NEWTON LAW'S OF MOTION

NAME- Himanshu kumar

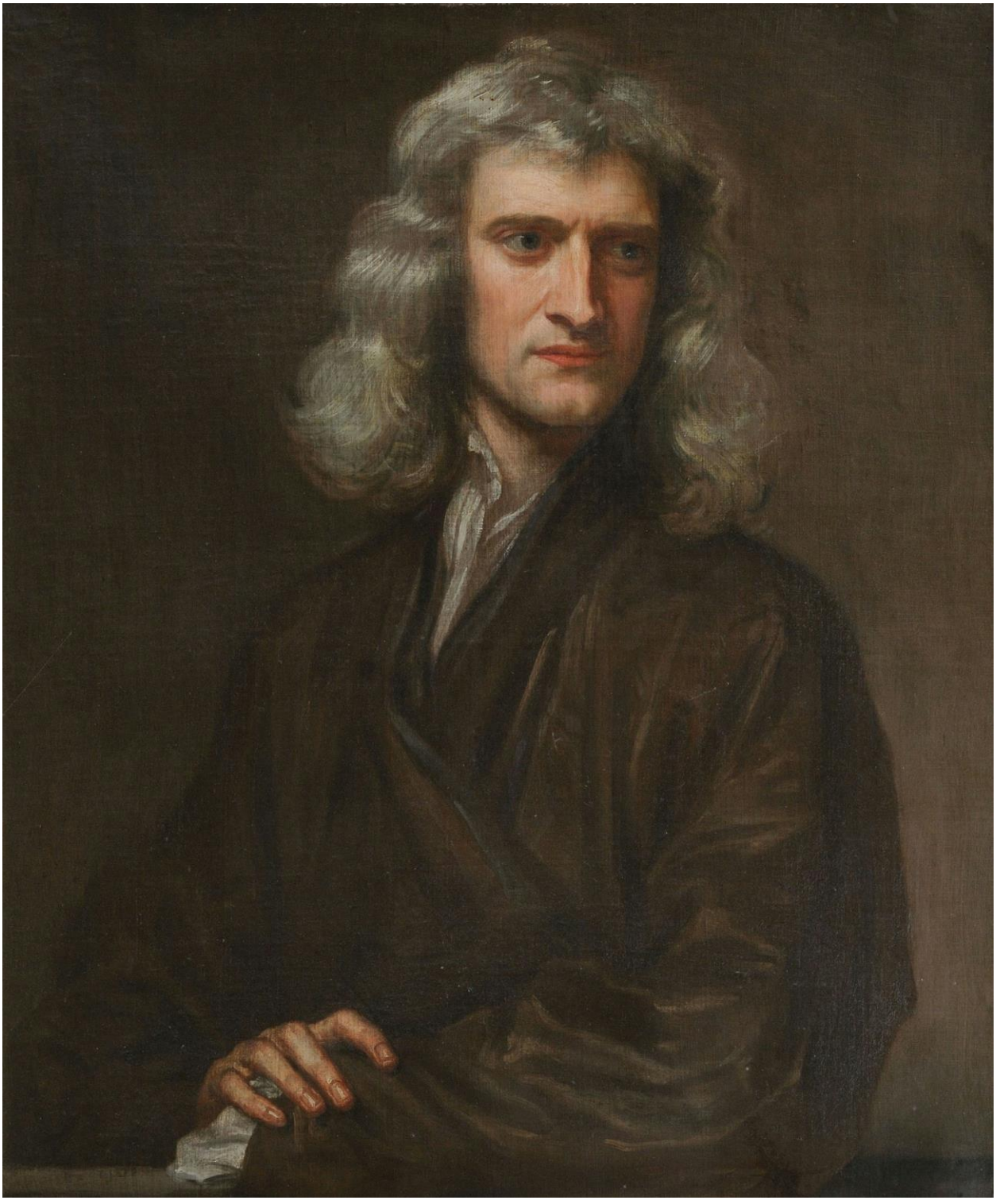
ENROLMENT NO. – 21113063

CIVIL M3

I choose this topic because Newton's laws are very important because they tie into almost *everything* we see in everyday life. These laws tell us exactly how things move or sit still, like why you don't float out of bed or fall through the floor of your house. Newton's laws control how cars work, how water flows, how buildings don't fall down, and basically how everything around us moves. Newton's laws speak very generally *all* forces, but to use them for any specific problem, you have to actually know all the forces involved, like gravity, friction, and tension. For example- a car to move, there must be friction between the wheels and the ground. The wheels exert a force on the ground because they are spinning, and the ground exerts a reaction force on the wheels. It is this force which pushes the car forward. So thank Newton's law of action and reaction every time you drive somewhere!

