

# Newton's law of motion computer science essay

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In this assignment, I will learn about the result two that is Newton 's jurisprudence and harmonic oscillation. Newton 's jurisprudence can be divide by three types that is 1st jurisprudence, 2nd jurisprudence and 3rd jurisprudence. It is teach about the gesture in our existent life. Thus, harmonic oscillation can be divided by three types that are pendulum oscillation, damped oscillation and mechanic oscillation. All of these oscillation are utile in our life especial is use in different type of mechanics.

### **Question One**

Research on the Newton 's Laws of gesture, and do a study that provide item account and illustrations on Newton 's 3 Torahs of gesture. Your report should include relevant and utile expression.

### **Answer**

Newton 's jurisprudence of gesture can be divided by three types that is 1st jurisprudence, 2nd jurisprudence and 3rd jurisprudence and it is jurisprudence of gravitation. The three Torahs are simple and reasonable.

The first jurisprudence provinces that a force must be applied to an object in order to alter its speed. When the object 's speed is altering that average it is speed uping, which implies a relationship between force and acceleration.

The 2nd jurisprudence, the acceration of an object is straight relative to the net force moving on it and is reciprocally relative to its mass. The way of the acceleration is in the way of the acceleration is in the way of the net force moving on the object.

Finally, the 3rd Torahs, whenever we push on something, it pushes back with equal force in the opposite way.

## **Forces**

A force is normally imagined as a push or a pull on some object, possibly quickly, as when we hit a tennis ball with a racket. ( see figure 1. 0 ) . We can hit the ball at different velocities and direct it into different parts of the oppositions ; s tribunal. This mean that we can command the magnitude of the applied force and alos its way, so force is a vector measure, merely like speed and acceleration.

Figure 1. 0: Tennis title-holder Rafael Nadal strikes the ball with his racket, using a force and directing the ball into the unfastened portion of the tribunal.

Figure 1. 1: Examples of forces applied to assorted objects. In each instance, a force acts on the object surrounded by the dotted lines. Something in the environment external to the boxed country exerts the force.

## **Newton 's 1st jurisprudence**

Newton 's 1st jurisprudence of gesture provinces that if a organic structure is at remainder it will stay at the remainder and if a organic structure is traveling in a consecutive line with unvarying speed will maintain traveling unless an external force is acted upon.

For illustration, see a book lying on a tabular array. Obviously, the book remains at remainder if left entirely. Now imagine forcing the book with a horizontal force great plenty to get the better of the force of clash between

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the book and the tabular array, putting the book in gesture. Because the magnitude of the applied force exceeds the magnitude of the clash force, the book to a halt.

Now imagine the book across a smooth floor. The book once more comes to rest one time the force is no longer applied, but non every bit rapidly as earlier. Finally, if the book is traveling on a horizontal frictionless surface, it continues to travel in a consecutive line with changeless speed until it hits a wall or some other obstructor.

However, an object moving on a frictionless surface, it 's non the nature of an object to halt, one time set in gesture, but instead to continues in its original province of gesture. This attack was subsequently formalized as Newton 's first jurisprudence of gesture:

An object moves with a speed that is changeless in magnitude and way, unless acted on by a nonzero net force.

For illustration:

In the figure 1. 2, the twine is supplying centripetal force to travel the ball in a circle around 3600. If sudden the twine was break, the ball will travel off in a consecutive line and the gesture in the absence of the restraining force. This illustration is non hold other net forces are moving, such as horizontal gesture on a frictionless surface.

Figure 1. 2

## **Inactiveness**

Inertia is the reluctance of an object to alter its province of gesture. This means if an object is at remainder it will stay at remainder or if it 's traveling it will maintain traveling in a consecutive line with unvarying speed. Force is needed to get the better of inactiveness.

## **For illustration**

In figure 1. 3, it is an experiment to turn out the construct of inactiveness. In experiments utilizing a brace of inclined planes confronting each other, Galileo observed that a ball would up the opposite plane to the same tallness and turn over down one plane. If smooth surface are used, the ball is roll up to the opposite plane and return to the original tallness.

When it is get downing to turn over down the ball on the degree topographic point, it is will return the ball at the same tallness from original point.

Figure 1. 3

If the opposite slope were elevated at about a 0 grade angle, so the ball will be roll in an attempt to make the original tallness that is show in the figure 1. 4.

