

## Newton's third law of motion

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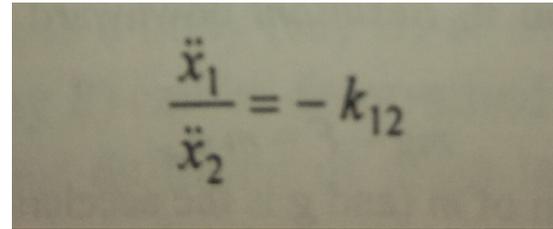
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### Abstract:-

This article is about Newton's third law of motion out of the three laws of motion he gave and forever changed the path of physics.

In order to arrive at the third law we considered an ideal experiment of the two interacting particles which are completely isolated from all other interactions with the surroundings. It is obvious that complete isolation is impossible. However the approximate situation we may imagine the case of a tug of war between two boys not necessary of equal size over a rigid pole on smooth horizontal surface of eyes for the interaction between two charged particle or the interaction between two pieces of dry eyes attached to the end of a massless spring and kept over a smooth horizontal surface. It is observed that in the experiments that the two bodies are always accelerated in opposite direction and the ratio of the acceleration is constant for any particular pair of body is irrespective of the strength of the interaction. Find

the coordinates  $X_1$  and  $X_2$  of the two bodies and measured along the line of the acceleration we see that


$$\frac{\ddot{x}_1}{\ddot{x}_2} = -k_{12}$$

Where,  $k_{12}$  is a positive constant characteristics of the two bodies concerned. The negative sign implies oppositely directed acceleration. We also find in general but the heavier body is accelerated the least. In fact,  $k_{12}$ , is found to be equal to the ratio of the masses of the body 2 to that of body 1.

The Newton's third law says

***To every action there is always an equal and opposite reaction.***

In an inertial frame every forces real that is associated with an object in the environment. Any single force is only one aspect of a mutual interaction between two bodies. Thought losses that when one body exerts a force on a second body the second body always exerts simultaneously a force equal in magnitude and opposite in direction on

the first. Action and reaction in the statement means force and not cause and effect. The act on different bodies so question of balancing Each Other does not arise at all. The most important practical inference of Newton's third law is that no internal interaction that is the interaction between two parts of the same system can impact acceleration to the system as a whole. For example, interaction between the horse and the cart cannot accelerate the horse cart system or you can lift yourself why your hair.

Like any other law Newton's third law also has limitations. In a system involving moving charges the forces between charges predicted by our law indeed violates the third law. In fact it pays for any courses which propagate from one body to another with finite velocities. The third law is true for Pair wise interaction only. Phonon pair wise interactions such as three body on many body interaction which to occur in nature obviously unintelligible in terms of the third law stated above.

### **Reference:-**

General properties of matter:- DP Roychowdhary