

Newton's Laws of Motion

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“Truth is ever to be found in the simplicity, and not in the multiplicity and confusion of things.”

WHO is Isaac Newton:

Isaac Newton was a well known physicist, astronomer, mathematician, philosopher, alchemist and theologian from the *The Scientific Revolution of the 17th Century*

WHAT is Isaac Newton known for:

He published Philosophiae Naturalis Principia Mathematica, which is widely regarded to be one of the important books in the history of science. He describes universal gravitation and the three laws of motion. He also is responsible for the principles of conservation related to momentum and angular momentum, the refraction of light, an empirical law of cooling, the building of the first practical telescope and much more.

"Plato is my friend - Aristotle is my friend - but my greatest friend is truth."

WHEN did Isaac Newton live:

Newton was born on Christmas Day, December 25, 1642; though historians believe that his actual date of birth was January 4, 1643. This is because of the fact that at this time England had not yet adopted the Gregorian calendar. He died on March 31, 1727 and his body was buried in Westminster Abbey.

WHERE is Isaac Newton from:

He was born in a hamlet named Woolsthorpe in the countryside of Lincolnshire.

"I can calculate the motions of the heavenly bodies, but not the madness of people."

WHY are we studying Isaac Newton:

To understand Isaac Newton's Three Laws of Motion

HOW did Isaac Newton impact society:

Newton's contributions towards the development of modern theories of science and mathematics are unparalleled

Fun Facts

❑ He discovered that color is an outcome of objects reflecting colored light. This discovery became famous by the name, 'Newton's Theory of Color'. Isaac Newton is famed for the invention of the reflecting telescope.

❑ Invented the generalized binomial theorem and developed calculus

❑ Newton was known to have said that his work on formulating a theory of gravitation was inspired by watching an apple fall from a tree. A story well publicized to this very day.

❑ Newton was knighted by Queen Anne in 1705.

❑ The Newton's Laws of Motion became the founding principle of mechanics and enlightened the masses about the relationships between force and motion.

Newton's Laws of Motion

Law #1

An object in motion tends to stay in motion and an object at rest tends to stay at rest unless acted upon by an unbalanced force.

Law #2

Force equals mass times acceleration.

Law #3

For every action there is an equal and opposite reaction.

[BrainPop](#)

Newton's First Law

- *An object at rest tends to stay at rest*
- *An object in motion tends to stay in motion unless acted upon by an unbalanced force.*

What does this mean?

Basically, an object will “keep doing what it was doing” unless acted on by an unbalanced force.

If the object was sitting still, it will *remain stationary*. If it was moving at a constant velocity, it will *keep moving*.

It takes *force* to change the motion of an object.

Some Examples from Real Life

A soccer ball is sitting at rest. It takes an unbalanced force of a kick to change its motion.



Two people are trying to push a desk. They are both exerting equal force on desk in opposite directions. This balanced force results in no change of motion.

Newton's First Law

is also called the *Law of Inertia*

Inertia: the tendency of an object to resist changes in its state of motion

The First Law states that *all objects have inertia*. The more mass an object has, the more inertia it has (and the harder it is to change its motion).

If objects in motion tend to stay in motion, why don't moving objects keep moving forever?

Things don't keep moving forever because there's almost always an unbalanced force acting upon it.

A sliding book across a floor slows down and stops because of the force of *friction*.



If you throw a ball upwards it will eventually slow down and fall because of the force of *gravity*.

Newton's Second Law

Force equals mass times acceleration.

$$F = ma$$

Acceleration: a measurement of how quickly an object is changing speed.

Newton's Third Law

For every action there is an equal and opposite reaction.

What does this mean?

For every force acting on an object, there is an equal force acting in the opposite direction. Right now, gravity is pulling you *down* in your seat, but Newton's Third Law says your seat is pushing *up* against you with *equal force*. This is why you are not moving. There is a *balanced force* acting on you— gravity pulling down, your seat pushing up.



Review

Newton's First Law:

Objects in motion tend to stay in motion and objects at rest tend to stay at rest unless acted upon by an unbalanced force.

Newton's Second Law:

Force equals mass times acceleration
($F = ma$).

Newton's Third Law:

For every action there is an equal and opposite reaction.

Vocabulary

Inertia:

the tendency of an object to resist changes in its state of motion

Acceleration:

- a change in velocity
- a measurement of how quickly an object is changing speed, direction or both

Velocity:

The rate of change of a position along a straight line with respect to time

Force:

strength or energy