

LETTERS TO THE EDITOR

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Weight and mass

Evaluating some works, including my own, I observed that we are committing a primary error in respect to demographic data, when we refer to weight. Thus, I would like to make some comments and after a suggestion.

Inertial Mass

When trying to modify the inertial state of any body, it will resist this modification. Inertia is the propriety of matter related to the tendency of a body to stay at rest or in uniform movement. Mass is the term used to measure inertia. The greater the mass (m) of a body the less its acceleration will be under the action of an applied force. For example: If a specific force acting on a body of 3 kg provokes an acceleration of 4m/s^2 , the same force, applied on a mass of 6 kg will provoke an acceleration of 2m/s^2 . It is important to stress that mass can not be confused with weight. The weight of a body is equal the force of the gravity that acts on the body and varies with its location. On the other hand, the mass of a body is always the same, wherever it is. A body with mass of 10 kg on the Earth will also have a mass of 10 kg in the moon. Mass is a property inherent to a body and independent of the location of the body and of the method adopted to measure it. As mass obeys the ordinary laws of arithmetic, several masses can be combined in a simple numerical manner.

Weight

The force exerted by the Earth on a body is the weight of the body (W). This force is directed to the center of the earth. When a body in free fall has an acceleration g directed to the center of the earth, on applying the second law of Newton ($\Sigma \vec{F} = m \cdot \vec{a}$), we have:

$$W = mg$$

Acceleration (a) = g (acceleration of gravity) and F_g (Gravitational force) = W (weight)

So, as it is dependent on g, the weight varies with the geographical localization. The weight, however, as opposed to mass, is not an inherent invariable property of a body. It is thus, not possible, to confuse weight with mass. For example: a ten-pin bowling ball with a mass of 10 kg weighs 98 N (Newtons = kg m/s^2 on the earth's surface, but would weigh only 17 N on the moon. The mass is the same on the earth and on the moon, but the acceleration of the free fall on the moon is only 1.7m/s^2 and on the earth 9.8m/s^2 (at sea level at the equator).

Suggestion:

That a correction for mass should be made when we use the gram or multiples thereof, as weight is a measure of force (vectorial) and its size is measured in N (Newtons), dynes or pounds.

BIBLIOGRAPHIC REFERENCES

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