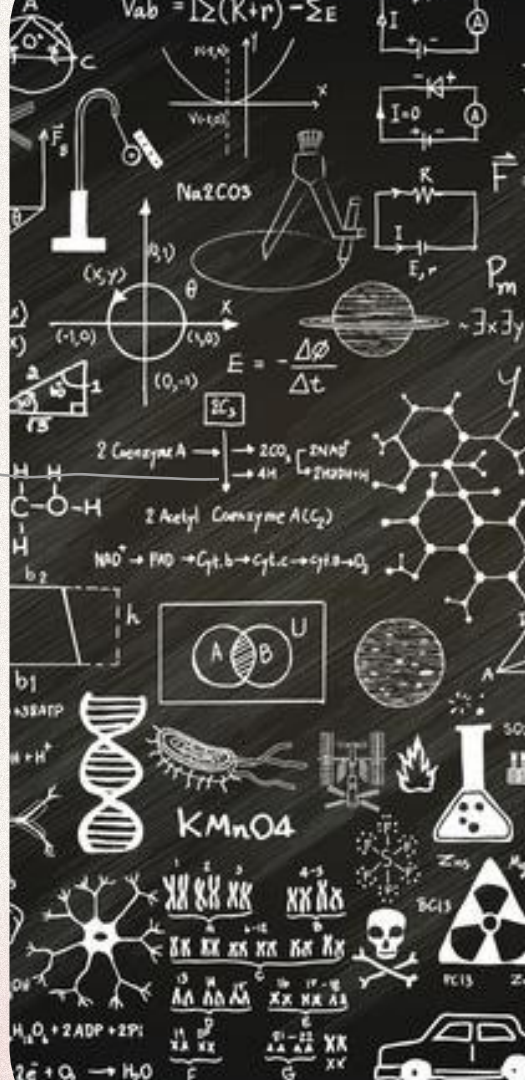
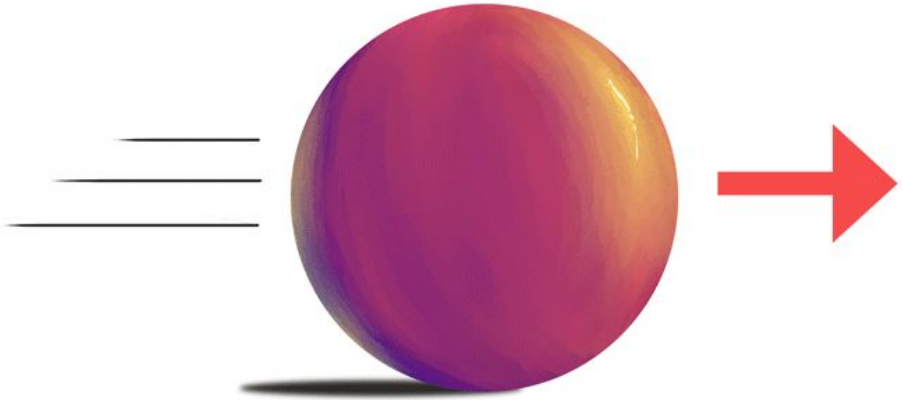
WELCOME TO PHYSICS

