

NEWTON'S LAWS AND THEIR APPLICATION IN EVERYDAY LIFE.

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Abstract: This article discusses the content of Newton's three laws, discovered by the famous scientist Isaac Newton, and their application in everyday life. The scientific basis of each law is explained in simple language and reinforced with real-life examples. The article provides students with information on how Newton's laws are used in physics lessons and in our daily activities.

Keywords: Newton's First Law, Second Law, Third Law.

Introduction. Isaac Newton is considered one of the greatest scientists in the history of mankind. His work in the field of mechanics forms the basis of modern physics. In particular, the three laws of mechanics developed by him play an important role in understanding the motion of objects. These laws are widely used not only in scientific research, but also in our everyday lives. A car in motion, a stone falling from a hill, or a person walking - all this is related to Newton's laws.

Main part. Newton's first law is also called the law of inertia. According to this law, an object at rest will remain at rest, and in motion will remain in motion at a constant speed and in a straight line, unless acted upon by an external force. Applications of Newton's first law in everyday life:

1. A passenger leans forward when a bus or car stops. When a moving vehicle suddenly stops, the people inside it "slide" forward. The reason: people's bodies were also in motion, and when the vehicle stops, they continue to move forward due to inertia. This is a phenomenon of inertia and is a clear example of the 1st law.
2. An inflated ball lies motionless on the ground. If you do not push the ball, it will remain in its position. Without an external force, the ball will not change its position — this is also an expression of inertia.
3. When you quickly pull a piece of paper from a table, the object on it remains in place. The paper moves quickly, but the object on it maintains its position due to the inertia of the object on it. This is often demonstrated in scientific experiments.
4. A passenger leans backward when a moving car accelerates. When a car starts moving quickly, the human body tends to lag behind for a while due to inertia. This is also explained by Newton's 1st law.
5. In sports, if you don't kick the ball, it just sits there motionless. Only an external force (foot power) makes the ball move.
6. Passengers feel pulled back during takeoff. When the plane starts moving, our bodies are not yet "ready to move" and feel pulled back. This happens due to our body's inertia.

Newton's Second Law - When a force is applied to an object, it accelerates. This acceleration depends on the mass of the object and the force acting on it.

$$F = m \cdot a$$

Where:

F is the force (in Newtons, N)

m is the mass of the object (in kilograms, kg)

a is the acceleration (in m/s^2)

That is, the greater the force acting on an object, the greater its acceleration. However, the greater the mass, the smaller the acceleration under that force. Newton's second law is applied in everyday life.

1. Kicking a soccer ball: A ball kicked with a small force moves slowly. A ball kicked with a large force moves faster (i.e., accelerates). Even though the mass of the ball does not change, the acceleration increases as the force increases—this is Newton's 2nd Law.
2. When a car starts moving, a light car accelerates quickly because its mass is small. Trucks accelerate slowly because their mass is large, so the same force moves them more slowly. This demonstrates the relationship between force, mass, and acceleration in practice.
3. Riding a bicycle downhill A person riding a bicycle downhill is subject to the force of gravity (earth's gravity), which gives him acceleration. If the load is increased, i.e. the mass increases, more force is required to move.
4. Pushing a stroller: An empty stroller is easy to push and moves quickly. It takes more effort to push a loaded stroller.
5. Athletes use starting force when running. A large amount of force is used to start the movement. This causes the body to accelerate. Each athlete moves according to their mass and the force of their stride - this is a clear example of the 2nd law.
6. An airplane takes off, the plane is stationary on the ground (m is very large), it needs a large engine power (F) to move it and create acceleration (a). This is calculated using the 2nd law: how much thrust is needed, how much fuel is consumed, etc.

Newton's third law - for every action, there is always an equal and opposite reaction. This means that if one object exerts a force on another (action), the second object exerts a force on the first with the same force, but in the opposite direction (reaction). Newton's third law is used in everyday life.

