

Nomos package

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Nomenclature

Latin

Symbol	Description	Value	Unit	Domain
F	Gravitational force		N	$\mathbb{R}_{\geq 0}$
G	Gravitational constant	6.67430×10^{-11}	$\text{m}^3\text{kg}^{-1}\text{s}^{-2}$	
m_1	Mass of body 1		kg	$\mathbb{R}_{\geq 0}$
m_2	Mass of body 2		kg	$\mathbb{R}_{\geq 0}$
r	Distance between the centers of the masses		m	$\mathbb{R}_{> 0}$
M	Mass of the larger body		kg	$\mathbb{R}_{\geq 0}$

Greek

Symbol	Description	Value	Unit	Domain
Φ	Gravitational potential		J kg^{-1}	$\mathbb{R}_{\leq 0}$

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Newton's Law

The relationship between the Earth and the Moon is governed by Newton's Law of Universal Gravitation. It posits that the gravitational force (F) between two bodies is proportional to the product of their masses and inversely proportional to the square of the distance between them. Since its a force, F is express in N.

The Formula

The central equation for this interaction is:

$$F = G \frac{m_1 m_2}{r^2}$$

Where:

- F is the gravitational force expressed in N in $\mathbb{R}_{\geq 0}$.
- G is the gravitational constant which is equal to $6.67430 \times 10^{-11} \text{ m}^3\text{kg}^{-1}\text{s}^{-2}$.
- m_1 is the mass of body 1 expressed in kg in $\mathbb{R}_{\geq 0}$.
- m_2 is the mass of body 2 expressed in kg in $\mathbb{R}_{\geq 0}$.
- r is the distance between the centers of the masses expressed in m in $\mathbb{R}_{> 0}$.

Gravity at the Local Level

The potential energy or the force acting on an object is the gravitational potential (Φ) given by:

$$\Phi = -\frac{G M}{r}$$

Where:

- Φ is the gravitational potential expressed in J kg^{-1} in $\mathbb{R}_{\leq 0}$.
- M is the mass of the larger body expressed in kg in $\mathbb{R}_{\geq 0}$.