

Balanced and Unbalanced Forces

- **balanced forces**

if object is not moving it will remain **stationary**

if object **already moving** it will move at a **steady speed**

- **unbalanced forces**

object will **accelerate** if larger force is in direction object is moving

object will **decelerate** if larger force is in the opposite direction it is moving

Newton's Second Law

- **Force(N)=mass(kg) x acceleration(m/s^2)**
- **Mass** - how much matter there is, measured in kg
- **Weight** - the force when gravity acts on a mass, measured in N
- **On Earth there is 10N of weight acting on every 1kg of mass so 12kg of mass will have a weight of 120N**

Terminal Speed

- **Terminal Speed** - the maximum speed when the forward push is balanced by the air resistance and friction
- as objects falls **faster** their **air resistance increases**
- this means the **resultant force** acting downwards **decreases** (and so its acceleration decreases)
- eventually **air resistances** balances the objects **weight**
- the **resultant force is zero**, **acceleration is zero** so the object falls with a **steady speed** called terminal speed
- **cars** and other vehicles also **have terminal speed**, this is the maximum speed they can achieve.

Newton's Third Law

- **action and reaction**
the force exerted by **object A** on **object B** is equal in size and **opposite** to the force exerted by **object B** on **object A**
eg., rocket propulsion, gun recoil

Work

- **work is done when an object moves**
- **the more force needed to move it the more work is done**
- **the greater the distance it moves the more work is done**
- **work is energy**

$$\text{Work (J)} = \text{Force (N)} \times \text{distance (m)}$$

Stopping Distance

- how far a car goes when stopping
- 2 parts:

Thinking distance – how far it goes while driver reacts

Braking distance – how far it goes while braking

- These are increased by:

Thinking – drugs, alcohol, using mobile phone, tiredness, greater speed

Braking – worn tyres, worn brakes, icy/wet roads, greater speed

- Doubling the speed:

Doubles thinking distance

Braking distance 4X greater

Safety in Cars

- Crumple Zones eg., engine bay/boot – increase time to stop, deceleration less, force on passenger less
- Air Bags – work in same way, longer time to stop so force is less

