# Newton's laws of motion

*Newton's laws of motion* can be stated as follows.

- *Newton's first law*. A particle continues in a state of rest or uniform motion in a straight line unless a force acts on it.
- *Newton's second law*. If a resultant force acts on a particle, the particle's linear momentum changes at a rate proportional to the size of the force and in the same direction as the force, $\mathbf{F} = \frac{d}{dt}(m\mathbf{v})$. In the case where the mass is constant, this becomes $\mathbf{F} = m\mathbf{a}$, where $\mathbf{a}$ is the acceleration.
- *Newton's second law*. When one object exerts a force upon another, there is always a reaction force equal in size and opposite in direction to the acting force.