Immy Tree

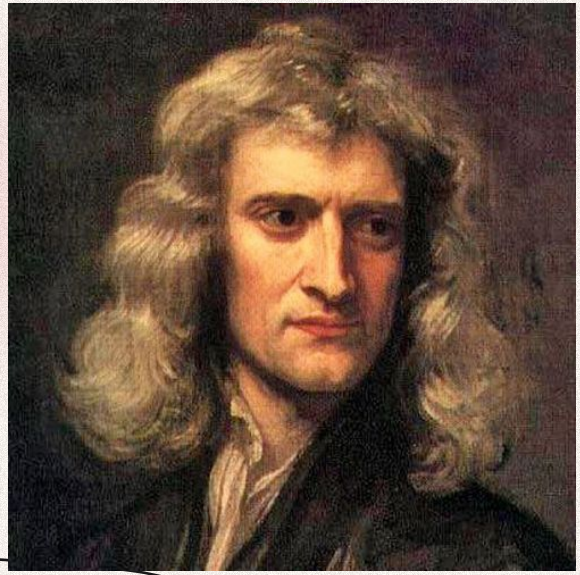


TOPIC: NEWTON'S LAW

Video Link:
https://youtu.be/JGO_zDWmkvk



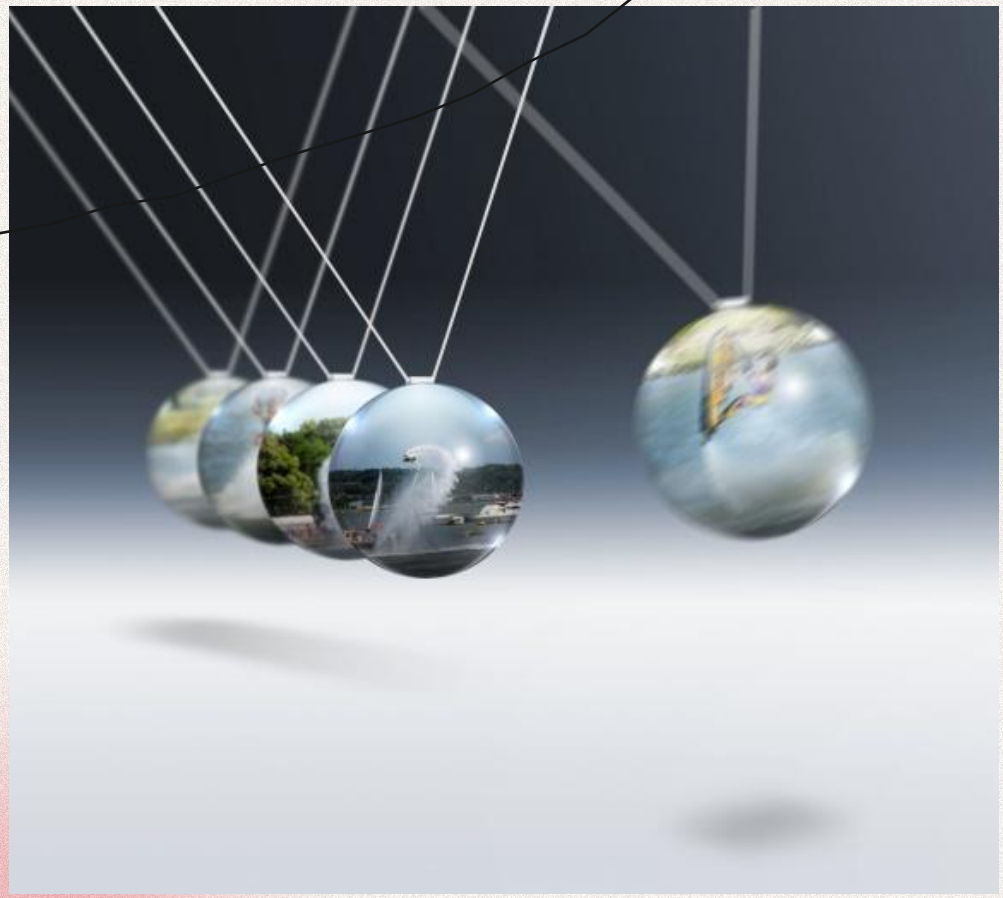
“An apple fell on the boy’s head and that’s how he came up with the theory of gravity.” Who was the genius in this most famous legend in the history of science? Isaac Newton.



Isaac Newton

(25 December 1642 – 20 March 1726/27)

- Influential mathematician, physicist, astronomer, alchemist, theologian, and author who was described in his time as a natural philosopher.
- Great contribution to the field of science in his lifetime
- Invented calculus and provided a clear understanding of optics
- Developed a universal law of gravitation and the his laws of motion



01

Newton’s First Law

Newton’s First Law

Newton's first law, often called the **law of inertia**, essentially states that an object will remain at rest or keep moving at a constant speed in a straight line unless it is acted upon by an external force.

