NEWTON'S LAWS:

Newton' s First Law of Motion (the Laws of Inertia)

An object will remain at rest or in uniform motion unless acted upon by an external unbalanced force.

Newton' s Second Law of Motion:

$$\vec{F}_{net} = m\vec{a}$$

$\vec{F}_{net}$: Net force (Newton, N)

m: Mass (kg)

$\vec{a}$: Acceleration $\left(\frac{m}{s^2}\right)$

Newton' s Third Law of Motion:

For every action (applied) force, there is an equal and opposite reaction force. The reaction force is equal in magnitude and opposite in direction to the action force.

Friction and the Normal Force:

$$F_f = \mu F_n$$

F_f : Frictional force (Newton, N)

μ: Coefficient of friction (dimensionless) (μ_k : Kinetic friction < μ_s : Static friction)

F_n = Normal force (always perpendicular to the surface) (Newton: N)

Newton' s Law of Universal Gravitation:

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

G = 6.67×10^{-11} ($\frac{Nm^2}{kg^2}$) Universal gravitational constant

F_g **:** Gravitational force (Newton: N)

m_1: Mass of the first object (kg)

m_2: Mass of the second object (kg)

r: Separation of the centres of two objects

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Gravitational Acceleration

$$g = \frac{Gm_E}{r_E^2}$$

g: Gravitational Acceleration near the earth's surface $\left(\frac{m}{s^2}\right)$

m_E : Mass of the earth (kg) = 5.98×10^{24} kg

r_E : Radius of the earth (m) = 6.38×10^6 m