Newton's Laws

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Everything can be related back to them.

First Law

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Mathematical Statement of the First Law:

$$\sum_i \vec{F}_i = 0 \qquad \Longrightarrow \qquad \frac{\Delta \vec{v}}{\Delta t} = 0$$

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Third Law

If object$_1$ acts on object$_2$ with a force F, then object$_2$ acts on object$_1$ with a force of $-F$.

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"For every action there is an equal and opposite reaction."

Applications

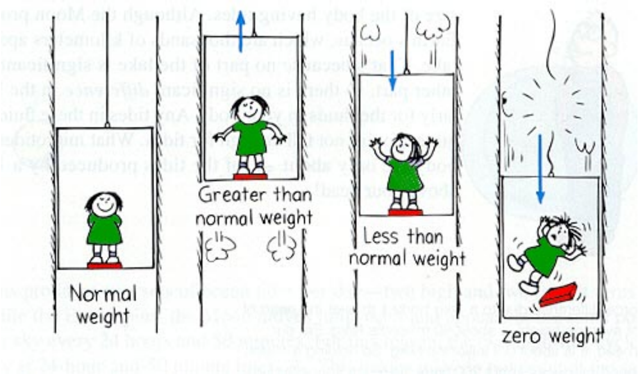
A 5 kg mass is at rest on a table. What is the sum of the forces acting on it? Draw a free-body diagram.

Applications

A 10 kg mass is hanging on a string. What is the sum of the forces acting on it? Draw a free-body diagram.

Applications

Inertial Reference Frame



Applications

A 10 kg mass is hanging on 2 strings. What is the tension in each string? Draw a free-body diagram.

Applications

A 10 kg mass is hanging on a clothesline. If the clothesline makes an angle of 15° with the horizontal, what is the tension in the clothesline?

Applications

A 10 kg mass is being acted upon by two forces. $\vec{F_1} = 12N, 25^\circ$ and $\vec{F_2} = 20N, 120^\circ$. Draw a free-body diagram and find the direction and magnitude of the acceleration.