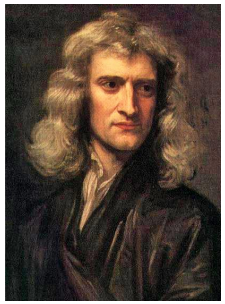
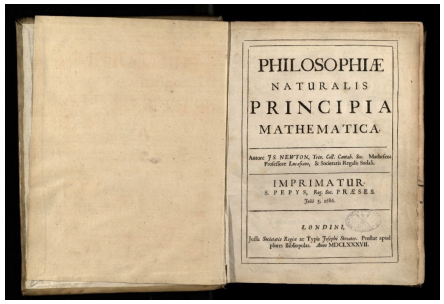
Lecture 6

Tuesday, May 16, 2023 9:52 AM

- How the Motion Happens – Kinematics — Experimental Physics (Measurement)
- Why the Motion Happens – Dynamics — Theoretical Physics

Isaac Newton (1642–1727)





⇒ Newton's Three Laws of Motion:

(1) Two new quantities
- m – inertial mass
- $\vec{F}$ – Force

(2) Concept of Inertial Reference Frame
- RF with $\vec{V}_{RF}$ = const
  - Includes ($\vec{V}_{RF} = 0$)

- Concept of Force → result of Direct action on object (P.O.)

1. Force — magnitude, Direction → $\vec{F}$ Vector

2. $\vec{F}_{Net} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3$

3. $\vec{F}_{Net} = 0$ P.O.

IRF

B.O.

- Concept of Inertial Mass

$\vec{F}_{Net} = 0$ Object is Moving

[Property of object is to attain its Velocity in IRF, when $\vec{F}_{Net} = 0$]

Inertia → characterized by → Inertial Mass

$m\ [m] = kg$

- Conservation of Mass

- Mass always Present ~~never disappears~~ never appears

$E = \Delta m c^2$

$c = 300\,000\,000\ \frac{m}{s}$

$E = mc^2$

- Two objects m_1 m_2 together
have mass $m_1 + m_2$

- Newton's Three Laws

Law 1. In Inertial Reference Frames if $\vec{F}_{Net} = 0$

$\vec{V}_{object} = const$ (all the time)

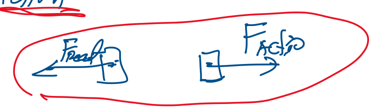
Law 2. if $\vec{F}_{Net} \neq 0$

$$\vec{F}_{Net} = m\vec{a}_{object}$$

So. $[F_{Net}] = [m \cdot a] = [m][a] = kg\frac{m}{s^2} = N$

Law 3.

$$\vec{F}_{Reaction} = -\vec{F}_{Action}$$



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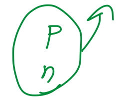

$p = m_p$

$n = m_n$

$m_d = m_p + m_n$

$m_d < m_p + m_n$

Δm

ITER

m_d

$d + d = He$

Highlight