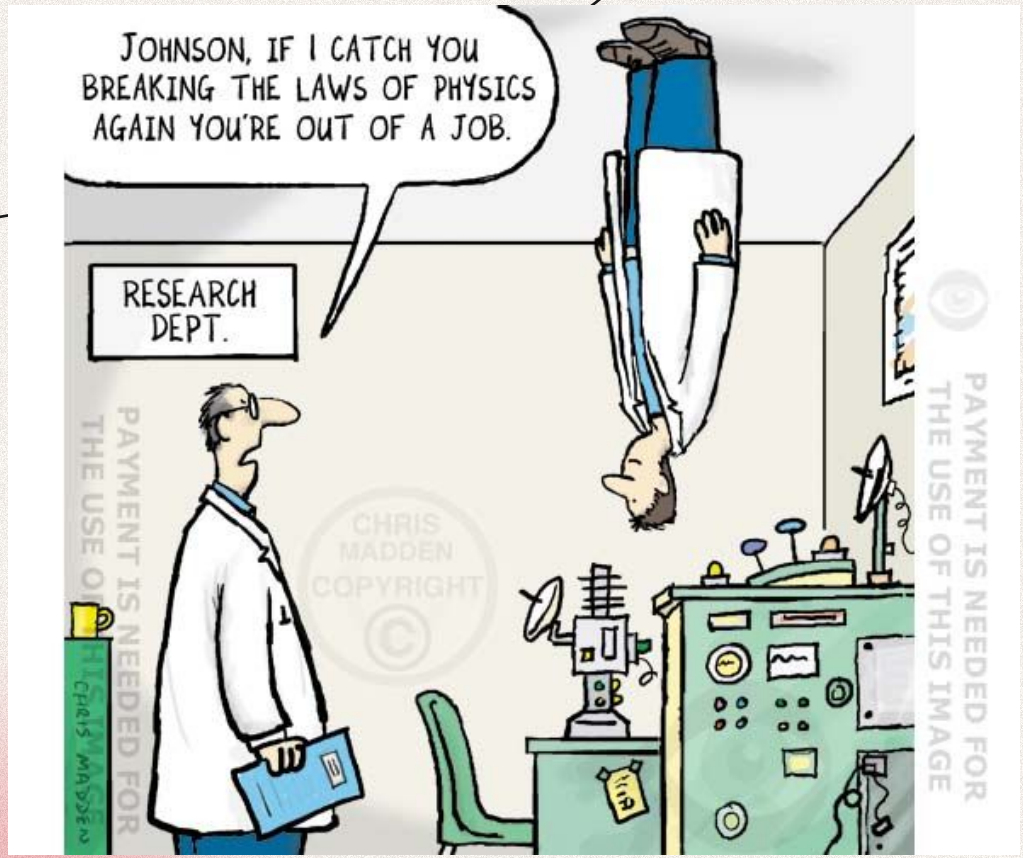
As mentioned in the video, **objects in motion tend to stay in motion, objects in rest tend to stay in rest.**

In this case, imagine riding a bicycle on a smooth path (no friction), If you stop pedalling your bicycle, it doesn’t stop immediately, If you stop pedaling your bicycle, it doesn’t immediately stop. Instead, it continues to roll forward.

Think about it, what external forces could be applied to change the motion of the bicycle?

This happens because of inertia; the bicycle wants to keep moving forward at the same speed because there's nothing stopping it (assume there’s no other forces stopping it)

When the bicycle is at rest and you start to pedal,
you're applying a force that changes its state from being at rest to moving. Again, according to Newton's first law, the bicycle requires this force (your pedaling) to change its motion from stationary to moving.