Figure 1. 4: If a ball stops when it attains its original tallness, so this ball would ne'er halt. It would turn over everlastingly if clash were absent.

## **Other illustration**

Figure 1. 5: Harmonizing to Newton 's 1st jurisprudence, a bikes gesture was n't alteration until same force, such as braking makes it alteration.

## **Newton 2nd jurisprudence**

Newton 's first jurisprudence explains what happens to an object that has no net force moving on it. The object either remains at remainder or continues traveling in a consecutive line with changeless velocity. Newton 's 2nd jurisprudence is the acceleration of an object is straight relative to the net force moving on it and is reciprocally relative to its mass. The way of the acceleration is in the way of the acceleration is in the way of the acceleration is in the way of the net force moving on the object.

Imagine forcing a block of ice across a frictionless horizontal surface. When you exert some horizontal force on the block, it moves with an acceleration of the  $2\text{m/s}^2$ . If you apply a force twice every bit big, the acceleration doubles to  $4\text{m/s}^2$ . Pushing three times as difficult triples the acceleration, and so on. From such observations, we conclude that the acceleration of an object is straight relative to the net force moving on it.

Mass besides affects acceleration. Suppose you stack indistinguishable block of ice on top of each other while forcing the stack with changeless force. If the force applied to one block produces an acceleration of  $2\text{m/s}^2$ , so the acceleration drops to half that value,  $1\text{ m/s}^2$ , When 2 blocks are pushed, to one-third the initial value. When three block is pushed, and so on. We conclude that the acceleration of an object is reciprocally relative to its mass. These observations are summarized in Newton 's 2nd jurisprudence:

The acceleration of an object is straight relative to the net force moving on it and reciprocally relative to its mass.

## Unit of measurements of Force and Mass

The SI unit of force is the Newton. When 1 Newton of force Acts of the Apostles on an object that has a mass of 1 kilograms, it produces an acceleration of  $1 \text{ m/s}^2$  in the object. From this definition and Newton 's 2nd jurisprudence, we can see that the Newton can be expressed in footings of the cardinal units of mass, length and clip.

$$1 \text{ N} = 1 \text{ kg} \cdot \text{m/s}^2$$

A force is a push or a pull. Hence a force can alter the size, form, and province of remainder or gesture, way of gesture and velocity / speed. The symbol for force is  $F$  and the S. I. unit is Newton (  $\text{N}$  ) . An object of mass  $m$  is subjected to a force  $F$ , its speed alterations from  $U$  to  $V$  in clip  $t$ . The above status can be stated as:

$$F =$$

Where  $a$  = is acceleration, therefore  $F = \text{mom}$ .

### For illustration

Figure 1. 6: An airboat.

An airboat with mass  $3.50 \times 10^2 \text{ Kg}$ , including riders, has an engine that produces a net horizontal force of  $7.70 \times 10^2 \text{ N}$ , after accounting for forces of opposition ( see figure 1. 6 ) .

( a ) Find the acceleration of the airboat.

( B ) Get downing from remainder, how long does it take the airboat to make a velocity of 12. 0m/s<sup>2</sup>?

( degree Celsius ) After making this velocity, the pilot turns off the engine and impetuss to a Michigan over distance of 50. 0m. Find the opposition force, presuming it 's changeless.

## Solution

( a ) Find the acceleration of the airboat.

Apply Newton 's 2nd jurisprudence and work out for the acceleration:

$$F_{net} = ma$$

$$a = \frac{F_{net}}{m}$$

$$= 2. 20m/s^2$$

( B ) Find the clip necessary to make a velocity of 12. 0m/s.

Use the kinematics velocity equation:

$$v = at + v_0$$

$$v = at + v_0 = ( 2. 20m/s^2 ) ( 5. 45 ) = 12. 0m/s$$

( degree Celsius ) Find the opposition force after the engine is turned off.

