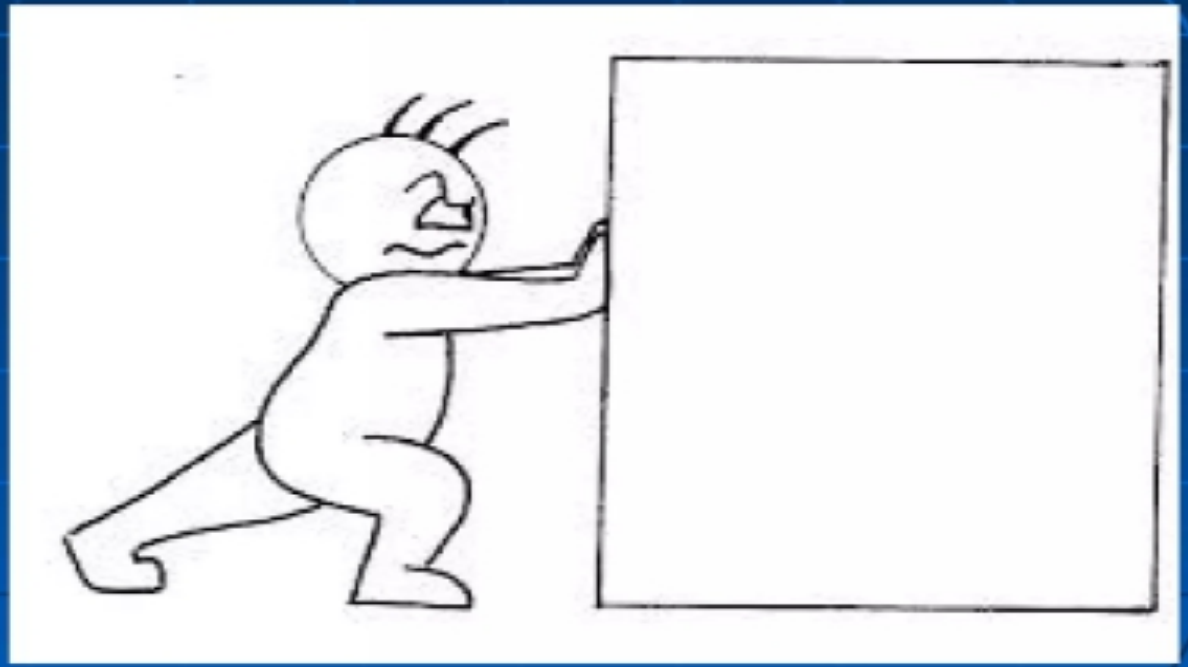
Force

What is Force?

- Force is the action of one body on the another body.

  or

  Force may be defined as an action which changes or tends to change the state of rest or of uniform motion of body.



Newton's second law of motion

- force = mass * acceleration
  = mass * length/(time)2

- The original form of Newton's second law states that the net force acting upon an object is equal to the rate at which its momentum changes with time.

Effect of a Force

- 1. A force can change the motion of a body. If a body is at rest, the force may set it into the motion and if the body is already in the motion, the force may accelerate or retard it.
- 2. It can bring the object in to rest by retarding the motion of the object.
- 3. It can produce internal stresses in the body, on which it acts.