This is too much important in our course that is in PHN001 because all know very well without newton's law we can't do any single problem of mechanics and also in daily life.

Sir Isaac Newton worked in many areas of mathematics and physics. He developed the theories of gravitation in 1666 when he was only 23 years old. In 1686, he presented his three laws of motion in the "Principia Mathematica Philosophiae Naturalis." By developing histhree laws of motion, Newton revolutionized science. Newton's laws together with Kepler'sLaws explained why planets move in elliptical orbits rather than in circles.



Newton's first law:-

Newton's first law states that 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. This tendency to resist changes in a state of motion is inertia. There is no net force acting on an object (if all the external forces cancel each other out). Then the object will maintain a constant velocity. If that velocity is zero, then the object remains at rest. If an external force acts on an object, the velocity will change because of the force.

This law also knows as law of inertia.

Types of Inertia:

Inertia of rest:

An object stays where it is placed, and it will stay there until you or something else moves it.

Inertia of motion**:**

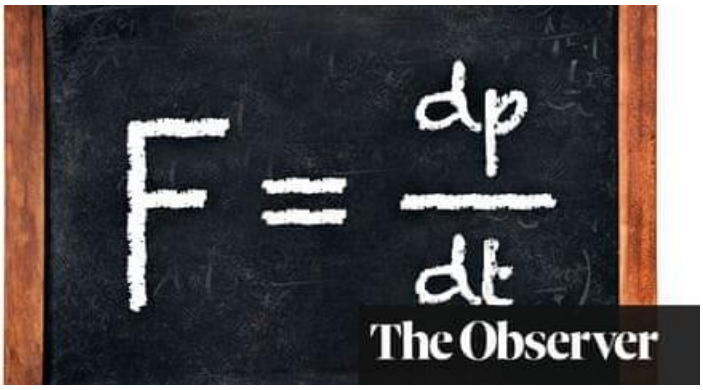
An object will continue at the same speed until a force acts on it.

Inertia of direction: –

An object will stay moving in the same direction unless a force acts on it.

Newton's second law:-

Force is equal to the rate of change of momentum. For a constant mass, force equals mass times acceleration.



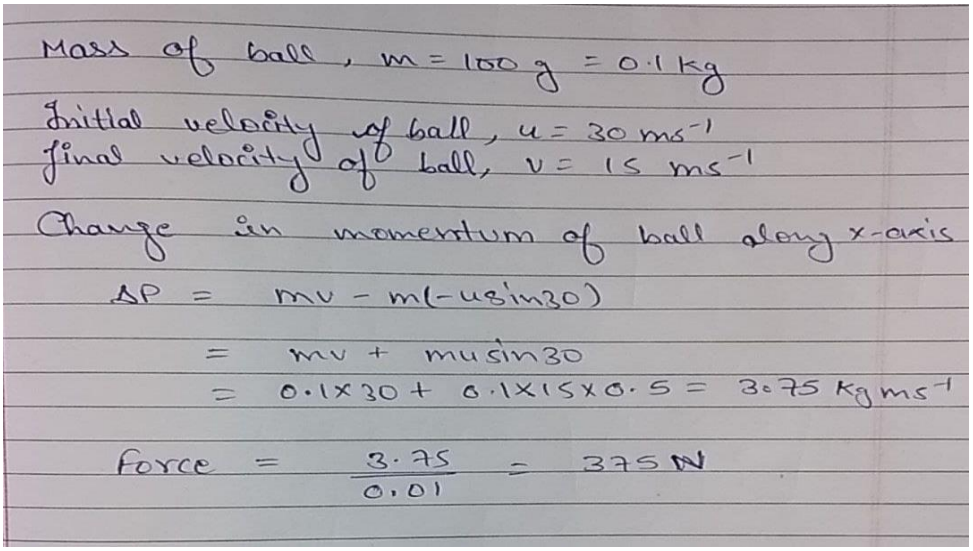
$$F = ma$$

F = Net force
m = mass
a = acceleration

Newton's second law states that the acceleration of an object depends upon two variables – the net force acting on the object and the mass of the object. The acceleration of the body is directly proportional to the net force acting on the body and inversely proportional to the mass of the body. This means that as the force acting upon an object is increased, the acceleration of the object is increased. Likewise, as the mass of an object is increased the acceleration of the object is decreased.