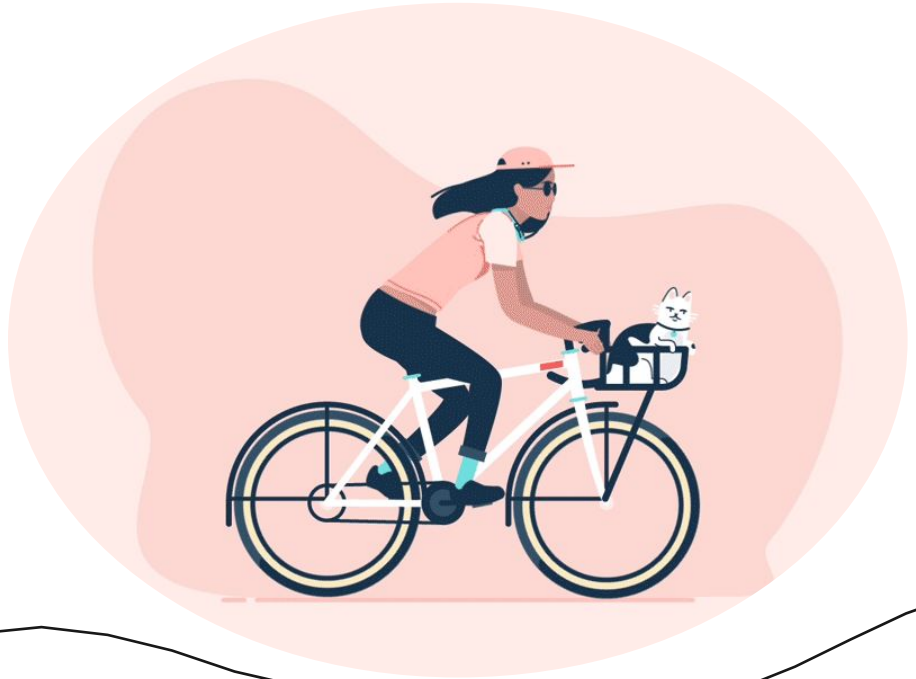
02

Newton's Second Law

Newton's Second Law of Motion explains how the velocity of an object changes when it is subjected to an external force. In simpler terms, it describes how an object will move faster, slower, or change direction depending on the forces acting on it. In mathematical terms, the law indicates that

Force = Mass * Acceleration
(where Force is the force applied to the object,
Mass is the mass of the object and
Acceleration is the how much speed changes overtime.)

Still, imagine riding a bicycle, but this time consider how hard you pedal.



-If you start pedaling lightly, you're applying a small force to the bicycle. Because the force is small, the acceleration (increase in speed) of your bicycle is also small. You gradually pick up speed.

What about if you start pedaling harder? Will the acceleration have any changes?

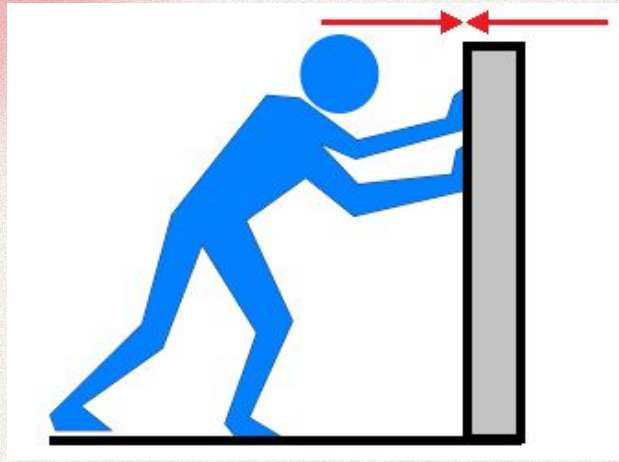
-Suppose this time you're carrying a heavy backpack while riding the bicycle. The extra weight (increased mass) of the backpack makes your bicycle harder to speed up, even if you're pedaling with the same force as before without the backpack. This is because with more mass, the same force results in less acceleration.

