## 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.