Using kinematics, find the net acceleration due to resistance forces

$$v^2 - v_0^2 = 2a \Delta x$$



$$0 - (12.0 \text{ m/s})^2 = 2a (50.0 \text{ m})$$

$$= -12 / 100$$

$$= -0.12 \text{ m/s}^2$$

Substitute the acceleration into Newton's 2nd jurisprudence, happening the opposition force:

$$F_{\text{resistance}} = m \cdot a$$

$$= (3.50 \times 10^2 \text{ kg}) (-1.44 \text{ m/s}^2)$$

$$= -504 \text{ N}$$

## **Impulse and Impulsive Force**

The force, which acts during a short minute during a hit, is called Impulsive Force. Impulse is defined as the alteration of impulse, so Impulse =  $MV - Mu$ , since  $F = \frac{\Delta p}{\Delta t}$ , therefore impulse can be written as:

Impulsive force is Force = Impulse/Time. Unit is Newton ( N ) .

## **The applications of unprompted force**

In existent life we tend to diminish the consequence of the unprompted force by cut downing the clip taken during hit.

## **Gravitational force or gravitation**

Gravity exists due to the Earth's mass and it is Acts of the Apostless towards the centre of Earth. Object falling under the influence of gravitation will see free autumn. Assuming no other force acts upon it.

Object sing free autumn will fall with acceleration ; gravitation has an approximative value of  $10\text{m/s}^2$ . The gravitative force moving on any object on Earth can be expressed as  $F = mg$ . This is besides every bit weight.

### **For illustration**

Find the gravitative force exerted by the Sun on a  $79.0\text{kg}$  adult male located on Earth. The distance from the Sun to the Earth is about  $1.50 \times 10^{11}\text{ m}$ , and the Sun 's mass is

$1.99 \times 10^{30}\text{kg}$ .

### **Solution**

$F_{\text{sun}} = G$

$= (6.67 \times 10^{-11} \text{ Kg} \cdot \text{m}^3\text{s}^2)$

$= 0.413\text{N}$

### **Newton 's 3rd jurisprudence**

The action of one organic structure moving upon another organic structure tends to alter the gesture of the organic structure acted upon. This action is called a force. Because a force has both magnitude and way, it is a vector measure, and the old treatment on vector notation applies.

Newton 's 3rd jurisprudence is the sum of force which you inflict upon on others will hold the same repelling force that act on you every bit good.

Force is exerted on an object when it comes into contact with some other object. See the undertaking of driving a nail into a block of wood, for illustration, as illustrated in the figure 1.7 ( a ) . To speed up the nail and

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drive it into the block, the cock must exercise a net force on the nail. Newton is a individual stray force ( such as the force exerted by the cock on the nail ) could n't be. Alternatively, forces in nature ever exist in braces. Harmonizing to Newton, as the nail is driven into the block by the force exerted by the cock, the cock is slowed down and stopped by the force exerted by the nail.

Newton described such mated forces with his 3rd jurisprudence: Whenever one object exerts a force on a 2nd object, the 2nd exerts an equal and opposite force on the first.

This jurisprudence, which is illustrated in figure 1. 7 ( B ) , province that a individual stray force ca n't be. The force  $F_{12}$  exerted by object 1 on object 2 is sometimes called the action force, and the force  $F_{21}$  exerted by object 2 on object 1 is called the reaction force. In world, either, either force can be labeled the action or reaction force. The action force is equal in magnitude to the reaction force and antonym in way. In all instances, the action and reaction forces act on different objects.

For illustration, the force moving on a freely falling missile is the force exerted by Earth on the missile,  $F_g$ , and the magnitude of this force is its weight milligram. The reaction to coerce  $F_g$  is the force exerted by the missile on Earth,  $F_g = -F_g$ . The reaction force  $F_g$  must speed up the Earth towards the missile, merely as the action force  $F_g$  accelerates the missile towards the Earth. Because the Earth has such a big mass and its acceleration due to this reaction forces is negligibly little.

Figure 1. 7: Newton 's 3rd jurisprudence. ( a ) The force exerted by the cock on the nail is equal in magnitude and antonym in way to the force exerted by the nail on the cock. ( B ) The force  $F_{12}$  exerted by object 1 on object 2 is equal in magnitude and antonym in way to the force  $F_{21}$  exerted by object 2 on object 1.

Newton 's 3rd jurisprudence invariably affects our activities in mundane life. Without it, no motive power of any sort would be possible, whether on pes, on a bike, or in a motorised vehicle. When walking, we exert a frictional force against the land. The reaction force of the land against our pes propels us frontward. In the same manner, the tired on a bike exert a frictional force against the land, and the reaction of the land pushes the bike frontward. This is called clash plays a big function in such reaction forces.

