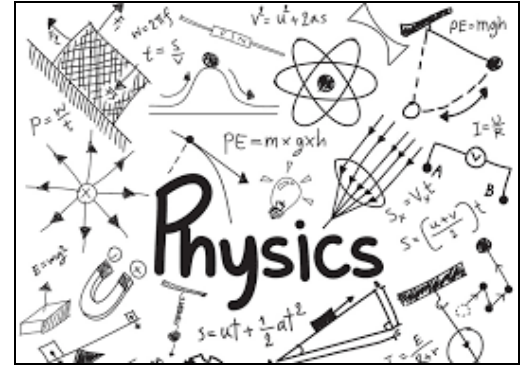


# Physical Science

Physics: The natural science that studies the matter and its motion and behaviour through space and time and that studies the related entities of energy and force.

Sir Isaac Newton was one of humanity's greatest scientists, he was the person who discovered gravity and gave us calculus. He has established three laws which are known as Newton's Laws of Motion.



Newton's First Law: Inertia, every object will remain at rest or in uniform motion in a straight line unless compelled to change its state by the action of an external force.

The key point here is that if there is no net force acting on an object then the object will maintain a constant velocity. If that velocity is zero, then the object remains at rest. If an external force is applied, the velocity will change because of the force.

Newton's Second Law:  $F=ma$ , this law defines a force to be equal to change in momentum (mass times velocity) per change in time.

For an external applied force, the change in velocity depends on the mass of the object. A force will cause a change in velocity; and likewise, a change in velocity will generate a force. The equation works both ways.

Newton's Third Law: Action-Reaction, for every action in nature there is an equal and opposite reaction. In other words, if object A exerts a force on object B, then object B also exerts an equal force on object A.

## Kinetic and Potential Energy:

Kinetic Energy: Energy in motion

To calculate Kinetic Energy, we have to use the formula  $KE = \frac{1}{2} * mv^2$ , and its units are joules (J), m is the mass and v is the velocity.

If something is 500g and is moving at 2m/s then what is its kinetic energy in joules.

First we plug the numbers into our formula:

$$\frac{1}{2} * (500)(2)(2)$$

Then we simply do the math and get the kinetic energy.

$$\frac{1}{2} * (500)(2)(2) = 1000 \text{ J}$$

Potential Energy: Energy an object has because of its position relative to some other object.

When you stand at the top of a stairwell you have more potential energy than when you are at the bottom, because the earth can pull you down through the force of gravity, doing work in the process. When you are holding two magnets apart they have more potential energy than when they are close together. If you let them go, they will move toward each other, doing work in the process.

The formula we use is  $PE = mgh$ ,  $m$  is mass,  $g$  is gravitational pull of the Earth ( $9.8\text{m/s/s}$ ), and  $h$  is the height. It also is used in joules.

