Force

In physics, a **force** is any interaction that, when unopposed, will change the motion of an object.[1] A force can cause an object with mass to change its velocity (which includes to begin moving from a state of rest), i.e., to accelerate. Force can also be described intuitively as a push or a pull. A force has both magnitude and direction, making it a vector quantity. It is measured in the SI unit of newtons and represented by the symbol **F**.

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. If the mass of the object is constant, this law implies that the acceleration of an object is directly proportional to the net force acting on the object, is in the direction of the net force, and is inversely proportional to the mass of the object.

A force is a push or pulls acting upon an object as a result of its interaction with another object. There are a variety of types of forces. Previously in this lesson, a variety of force types were placed into two broad category headings on the basis of whether the force resulted from the contact or non-contact of the two interacting objects.

Contact Forces

Frictional Force

Gravitational Force

Tension Force

Electrical Force

Normal Force

Magnetic Force

Air Resistance Force

Applied Force

Spring Force

Applied Force

F_{app}

An applied force is 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 applied force acting upon the object. The applied force is the force exerted on the desk by the

person.

Gravity Force

(also known as Weight)

F_{grav}

The force of gravity is the force with which the earth, moon, or other massively large object attracts another object towards itself. By definition, this is the weight of the object. All objects upon earth experience a force of gravity that is directed "downward" towards the center of the earth. The force of gravity on earth is always equal to the weight of the object as found by the equation:

Fgrav = m * g

where g = 9.8 N/kg (on Earth)

and m = mass (in kg)

Normal Force

F_{norm}

The normal force is the support force exerted upon an object that is in contact with another stable object. For example, if a book is resting upon a surface, then the surface is exerting an upward force upon the book in order to support the weight of the book. On occasions, a normal force is exerted horizontally between two objects that are in contact with each other. For instance, if a person leans against a wall, the wall pushes horizontally on the person.

Friction Force

F_{frict}

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. Though it is not always the case, the friction force often opposes the motion of an object. For example, if a book slides across the surface of a desk, then the desk exerts a friction force in the opposite direction of its motion. Friction results from the two surfaces being pressed together closely, causing intermolecular attractive forces between molecules of different surfaces. As such, friction depends upon the nature of the two surfaces and upon the degree to which they are pressed together. The maximum amount of friction force that a surface can exert upon an object can be calculated using the formula:

$F_{frict} = \mu \bullet F_{norm}$

Air Resistance Force

F_{air}

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 (and due to the fact that it is mathematically difficult to predict its value). It is most noticeable for objects that travel at high speeds (e.g., a skydiver or a downhill skier) or for objects with large surface areas. Air resistance

---

Tension Force

F_{tens}

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.

Spring Force

F_{spring}

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. For most springs (specifically, for those that are said to obey "Hooke's Law"), the magnitude of the force is directly proportional to the amount of stretch or compression of the spring.