Figure 1. 8:

In the figure 1. 8, when a force pushes on an object, the object pushes back in the opposite way. The force of the forcing back is called the reaction force. This jurisprudence explains why we can travel a dinghy in  $H_2O$ . The  $H_2O$  pushes back on the oar every bit much as the oar pushes on the  $H_2O$ , which moves the boat. The jurisprudence besides explains why the pull of gravitation does n't do a chair clang through the floor ; the floor pushes back plenty to countervail gravitation. When you hit a baseball, the chiropteran pushes on the ball, but the ball besides on the chiropteran.

Figure 1. 9

## Question Two

Research and exemplify the assorted features of "Damped Oscillations", your reply should besides include graphical show of these characteristic.

## Answer

In the existent life, the vibrating gesture can be taken topographic point in ideal systems that are hovering indefinitely under the action of a additive restoring force. In many realistic system, resistive forces, such as clash, are present and retard the gesture of the system. Consequently, the mechanical energy of the system diminishes in clip, and the gesture is described as a damped oscillation.

Therefore, in all existent mechanical systems, forces of clash retard the gesture, so the systems do n't hover indefinitely. The clash reduces the mechanical energy of the system as clip base on ballss, and the gesture is said to be damped.

In the figure 2. 0, daze absorbers in cars are one practical application of damped gesture. A daze absorber consists of a Piston traveling through a liquid such as oil. The upper portion of the daze absorber is steadfastly attached to the organic structure of the auto. When the auto travels over a bump in the route, holes in the Piston let it to travel up and down in the fluid in a damped manner.

( B )

Figure 2. 0: ( a ) Angstrom daze absorber consists of a Piston hovering in a chamber filled with oil. As the Piston oscillates, the oil is squeezed through

holes between the Piston and the chamber, doing a damping of the Piston 's oscillations. ( B ) One type of automotive suspension system, in which a daze absorber is placed inside a spiral spring at each wheel.

Damped gesture varies with the fluid used. For illustration, if the fluid has a comparatively low viscousness, the vibrating gesture is preserved but the amplitude of quiver lessenings in clip and the gesture finally ceases. This procedure is known as under damped oscillation. The place vs. clip curve for an object undergoing such as oscillation appears in active figure 2. 1. In the figure 2. 2 compares three types of damped gesture, with curve ( a ) stand foring underdamped oscillation. If the fluid viscousness is increased, the object return quickly to equilibrium after it is released and does n't hover. In this instance the system is said to be critically damped, and is shown as curve ( B ) in the figure 2. 2. The Piston return to the equilibrium place in the shortest clip possible without one time overshooting the equilibrium place. If the viscousness is greater still, the system is said to be overdamped. In this instance the Piston returns to equilibrium without of all time go throughing through the equilibrium point, but the clip required to make equilibrium is greater than in critical damping. As illustrated by curve ( degree Celsius ) in figure 2. 2.

Active figure 2. 1: A graph of displacement versus clip for an under damped oscillator. Note the lessening in amplitude with clip.

Figure 2. 2: Plots of displacement versus clip for ( a ) an under damped oscillator, ( B ) a critically damped oscillator, and ( degree Celsius ) an overdamped oscillator.

Damped oscillation is relative to the speed of the object and Acts of the Apostles in the way opposite that of the object 's speed relation to the medium. This type of force is frequently observed when an object is hovering easy in air, for case, because the resistive force can be expressed as  $R = -bv$ , where  $B$  is a changeless related to the strength of the resistive force, and the reconstructing force exerted on the system is  $-kx$ , Newton 's 2nd jurisprudence gives us

$$= -kx - bv = \text{soap}$$

$$-kx - B = m \sim (1)$$

The solution of this differential equation requires mathematics that may not yet be familiar to you, so it will merely be started without cogent evidence. When the parametric quantities of the system are such that  $B \ll \dots$ ; so that the resistive force is little, the solution to equation is

$$x(t) = (Ae^{- (b/2m) T}) \cos ( \omega t + \phi ) \sim (two)$$

Where the angular frequency of the gesture is

$$= \omega \sim (three)$$

The object suspended from the spring experience both a force from the spring and a resistive force from the environing liquid. Active figure 2. 1 shows the place as a map of clip for such a damped oscillator. We see that when the resistive force is comparatively little, the oscillating character of the gesture is preserved but the amplitude of quiver lessenings in clip and the gesture finally ceases, this system is known as an underdamped

oscillator. The dotted blue lines in active figure 2. 1, which form the envelope of the oscillatory curve, represent the exponential factor that appears in equation ( two ) . The exponential factor shows that the amplitude decays exponentially with clip.