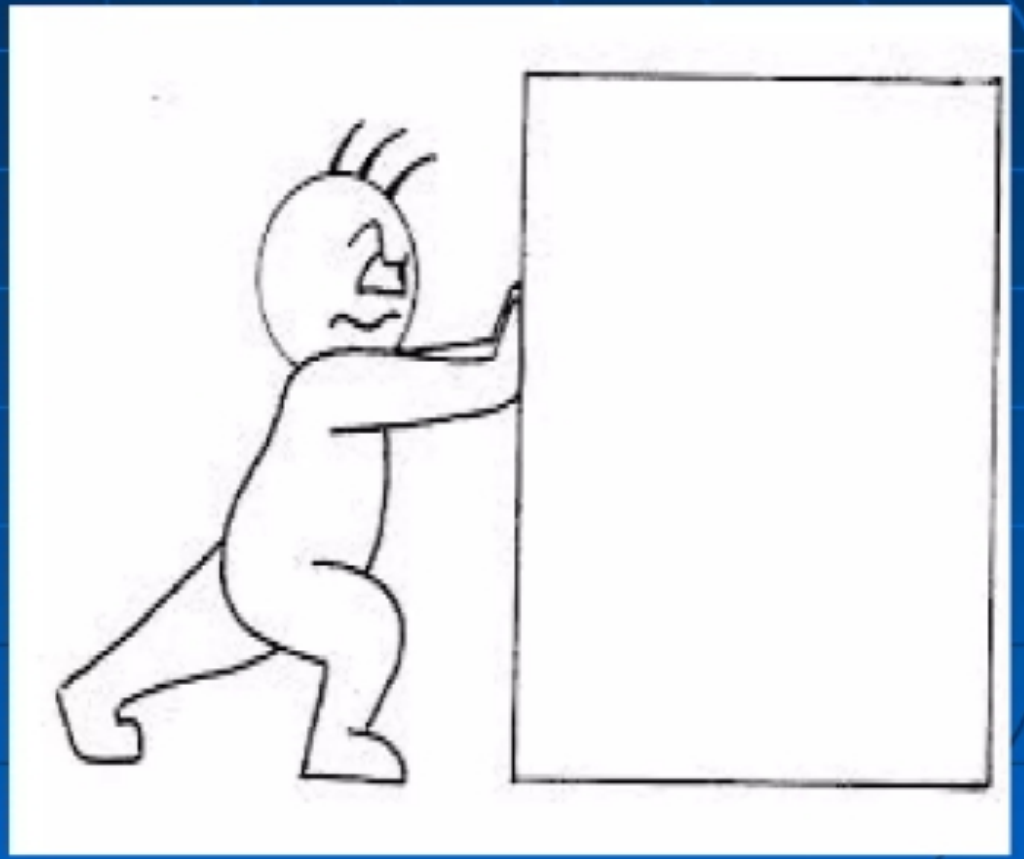
Types of Forces

- **1. Contact Forces -**
- (a) Frictional Force
- (b) Tension Force
- (c) Normal Force
- (d) Air Resistance Force
- (e) Applied Force
- (f) Spring Force

- **2. Action-at-a-Distance Forces -**
- (a) Gravitational Force
- (b) Electrical Force
- (c) Magnetic Force

