

Newton's Laws of Motion

Sir Isaac Newton (1642-1727) described the three principles that connect force with movement. These are known as *Newton's laws of motion*. Although Newton's laws are found to be obeyed in non-extreme situations, another great scientist – Albert Einstein – showed that an alternative theory – the theory of relativity – governs motion at speeds close to the speed of light.

Newton's First Law

Every body continues in a state of rest or of uniform velocity unless acted upon by a resultant force.

This law defines force. It states that force accelerates a body and when no force acts on a body then it continues with its velocity unchanged.

Newton's Second Law

The rate of change of momentum of an object is proportional to the resultant force which acts on the object.

Since an object's momentum is the product of its mass and its velocity¹. In many cases the mass is constant and the rate of change of momentum is proportional to the product of the mass and the rate of change of velocity. If we select the constant of proportionality carefully (with appropriate units) then the law is most simply stated by saying '*force equals mass times acceleration*'. The unit of force is the Newton (N).

Newton's Third Law

When two objects interact, they exert equal and opposite forces on one another.

¹ [Momentum](#)