**Forces**

An object will start to move, slow down or change direction. accelerates to Newton's "Law of Inertia" states that objects that are stationary tend to stay that way and objects that are moving tend to continue moving in a straight line. A force causes an object to start to move, to change its velocity, or to change its direction of motion. The force can be applied directly on the object or at a distance.

Questions you may have about this include:

What is a force?

What factor does mass have with forces?

How does force change direction?

Force is a push or pull

A force is defined as a push or pull which can cause an object to move, can slow down an object, can stop its motion, or can change the direction of an object's motion. Since any change in velocity is considered an acceleration (or deceleration), it can be said that a force on an object results in the acceleration of that object.

**Common factor in motion**

In general, most things are standing still. But as you look around, you may see things that were still suddenly start to move for one reason or another. For example:

An apple falls from the tree to the ground.

Some men push a stalled car down the street.

You blow up balloon, and it flies away as the air rushes out.

You hold a stick under water, and after you let it go, it shoots up to the surface.

There is a common factor in the motion of the above examples. In every case, a **force** was acting on the object. The forces in the examples are respectively gravity, pushing, air pressure, and buoyancy.

**Two classes of forces**

Forces can be divided into two classes:

1. Those forces that act by direct contact, such as when you push on a door to open it.

2. Forces that act at a distance, with no physical contact between the objects. The forces of gravity or magnetism are examples of action at a distance.

**Direct forces make sense**

Direct contact forces seem to make sense. It only seems natural that if a moving object smashes into another object, it will cause the second object to move in the same direction, as explained by Newton's Laws.

**Force at a distance is strange**

On the other hand, how can a force act on another object at a distance? What is "pushing" on the second object to make it move, like in the case of two magnets of like poles. Not only that, most forces at a distance "pull" more than they push. What is this mystical force of gravity that pulls an object to the earth from a distance? There really isn't a good explanation, except that they are "forces" that act at a distance.

**Force affected by mass.** The heavier an object, the more force is needed to speed it up (accelerate it) or slow it down (decelerate it). Another way of saying this is that the amount of force needed to accelerate an object is proportional to the mass of the object.

If you wanted to measure the factors, you could use the equation or relationship that the force (**F**) equals the mass of the object (**m**) times the amount of resulting acceleration (**a**):

**F = m x a**.

In other words, it would take twice the force to accelerate a 2 kilogram object to a given velocity than it would for a 1 kilogram object. The unit of force is the Newton and has been defined as the force required to accelerate a 1 kg object at a rate of 1 m/s2

Therefore 1N = 1kgm/s2

**Accelerates Until Force Stops**

As long as the force is applied to a given object, it will to accelerate. Once the force is withdrawn, the object will continue to move at a constant velocity.

**Vectors help measure forces**

Just as vectors are used in measuring velocities in different directions, vectors are also used to help calculate the sum of forces in a given direction (see explanation of vectors in Linear Motion. You can also use scales to measure the resulting force of several forces at angles. In conclusion A force is a push or pull that causes an object to accelerate. You can often use a scale to measure force. There are direct contact forces and those that act at a distance. Newton's Laws of Inertia state that force is required to change the motion of matter. Momentum is an extension of inertia and energy is a result of matter in motion.