It is convenient to show the angular frequency of quiver of a damped system ( three ) in the signifier

=

Where  $\omega_0 = \sqrt{k/m}$  represents the angular frequency of oscillation in the absence of a resistive force ( the undamped oscillator ) . In other words, when  $b=0$ , the resistive force is zero and the system oscillates with angular frequency, called the natural frequency. As the magnitude of the resistive force additions, the oscillations dampen more quickly. When  $B$  reaches a critical value  $b_c$ , so that  $b_c/2m = \omega_0$ , the system does non hover and is said to be critically damped. In this instance, it returns to equilibrium in an exponential mode with clip, as in figure 2. 2.

Question Three:

Simple Harmonic Motion ( SHM ) is a dynamical system typified by the gesture of a mass on a spring when it is capable to the additive elastic reconstructing force given by Hooke 's Law. The gesture is sinusoidal in clip and demonstrates a individual resonant frequency.

What is the relationship between the tenseness and weight in the system?

What is Hooke 's jurisprudence when applied to the system?



## **Answer**

Oscillation of a body has one set of equations that can be used to depict and foretell the motion of any object whose motion is simple harmonic. The motion of a vibrating object is simple harmonic if its acceleration is relative to its displacement and its acceleration and displacement are in opposite ways.

The 2nd law point means that acceleration, and hence the end point force, always acts towards the equilibrium place, where the displacement is zero.

Common illustrations of simple harmonic motion include the oscillations of a simple pendulum and those of a mass suspended vertically on a spring.

The diagram shows the size of the acceleration of a simple pendulum and a mass on a spring when they are given a little displacement,  $x$ , from the equilibrium place.

Figure 3.0

In the figure 3.0, the numerical value of the acceleration is equal to a constant multiplied by the displacement, demonstrating that acceleration is relative to displacement. Then, the negative value of the acceleration shows that it is in the opposite way to the displacement, since acceleration and displacement are both vector measures.

## **Simple harmonic in a spring**

If you hang a mass from a spring, the mass will stretch the spring a certain amount and so come to rest. It is established when the pull of the spring upward on the mass is equal to the pull of the force of gravitation downward on the

mass. The system, spring and mass, is said to be in equilibrium when that status is met.

If the mass is up or down from the equilibrium place and release it, the spring will undergo simple harmonic gesture caused by a force moving to reconstruct the vibrating mass back to the equilibrium place. That force is called the restoring force and it is straight relative to magnitude of the supplanting and is directed opposite the supplanting. The necessary status for simple harmonic gesture is that a reconstructing force exists that meets the conditions stated symbolically as  $F_r = -kx$ , where  $K$  is the invariable of proportionality and  $x$  is the supplanting from the equilibrium place. The subtraction mark, as usual, indicates that  $F_r$  has a way opposite that of  $x$ .

### **For illustration**

Figure 3. 1

The grouch rotates with angular speed  $w$ . Then, the slide will skid between  $P_1$  and  $P_2$ .

$$V^2 = W^2 ( P_2 - X^2 )$$

$P$  = Amplitude or maximal point.

$V$  = Velocity of the skidder.

$x$  = Distance from centre point due to speed,  $V$ .

$W$  = Angular speed of grouch.

$$= 2l^f$$

degree Fahrenheit =

=  $1/T$

$a = -w^2x$

## Simple pendulum

A simple pendulum is merely a heavy atom suspended from one terminal of an nonextensible, weightless twine whose other terminal is fixed in a stiff support, this point being referred to as the point of suspension of the pendulum.

Obviously, it is merely impossible to obtain such an idealised simple pendulum. In existent pattern, we take a little and heavy spherical British shilling tied to a long and all right silk yarn, the other terminal of which passes through a split cork firmly clamped in a suited base, the length (  $a$ , " ) of the pendulum being measured from the point of suspension to the Centre of mass of the British shilling.

In the figure 3. 2, allow  $S$  be the point of suspension of the pendulum and  $O$ , the mean or equilibrium place of the British shilling. On taking the British shilling a small to one side and so gently let go ofing it, the pendulum starts hovering about its average place, as indicated by the flecked lines.