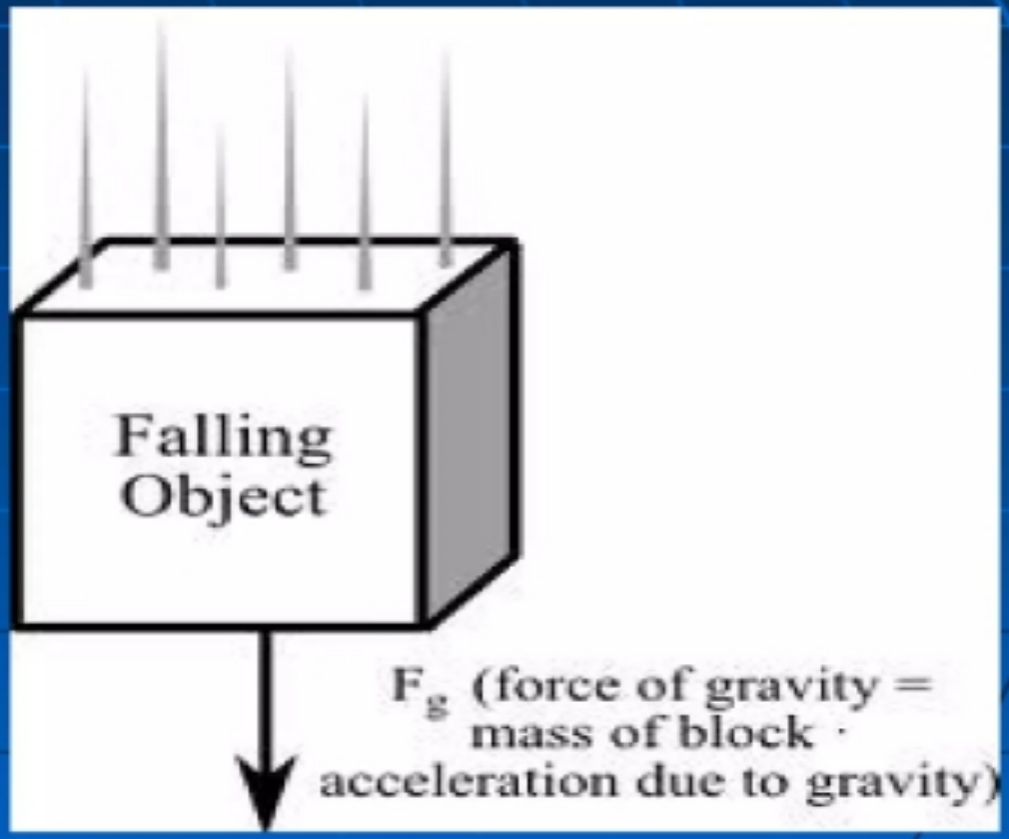
1. Applied Force

- A force that is applied to an object by a person or another object.
- If a person is pushing a desk across the room, then there is an applied force acting upon the object. The applied force is the force exerted on the desk by the person.



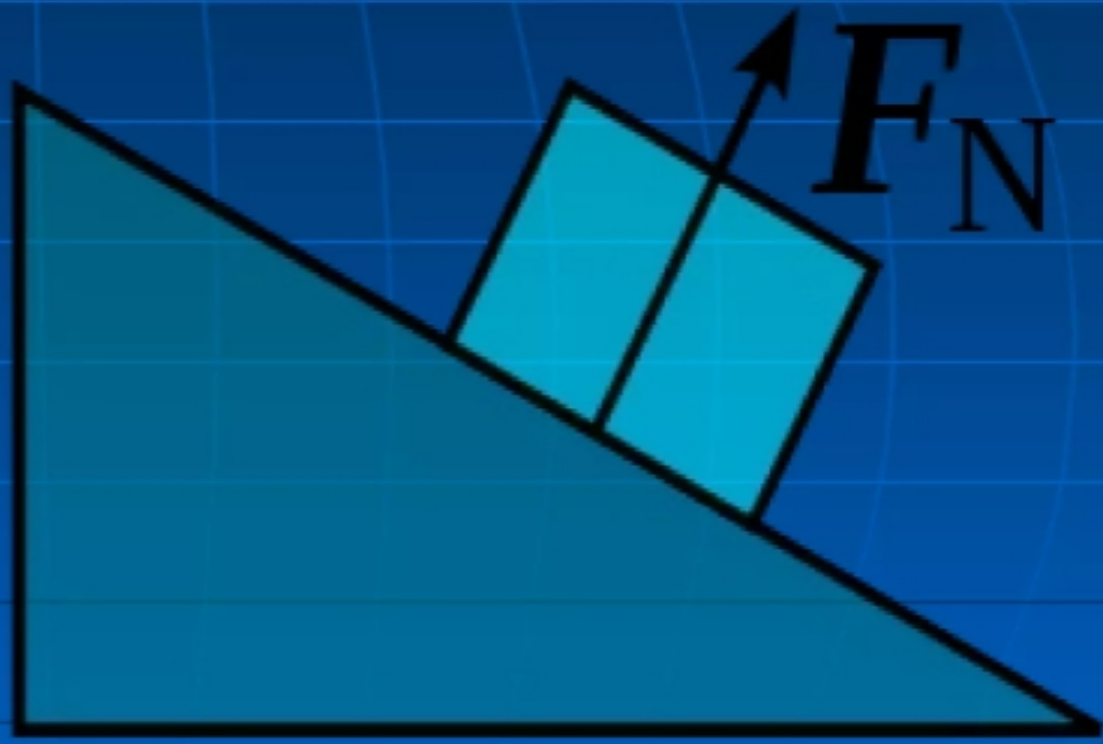
2. Gravity Force

- The force of gravity is the force with which the earth, moon, or other massively large object attracts another object towards itself.
- This is the weight of the object.