1. The motion of a swimmer. A swimmer pushes water backward. The water exerts an equal and opposite force on him (the reaction), causing the swimmer to move forward. This is the most obvious manifestation of Newton's 3rd law.
2. Firing a gun. The bullet leaves the gun at high speed. At this point, the gun "kicks" back - this is the reaction force. A bullet with a small mass travels forward at a very high speed, but a rifle with a large mass travels back relatively slowly.
3. When you jump, your feet press down on the ground with force as you jump. The ground exerts an equal but opposite force on you (reaction), so you jump up.
4. Walking. The foot presses against the ground with a force moving backwards (action). The ground responds with a force moving forward (reaction), causing you to move forward. The process of walking itself is based on Newton's third law.
5. Rocket launch. The rocket releases a stream of gases downward. In exchange for this force, the rocket rises. This law is the most basic mechanical principle for a rocket. In this process, there is no force acting on the air or surface - there is only action and reaction.
6. The effect of the car's wheels on the road. When the car's wheels turn backwards, they exert a force on the road in the opposite direction. The road responds by pushing the car forward. This is important in explaining the mechanism of motion of cars.

If we give real-life examples of how Newton's 1st, 2nd, and 3rd laws work simultaneously, we will see that although these laws are independent of each other, they all manifest together in almost every action in life.

When a person runs, the 1st law. A person changes the position of his body to start running from a standing position — this is only possible with the help of an external force (the pressure of the feet on the ground). The 2nd law ($F = ma$) the person applies a force to the ground with his feet, the body accelerates according to its weight (mass). The stronger the force, the faster the person runs. The 3rd law The feet exert a force backward, the ground exerts a force forward on the person. In this process, the person's body (1st law), its movement (2nd law), and the exchange of forces between the feet and the ground (3rd law) work simultaneously.

When a car is in motion, the 1st law: The car remains at rest unless acted upon by a force (engine power, friction with the road). The 2nd law: The engine provides power to the car, which creates acceleration based on its mass. The 3rd law: The wheels provide a force backward on the road, and the road pushes the car forward. The motion of a car is a complex but common process in which all three of Newton's laws work together.

A man swimming. 1st law: If a man stands still in water, he will not move without the force of the water. 2nd law: A man pushes water backward, accelerating according to his mass and the force of his movement. 3rd law: A man pushes water backward, the water pushes him forward. The process of swimming also includes all of Newton's laws together.

Rocket launch: 1st law: A rocket stays in the air, it does not move without any force. 2nd law: As the fuel burns, a large downward force is created, and it accelerates as its mass decreases. 3rd law: Gases are released downward, the rocket moves upward.

Newton's first law, the law of inertia, is an integral part of our lives. Behind every movement, stop, or change in position, this law is hidden. We see the practical consequences of this law every day, whether we are riding in a car, pushing an object, or even running. Understanding inertia is one of the simplest and most effective ways to connect physics to life.

Newton's second law explains the precise relationship between force, mass, and acceleration. This law is reflected in various vehicles, sports, technology, engineering, and even in our everyday tasks (lifting loads, pulling a cart). Understanding it helps to deeply understand the physical foundations of motion and the relationship between force and motion.

Conclusion. Newton's third law is based on the principle that every force has a direct reaction. This law plays an important role not only in mechanics, but also in aviation, sports, technology, and motion mechanisms. This law works in our daily lives when we walk, jump, shoot, swim, and even open a simple door. By understanding it, you will better understand the interaction of forces, balance, and the causes of motion. In almost every movement in everyday life, Newton's three laws operate simultaneously. They complement each other.

Used literature:

1. Savelev I.V. General Physics Course. T.: "Teacher", 1973.t.1
2. Ahmadjonov O. Physics course. Y.: "Teacher", 1987. t.1,2,3, parts
3. Izatovna, B. M. (2023). The place of integrative educational technologies in physics teaching. Research and Publication, 1(11), 79-81.
4. Bakayeva, M. (2024). Use of virtual laboratory works in the educational process and their advantages. Medicine, pedagogy and technology: theory and practice, 2(9), pp. 174-183.

5. Bakaeva M. I. (2025). The importance of measuring instruments in medicine. Development Of Science, 6(5), pp. 232-239.