

Name _____

Date _____

Understanding Newton's Laws

Ancient people believed the universe was controlled by the gods. They thought an invisible power caused the seasons to change, the sun to rise, and the tides to shift. Today we understand that the universe stays on course because nature follows certain cycles and rules. Scientists call these rules laws, and use them to better understand our world and make predictions about the future.

One of the most famous scientists to study the laws of nature was Sir Isaac Newton. Newton was born in the 1600's in England. He devoted his life to the study of astronomy, mathematics, philosophy, and theology. He is best known, though, for his contribution to the field of physics and classical mechanics. After careful study of the way objects react to force and motion, Newton developed the Three Laws.

The First Law: Inertia

Although the law of inertia is commonly known as Newton's first law, Newton did not discover it. Galileo and Descartes were actually the first to recognize the universal rule. **Inertia** is the force that keeps an object at rest or in motion. The law of inertia states that an object moving in a certain direction will keep moving at the same speed and in the same direction unless another force pushes or pulls on it. It also states that an object at rest, or not in motion, will remain at rest unless another force acts on it.

Imagine a football sitting on the grass. The law of inertia tells us that the football will remain sitting still unless someone or something moves it. If you kick the ball, it will fly in the direction you kicked it, at a certain speed, until a force stops the ball or slows it down. If the football doesn't hit anything, the force of gravity will cause it to slow down and fall to the ground.

Why does the football continue in the same direction? Why does it travel at a certain speed? These questions are answered by Newton's second law.

The Second Law: Motion

The law of motion states that "the net force of an object is equal to the mass of the object multiplied by its acceleration." To understand this rule, let's break it down into three parts.

- When an object is acted upon by a force, that object moves in the direction of the force. If you kick the football to the left, you are applying a force that sends the ball to the left.
- If the mass of an object does not change, more force will cause it to accelerate, or go faster. The harder you kick the football, the farther and faster it will travel in the direction you kicked it.
- If the mass of an object increases, but the force does not, the object will travel slower, or decelerate. If the football tripled in size, but you kicked it with the same force, it would travel slower and less distance than the first, smaller football.