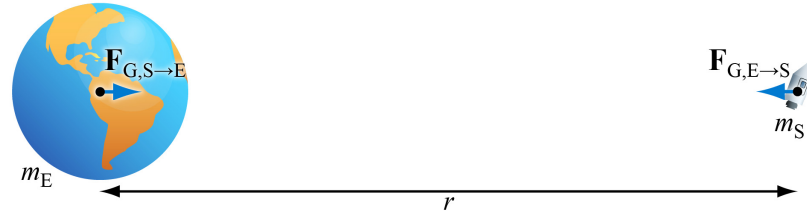
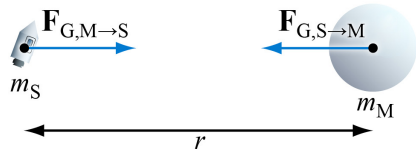
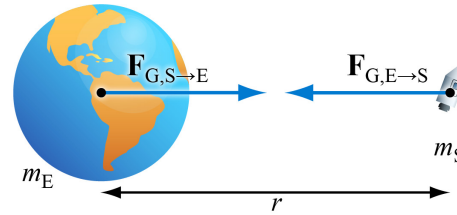
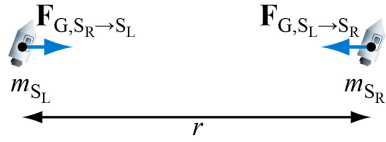


Newton's law of universal gravitation



Force

magnitude

$$|\vec{\mathbf{F}}_G| = G \frac{m_1 m_2}{r^2}$$

direction

attractive

Universal constant

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

Superposition

$$\vec{\mathbf{F}}_{G,1 \& 2 \text{ ON } 3} = \vec{\mathbf{F}}_{G,1 \text{ ON } 3} + \vec{\mathbf{F}}_{G,2 \text{ ON } 3}$$

Potential energy

$$U_G = -G \frac{m_1 m_2}{r} \quad (\text{relative to infinite separation})$$

Superposition

$$U_{G,\text{PARTICLES}} = \sum_{\text{PAIRS}} U_{G,i \text{ AND } j}$$