**Force**

Force is a push or a pull. Force is therefore that which changes a body’s state of motion or shape.  
The SI unit for force is **Newton (N)**. It is a *vector quantity*.

**Types of forces**

**1. Gravitational force** –this is the force of attraction between two bodies of given masses.  
- Earth's gravitational force is the force which pulls a body towards its center. This pull of gravity is called **weight**.  
**2. Force of friction** – this is a force which opposes the relative motion of two surfaces in contact with each other. Friction in fluids is known as viscosity.  
**3. Tension force** – this is the pull or compression of a string or spring at both its ends.  
**4. Upthrust force** – this is the upward force acting on an object immersed in a fluid.  
**5. Cohesive and adhesive forces** – cohesive is the force of attraction of molecules of the same kind while adhesive is the force of attraction of molecules of different kinds.  
**6. Magnetic force** – this is a force which causes attraction or repulsion in a magnet.  
**7. Electrostatic force** – this is the force of attraction or repulsion of static charges.  
**8. Centripetal force** – this is a force which constrains a body to move in a circular orbit or path.  
**9. Surface tension** – this is the force which causes the surface of a liquid to behave like a stretched skin. This force is cohesive.  
  
*Factors affecting surface tension*  
a) **Impurities** – they reduce the surface tension of a liquid i.e. addition of detergent.  
b) **Temperature** – rise in temperature reduces tension by weakening inter-molecular forces.

**Mass and weight**

**Mass** is the amount of matter contained in a substance while **weight** is the pull of gravity on an object.  
The SI unit for mass is the **Kg** while weight is the newton **(N)**. Mass is constant regardless of place while weight changes with place.  
Weight = Mass x g, where g is the **gravitational force**

**Differences between mass and weight Mass**

**Mass**  
It is the quantity of matter in a body  
It is measured in kilograms  
It is the same everywhere  
It is measured using a beam balance  
Has magnitude only Weight  
  
**Weight**  
It is the pull of gravity on a body  
It is measured in newton's  
It changes from place to place  
Measured using a spring balance  
Has both magnitude and direction

-- select another example --

**Measuring Force**

A spring balance is the most common tool for measuring force.

The length of a spring is 16.0 cm. its length becomes 20.0 cm when supporting a weight of 5.0 N. Calculate the length of the spring when supporting a weight of 6.0 N.  
  
*Solution*  
5N stretches to a length of (20.0 - 16.0) = 4cm  
hence 1N = 4 ÷ 5 = 0.8 cm  
Therefore, 6.0 x 0.8 = 4.8cm  
Overall length will be: 16.0 + 4.8 = 20.8cm  
**= 20.8**

**Vector and Scalar Quantities**

A **scalar quantity** is a quantity which has magnitude (size) only . Examples are distance, mass, speed  
  
A **vector quantity** is a quantity which has both magnitude and direction. Examples are displacement, weight, velocity