

Newton's laws of Motion

Knowledge organiser

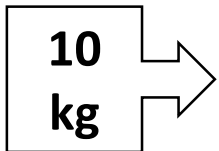
Newton's First Law

Newton's first law tells us: Vehicles moving at a constant speed have a driving (push) force exactly equal to the resistive forces (like friction); Velocity (speed and direction) will only change if there is a resultant force acting (so the resultant force is NOT zero). If an object changed direction, it must have been because of a resultant force

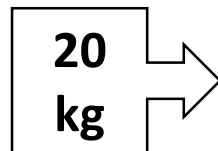
Newton's Second Law

This law follows on very sensibly from the first law. It reminds us that an object will only change in velocity (accelerate) if there is a resultant force acting on it. It also shows that the amount of acceleration depends on the resultant force and the mass of the object.

e.g. if a resultant force of 20 N acts on this object, the acceleration will be $20 \div 10 = 2$ m/s/s



But with this object, the same resultant force only causes an acceleration of $20 \div 20 = 1$ m/s/s.



Newton's Third Law

If object A exerts a force on object B, then object B exerts an equal but opposite force on object A.

This law explains why pushing down with your legs makes you jump up (the ground pushes back with the same size force as your push). It also explains why rockets can fly through space: the gases pushing out the back cause the rocket to move forward.

Terminal velocity

When you jump out of a plane you accelerate because the force of the air pushing against you is not as strong as gravity. As you accelerate, the force of the air pushing against you increases. Eventually, the force of air resistance is equal to the force of gravity. You stop accelerating. You have reached terminal velocity. When you pull your parachute, the air resistance becomes the larger force and so you slow down.

