Newton’s Three Laws of Motion

First Law: An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion continues in motion with the same speed and in the same direction unless acted upon by an unbalanced force.This law is often called "the law of inertia".

Second Law: Acceleration is produced when a force acts on a mass. The greater the mass (of the object being accelerated) the greater the amount of force needed (to accelerate the object).

F= ma

Third Law: For every action there is an equal and opposite re-action.

Zero Net Force

If the net force acting on an object is zero, then the object is not accelerating and is in a state that we call equilibrium. When an object is in equilibrium, then two things can be true: either the object is not moving at all, or the object is moving with a constant speed (no acceleration).

Non-zero Net Force

According to Newton's Second Law, when an object accelerates, then there must be a net force acting on it. If an object is accelerating, it has a non-zero net force. The object is NOT in equilibrium.

Contact Force

Contact forces are forces that are exerted by the contact of two surfaces. For example, the forces acting on each other when one object is kept on top of another are contact forces (e.g. a computer on a desk). In this case, contact forces arise to balance out gravity, a non-contact force. Contact forces also occur when two objects collide. Friction is a good example of a contact force. For contact forces, the effect of the force takes place immediately after the force is applied.

Non-contact Force

Non-contact forces are forces that do not require any physical connection between the two objects involved. Gravitational force, magnetic force, electric forces are some examples for non-contact forces. Since non-contact forces are forces acting on a distance, there is a time gap between a cause and an effect. For an example, if an electromagnet is stopped, the objects attracted to the magnet at a distance will feel a very small time lag. The lag experienced is equal to the time taken for light to reach the point from the object. If the sun vanishes from where it is now, the earth would feel the effect only after 8 minutes (time taken for sun light to come to the surface of the earth).

**What is the difference between Contact Forces and Non-contact Forces?**

• Contact forces take effect immediately after the force is applied whereas there is a time gap between the application and the effect of non-contact forces.

• There is always a field associated with a non-contact force, but not with a contact force.