# PHYSICS

# NCERT - NCERT PHYSICS(TAMIL ENGLISH)

# LAW OF MOTION

## Example

**1.** A body of mass 'm' is kept on the horizontal floor and it is pushed in the horizontal

direction with a force of 10N continuously, so that it moves steadily.

(a) Draw FBD (a diagram showing all the forces acting on the body at a point of time)

(b) What is the value of friction ?

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**2.** A mat of mass 1kg and length 1m is placed on the floor. One end of the mat is pulled with a constant speed of 1m/s towards the other end till the other end comes in to motion (till

the mat is reverse). How much force is required to do this ?

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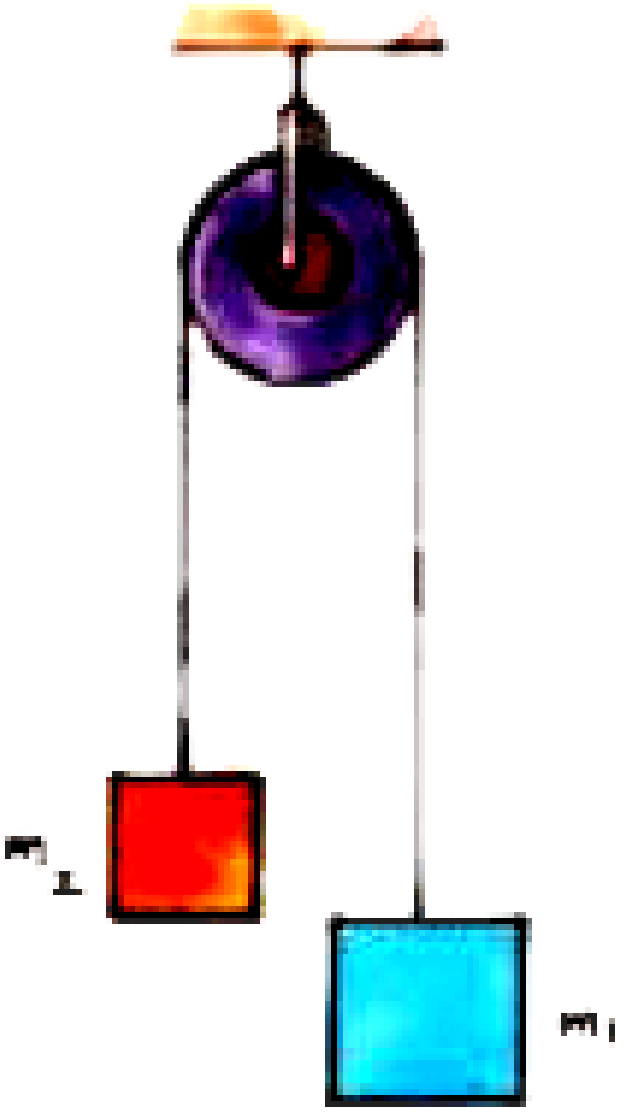
**3.** Atwood machine



Atwood used the system to prove Netwons

laws of motion. Atowood machine consists of two loads of mases $m_1$ and $m_2$ attached to the ends of a limp of inextensible string as shown in tghe figure 11. The string runs over a pully. FInd the acceleration of each load and tension in the string $(m_1 > m_2)$

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**4.** A cannon of mass $m_1 = 12000kg$ located on a smooth horizontal platform fires a shell of mass $m_2 = 300kg$ in horizontal direction with

a velocity $v_2 = 400m/s$. Find the velocity of the cannon after it is shot.

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## Think And Discuss

**1.** You may have seen the trick where a tablecloth is jerked from a table, leaving the dishes that were on the cloth nearly in their original positions.

What do you need to perform this

successfully?

Which cloth should we use? Is it cloth made of thick cotton or thin silk?

Should the dishes possess large mass or small mass?

Is it better to pull the cloth with a large force or pull it with a gentle and steady force?

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**2.** What is the velocity of a small object that has separated from a rocket moving in free

space with velocity 10km/s?

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**3.** What is the momentum of a ceiling fan when it is rotating?

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**4.** Is it possible to move in a curved path in the absence of a net force?

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**5.** Prove that the tension throughout the string is uniform when the mass of string is considered to be zero.

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**6.** The force exerted by the earth on the ball is 8N. What is the force on the earth by the ball?

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**7.** A block is placed on the horizontal surface. There are two forces acting on the block. One, the downward pull of gravity and other a normal force acting on it. Are these forces equal and opposite? Do they form action - reaction pair? Discuss with your friends.