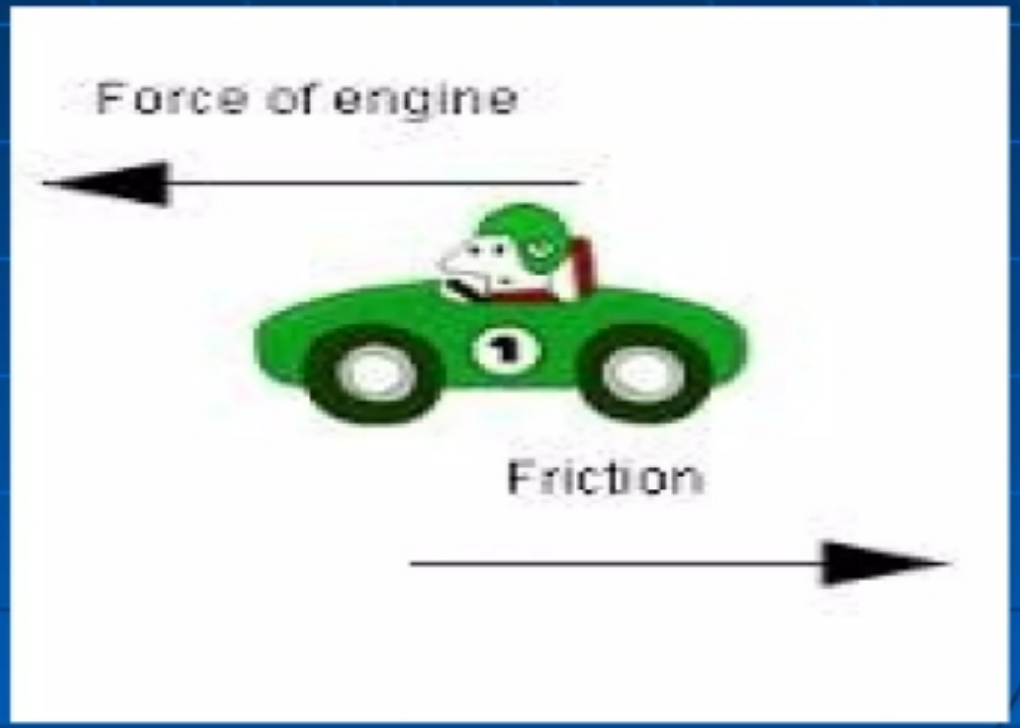
3. Normal Force

- The normal force is the support force exerted upon an object that is in contact with another stable object.
- If a person leans against a wall, the wall pushes horizontally on the person.