03

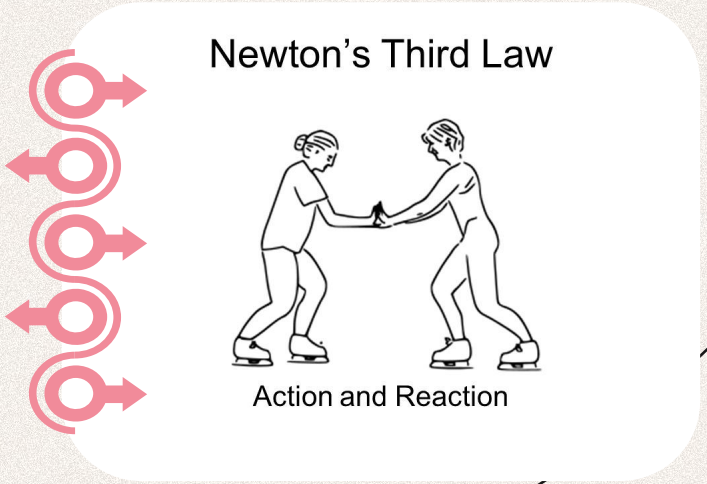
Newton's Third Law

Newton's Third Law

Newton's Third Law of Motion states: "For every action, there is an equal and opposite reaction." This law means that in every interaction between two objects, they exert forces on each other that are equal in magnitude and opposite in direction.

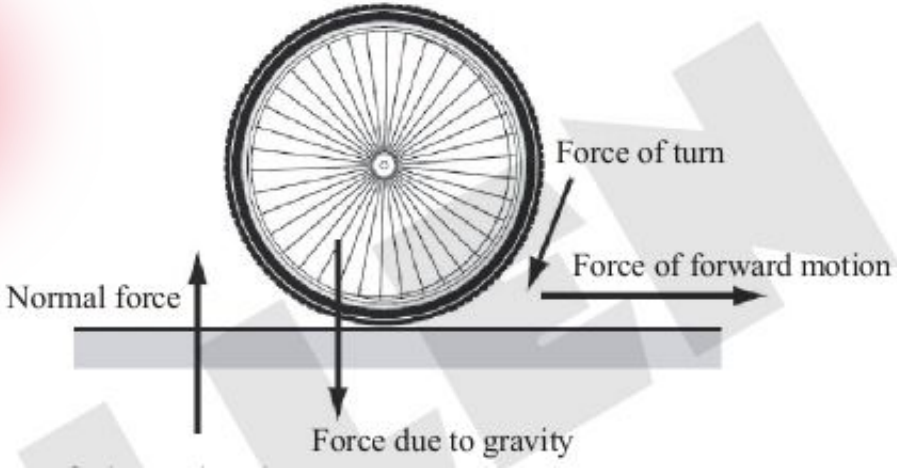


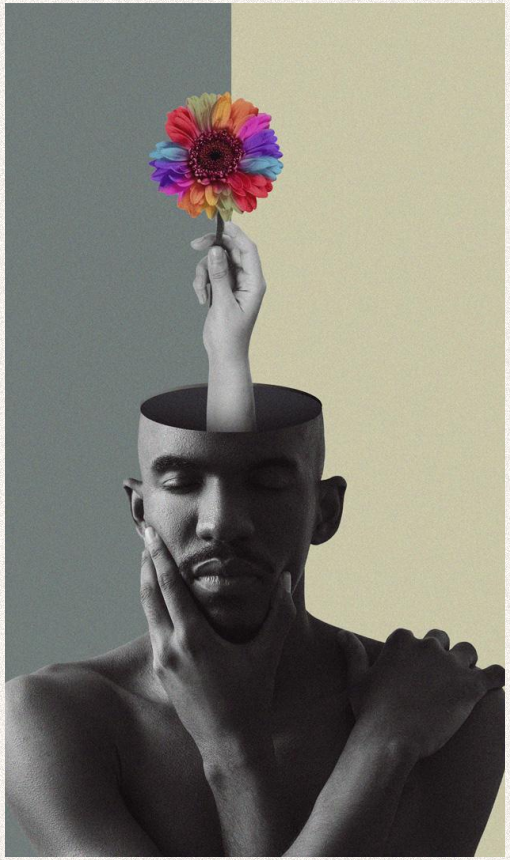
Imagine you push against a wall with your hand. Even though it might not look like it, the wall is actually pushing back against your hand with the same amount of force. You don't move the wall because it's strong enough to resist the force you apply, but you can feel the wall's force in how hard it is to push.



Can you think of any other examples?

Back to the bicycle, as the wire spins clockwise, it is pushing the ground backward with the same force. It is only that this force is too little to move the Earth so we don't feel it.
This reaction force helps to turn the wheels and propels the bicycle forward. The force you exert on the pedals moves through the gears and ultimately to the wheels, moving you forward.





THANKS!

Do you have any questions?