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**8.** Why is it difficult for a fire fighter to hold a hose that ejects large amount of water at high speed?

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**9.** A meteorite burns in the atmosphere before it reaches the earth's surface. What happens to its momentum?

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**10.** As you throw a heavy ball upward, is there any change in the normal force on your feet?

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**11.** When a coconut falls from a tree and strikes the ground without bouncing. What happens to its momentum?

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**12.** Explain the use of air bags in cars during accidents.

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## Let Us Improve Our Learning Reflections On Concepts

**1.** Explain the reasons for the following

(a) Why dust comes out of carpet when it is beaten with a stick ?

(b) Luggage kept on the roof of a bus is tied with a rope.

(c ) Why a pace bowler in cricket runs from a long distance before he bowls ?

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**2.** Illustrate an example of each of the three laws of motion. $(AS_1)$

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**3.** Explain the following $(AS_1)$

(a) Static Inertia

(ii) Inertia of motion

(c ) momentum

(d) impulse (e) impulsive force

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## Let Us Improve Our Learning Allpication Of Conepts

**1.** Two objects have measses 8 kg 25 kg. Which one ha smore inertia ? Why $(AS_1)$

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**2.** What is the momentum of $6.0kg$ ball bowling with a velocity of $2.2m/s$ ?

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**3.** Two people push a car for 3 s with a combined net force of $200N$. $(AS_1)$

(a) Calculate the impulse provided to the car.

(b) If the car has a mass of 1200 kg, what will be its change in velocity ?

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**4.** A force acts of $0.2$ sec on an object having mass $1.4kg$ initially at rest. The force stops to act but the object moves through 4m in the

next 2 seconds find the magnitude of the force ?

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**5.** An object of mass 5 kg is moving with a velocity of $10ms^{-1}$. A force is aplied so that in 20 s, it attains a velocity of $25ms^{-1}$. What is the force aplied on the object ?

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**6.** A hammer of mass 400 g, moving at $30ms^{-1}$. strickes a nail. The nail stops the hammer in a very short time of $0.01s$. What is the force of the nail on the hammer ? $(AS_1)$

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**7.** A man of mass 30 kg uses a rope of climb which bears only 450 N. What is the maximum acceleration with which he can climb safely

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## Let Us Improve Our Learning Higher Order Thinking Questions

**1.** A vehicle has a mass of 1500 kg. What must be the force between the vehicle and the road if the vechicle is to be stoped with a negative acceleration of $1.7ms^{-2}$ ?

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**2.** Two ice skaters initially at rest, push of each other. If one skater whose mass is 60 kg has a velocity of 2m/s. What is the velocity of other skater whose mass is 40 kg ?

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**3.** Thre identical blocks, each of mass 10kg, are pulled as shown on the horizontal frictionless surface If the tension (F) in the rope is 30N. What is the acceleration of each block? And

what are the tension in the other ropes? (Neglect the masses of the ropes) $(AS_1)$

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**4.** If a fly collides with the windshield of a fast-moving bus,

(a) Is the impact force experienced, same for the fly and the bus? Why

(b) It is same acceleration experience by thte fly and the bus? Why?

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## Let Us Improve Our Learning Multiple Choice Questions

**1.** The scientist who said that "an object in motion will remain in same motion as long as no external force is applied" is

A. Aristotle

B. Galileo

C. Newton

D. Dalton

**Answer:**

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**2.** f the net force acting on an object is zero, then the body is said to be in the state of

A. Equilibrium

B. Motion

C. Inertia of motion

D. Uniform motion

**Answer:**

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**3.** Inertia of the body depends on

A. Shape

B. Volume

C. Mass

D. Area

**Answer:**

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**4.** Newton used the word 'mass in motion' to represent

A. Linear momentum

B. Inertia of motion

C. Velocity

D. Inertia at rest

**Answer:**

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**5.** The unit of momentum in SI system is _____.

A. m/sec

B. Kg-m

C. k.g.m/sec

D. Kg. m/sec

**Answer:**

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## Let Us Improve Our Learning Suggested Experiments

**1.** Conduct an experiment to prove Newton's first law of motion and write a report.

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## Let Us Improve Our Learning Suggested Projects

**1.** Observe some daily life examples for Newton's first law of motion and explain the situaions. Write a report on your observations.

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**2.** Write a report on the action and reaction in the systems that you have observed in your daily life which are the evident of Newton's third law of motion.

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