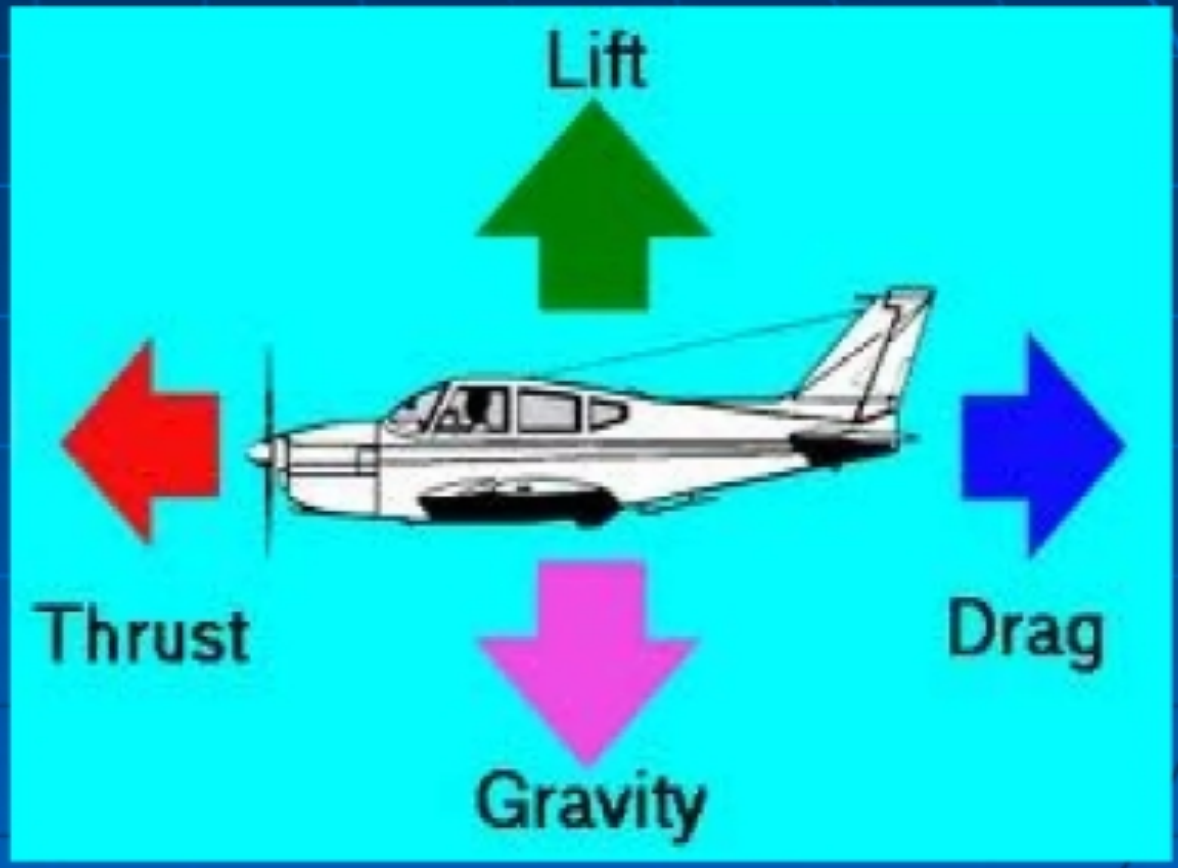
4. Friction Force

- The friction force is the force exerted by a surface as an object moves across it or makes an effort to move across it.
- There are at least two types of friction force - sliding and static friction.



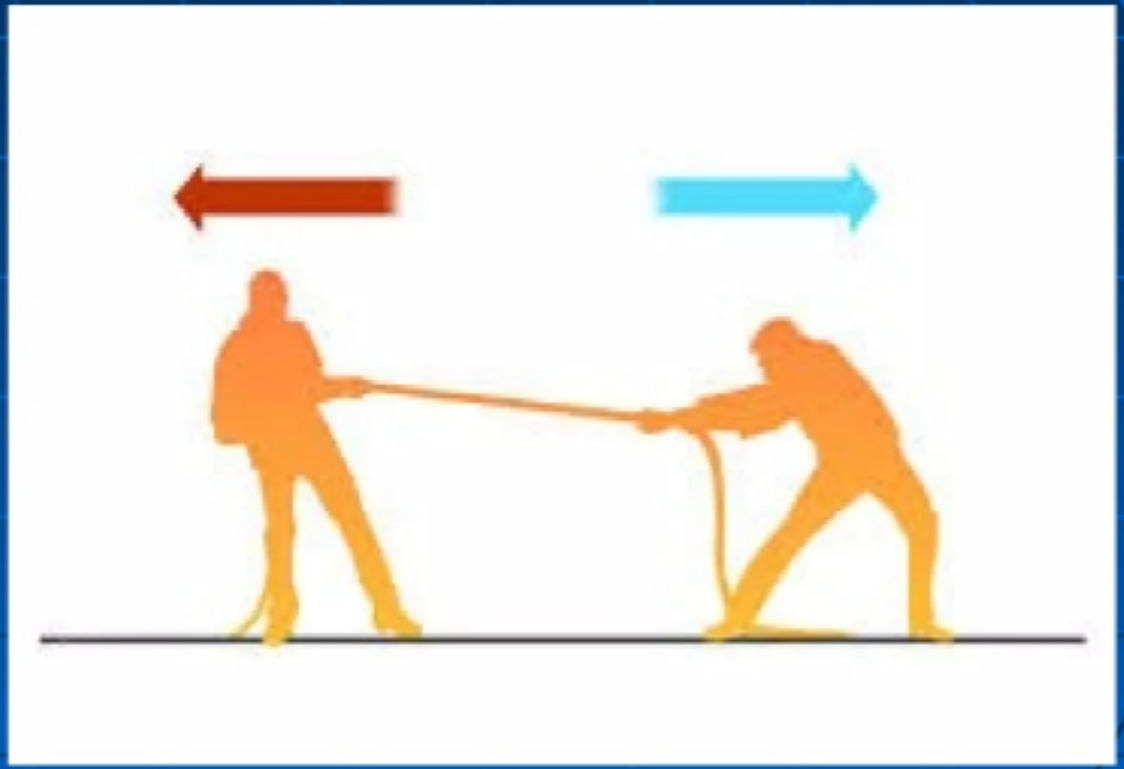
5. Air Resistance Force

- The air resistance is a special type of frictional force that acts upon objects as they travel through the air.
- The force of air resistance is often observed to oppose the motion of an object.
- This force will frequently be neglected due to its negligible magnitude



