2}$

$F_{Gx} = F_{13x} + F_{23}$ $F_{Gy} = F_{13y}$

$R_{F_G} = \sqrt{F_{Gx}^2 + F_{Gy}^2}$ $\theta = \tan^{-1}(F_{Gy}/F_{Gx})$

Electricity

1. Charge is conserved
2. Charge is quantized

SI unit = Columb (C)