We understand this by a numerical also

PROBLEM A hockey player receives a corner shot at a speed of 15 ms^{-1} at an angle of 30° with the y – axis and then shoots the ball of mass 100 g along the negative x-axis with a speed of 30 ms^{-1}. If it remains in contact with the hockey stick for 0.01s, the force imparted to the ball in the x-direction is

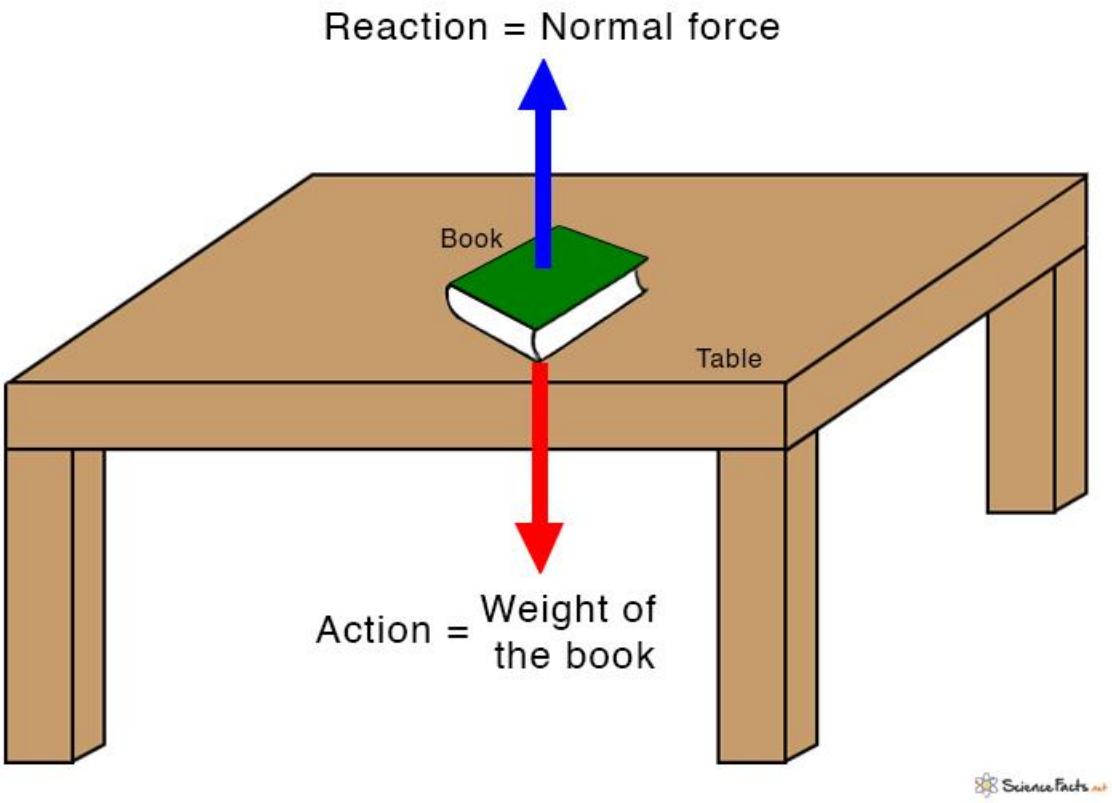


Newton's third law:-

Newton's third law states that when two bodies interact, they apply forces to one another that are equal in magnitude and opposite in direction. The third law is also known as the law of action and reaction.

For example, a book resting on a table applies a downward force equal to its weight on the table. According to the third law, the table applies an equal and opposite force to the book. This force occurs because the weight of the book causes the table to deform slightly so that it pushes back on the book like a coiled spring.

Newton's Third Law



References

1 https://www.google.com/search?q=book+on+table+newton+third+law&sxsrf=APq-WBvzL-3-ETFr8BspNCPJXSbASP8AcQ:1645865464263&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjViOHS_pz2AhX74jgGHVDmAloQ_AUoAXoECAEQAw&biw=1536&bih=714&dpr=1.25#imgrc=8Mu-oM-vQxvD3M

2 https://www.google.com/search?q=newton%27s+second+law&tbm=isch&chips=q:newton%27s+second+law,g_1:formula:8G65G7Z0Iiw%3D&hl=en-GB&sa=X&ved=2ahUKEwjD49nF-Zz2AhWsxjgGHd8cAo0Q4lYoAXoECAEQHA&biw=1519&bih=656#imgrc=y4favJkjJa2stM

3 https://www.google.com/search?q=newton&sxsrf=APq-WBtLd5M5yoDL4U2NHZfBpRix7w50vQ:1645865899025&source=lnms&tbm=isch&sa=X&ved=2ahUKEwim_oiigJ32AhUAgtgFHVMIAYUQ_AUoAXoECAIQAw&biw=1536&bih=656&dpr=1.25#imgrc=0VM3QhRfb3ucNM

4 JEE previous year problem