6. Tension Force

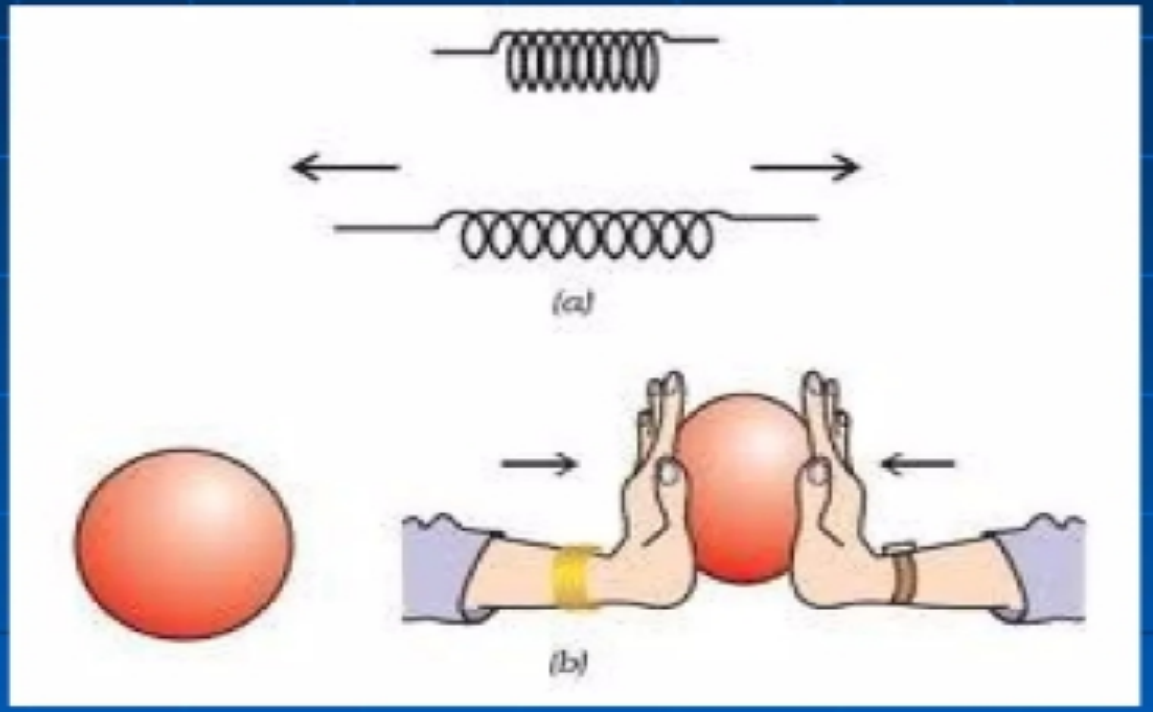
- The tension force is the force that is transmitted through a string, rope, cable or wire when it is pulled tight by forces acting from opposite ends.
- The tension force is directed along the length of the wire and pulls equally on the objects on the opposite ends of the wire.



7. Spring Force

- The spring force is the force exerted by a compressed or stretched spring upon any object that is attached to it.

- An object that compresses or stretches a spring is always acted upon by a force that restores the object to its rest or equilibrium position.



Force Systems

A force system is a collection of forces acting on a body in one or more planes

1. Collinear
2. Concurrent
3. Co-planer
4. Coplanar Concurrent
5. Non - Coplanar Concurrent
6. Coplanar non-concurrent
7. Non -coplanar non -concurrent

1. Collinear - The forces whose lines of action lie on the same line are known as collinear forces.

2. Concurrent - The forces, which meet at one point, are known as concurrent forces. Concurrent forces may or may not be collinear.

3. Co planer - The forces whose line of action lie on the same plane, are known as co planer forces.

4. Coplanar Concurrent Forces - The forces, which meet at one point and their lines of action lie on the same plane, are known as coplanar concurrent forces.

5. Non - Coplanar Concurrent Forces - The forces, which meet at one point but their lines of action do not lie on the same plane, are known as coplanar non-concurrent forces.

6. Coplanar non-concurrent - The forces, Which do not meet at one point but their line of action lie on the same plane, are known as coplanar non-concurrent forces.

7. Non -coplanar non -concurrent - The forces, which do not meet at one point and their line of action do not lie on the same plane, are known as non -coplanar non -concurrent forces.