At any given blink of an eye, allow the supplanting of the pendulum from its average place  $SO$  into the place  $SA$  is  $l$ ? . Then, the weight milligram of the British shilling, moving vertically downwards, exerts a torsion or minute -  $mg/\sin l$ ? about the point of suspension, be givening to convey it back to its

average place, the negative mark of the torsion bespeaking that it is oppositely straight to the supplanting ( $\theta$ ).

Figure 3. 2

If  $d^2\theta/dt^2$  be the acceleration of the British shilling, towards 0, and  $I$  its M. I about the point of suspension ( $S$ ), the minute of the force or the torsion moving on the bob is besides equal to  $I \cdot d^2\theta/dt^2$ .

$$I = -mga \sin\theta$$

If  $\theta$  is little, the amplitude of oscillation be little, we may pretermit all other footings except the first and take wickedness  $\theta = \theta$ .

$$I = -mga \theta$$

Whence, =

Since M. I of the British shilling about the point of suspension ( $S$ ) is  $ma^2$ .

We have

$$= = = A\mu\theta$$

Where  $= A\mu$

The acceleration of the British shilling is therefore relative to its angular supplanting  $\theta$  and is directed towards its average place 0. The pendulum therefore executes a simple harmonic gesture and its clip period is given by

$$T = 2\pi \sqrt{I/mga}$$

It being clearly understood that the amplitude of the pendulum is little. The supplanting here being angular, alternatively of additive, it is evidently an illustration of an angular simple harmonic gesture.

## **Hooke 's jurisprudence**

Vibration gesture is an object attached to a spring. We assume the object moves on a frictionless horizontal surface. If the spring is stretched or compressed a little distance  $x$  from its equilibrium place and so released, it exerts a force on the object as shown in figure 3. 3. From experiment the spring force is found to obey the equation

$$F = -kx \quad ( \text{four} )$$

Where  $x$  is the supplanting of the object from its equilibrium place ( $x = 0$ ) and  $K$  is a positive invariable called the spring invariable. This force jurisprudence for springs is known as Hooke 's jurisprudence. The value of  $K$  is a step of the stiffness of the spring. Stiff springs have big  $K$  value, and soft springs have little  $K$  value.

In the equation ( four ) , the negative mark mean that the force exerted by the spring is ever directed opposite the supplanting of the object. When the object is to the right of the equilibrium place, as in figure 3. 3 ( a ) ,  $x$  is positive and  $F$  is negative. This means that force is the negative way, to the left. When the object is to the left of equilibrium place, as in figure 3. 3 ( degree Celsius ) ,  $x$  is negative and  $F$  is positive, bespeaking that the way the force is to the right. Of class, when  $x = 0$ , as in figure 3. 3 ( B ) , the spring is unstretched and  $F = 0$ . Because the spring force ever acts toward

the equilibrium place, it is some clip called a restoring force. A reconstructing force ever pushes or pulls the object toward the equilibrium place.

The procedure is so repeated, and the object continues to hover back and Forth over the same way. This type of gesture is called simple harmonic gesture. Simple harmonic gesture occurs when the net force along the way of gesture obeys Hooke 's jurisprudence - When the net force is relative to the supplanting from the equilibrium point and is ever directed toward the equilibrium point.

Figure 3. 3: The force exerted by a spring on an object varies with the supplanting of the object from the equilibrium place,  $x=0$ . ( a ) When ten is positive ( the spring is stretched ) . ( B ) When ten is zero ( the spring is unstretched ) , the spring force is zero, ( degree Celsius ) When ten is negative ( the spring is compressed ) , the spring force is to the right.

## Decision

As my decision, Newton 's jurisprudence was a really utile in presents because it is can utilize the 3 type of jurisprudence to forestall any accidents in now coevals.

First 's jurisprudence is provinces that a force must be applied to an object in order to alter its speed. Second 's jurisprudence is acceration of an object is straight relative to the net force moving on it and is reciprocally relative to its mass. Third 's jurisprudence is whenever we push on something, it pushes back with equal force in the opposite way.

Second, harmonic oscillation is a type of forced and damped oscillation that is amplitude of a existent vacillation pendulum or hovering spring lessening easy with clip until the oscillation stop wholly. This decay of amplitude as a map of clip is called damping.