Chapter Five

Force, Weight And Mass:

- Force simply refers to either a push or a pull.
- An object which is not moving is said to be in a state of rest.
- We can apply a force to this object so as to cause it to start moving.
- If we apply a force to this object and it starts moving, then we say that we have changed the state of rest of the object.

The effects of force:

- Force has certain effects and some of these effects are:

(a) It can be used to stop a moving body:

- If a body or an object is moving or is in motion, we can apply a force to stop this moving object.
- For example, a very strong man can stand in front of a slowly moving car, and apply a force by pushing against the car to stop its movement.

(b) It can increase the speed of a moving object:

- If a body or an object is moving slowly, we can cause its speed to increase by applying a great force or push.

(c) It can cause a change in the direction of movement of a body:

- If a body is moving in the forward direction, we can apply a great force to it in the backward direction.
- This will cause the body to now start moving in the backward direction.
- The force has therefore caused a change in the direction of movement of the object.

Types of forces:

- There are different types of forces and some examples are:

(1) Magnetic force:

- This is the type of force which acts between two magnets, or between a magnet and a magnetic material.
- A magnetic material is a material, which can be attracted or pulled by a magnet.
- If a magnetic material such as iron is being brought towards or near a magnet, then at a certain point or distance away from the magnet, the magnetic force will attract or pull the nail towards the magnet.
- Also if two magnets are being brought towards each other, the magnetic force will either cause them to be attracted to each other, or to repel or move away from each other.

(2) Centripetal force:

- This is the type of force which is needed in order to enable an object or a body to move round in a circle, or in a circular path.
- Every object which is moving in a circular path must have this force acting on it.
- For without it, no object can move round in a circular path.

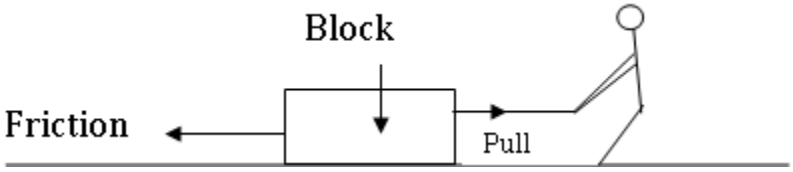
(1) Tension force:

- When an elastic material such as a spring or a rubber is stretched, a force tries to make the spring or the rubber to contract or become smaller.
- This force is called the tension force.
- Tension force is therefore the force, which tries to make an elastic material such as a rubber to contract, when it is stretched.

(2) The force of gravity:

- This is the type of force which attracts us and any object found on the surface of the earth, towards the centre of the earth.
- If an object is thrown into the sky, it is this force which pulls it back to the earth's surface.
- Also if we jump into the sky or air, it is this force which pulls us back onto the surface of the earth.

(3) Frictional force or friction:



- If we put an object such as a cement block on the floor, and try to move it in the forward direction by pulling it, we will notice that as if a force is preventing or trying to stop the block from moving.
- This force acts in an opposite direction to the direction in which the block is being pulled, and it is called friction.
- Friction always tries to prevent an object at rest, to start moving.
- It also tries to make an object which is moving, to stop moving.
- Friction is high on a surface which is not smooth or rough.
- Friction becomes low when the surface is made or becomes smooth.

Scalar quantity and vector quantity:

- A vector quantity is a quantity which has both magnitude and direction.
- An example of such a quantity is a velocity of 50km/h East.
- In this case, the 50km/h is the magnitude, while the direction is the east.
- Another example of a vector quantity is a force of 20N acting at an angle of 60^0 to the surface.

- In this case, the magnitude is 20N, and the direction is 60^0 to the surface.
- On the other hand, a scalar quantity has only magnitude but no direction.
- An example is a mass of 35kg.
- In this case, even though the magnitude is 35kg, there is no direction.

Weight and mass:

- If we place an object such as a book on a table, the table becomes the support of the book and the book exerts a force on the surface of the table.
- This force which is exerted by the book on the surface of the table, is referred to as the weight of the book.
- The weight of a body is therefore the force which it exerts on its support.
- With reference to the mass, the mass of the book refers to the materials such as the papers which make up the book.
- The mass of a body is therefore the amount of matter or material that it is made up of.

Difference between weight and mass:

These differences are that:
- While mass is a scalar quantity, weight is a vector quantity.
- Also while the mass of an object does not change from place to place, the weight of such an object changes from one place to another, or from place to place.

Questions:

(1) What is force?
Ans:
- It is either a pull or a push.

(2) What do we mean if a body is said to be in a state of rest?
Ans:
- It means that it is not moving.

(3) Give one effect of force.
Ans:
- It can be used to change the direction in which a body is moving.

(4) List two types of forces.
Ans:
- These are magnetic force and centripetal force.