**A force is a push, a pull or a twist**. Whenever there is a change in motion, a force has acted. **A force can**:

* Start something moving or **speed it up**. Acceleration is when something moves faster.
* Stop or **slow down** an objects motion. Deceleration is when something slows down.
* Cause an object to **change direction**.
* **Change the shape** of something.

**Measuring Forces**

A **spring balance** can be used to measure a force. The larger the force, the more the spring is stretched, and the higher the reading on the scale. Bathroom scales use a spring that is squashed or compressed to measure force.

**Force is measured** in a unit called the **newton** (symbol N) – Named after Sir Isaac Newton. It takes about 1N to lift an apple.

* **Balanced Forces**: The sum of all the **forces acting** on an object is **zero**.
The object **does not** speeds up, slows down ore changes direction.

 \* All of the forces
 acting on the rider
 are balanced as
 indicated by the
 arrows being the
 same length.

**driving force**

**friction**

* **Unbalanced Forces:** The **overall force** acting on an object is **not zero**.
The motion of an object will change whenever forces are not balanced.

Whenthe handlebars are turned, **force** acts on the bike causing it to **change direction.**

**Inertia**
Inertia is the **tendency of an object to resist any change in motion**. Newton’s first law of motion states that:

* Anything that is not moving will stay that way **unless a force makes it move**.
* Anything that is moving will keep moving at the same speed and in the same direction **unless a force makes it change**.



**Friction** between the tyres and the road acts on the car and **overcomes its inertia**.

This force **does not** act directly on the people. **Inertia** tends to keep them moving at the **same speed** and in the **same direction**.

Wearing seatbelts while travelling in a car and a helmet while riding a bike
help to protect you from the effects of inertia. In a front-on collision,
although the car has stopped, the motion of its passengers continues
at the same speed and direction.

Car turns left.
People lean to right

**The Effect of Mass**

The **more massive** something is, the **greater its inertia**.
This means it takes a **greater force to change its motion**.

The **force of friction is greater** than the driving force. This causes the rider and bike to
**slow down** or **come to a stop**.

The **forward force is greater** than the force of friction. This causes the rider and bike to **start moving** or **speed up.**