



PHYSICS

NCERT - NCERT Physics(Telugu)

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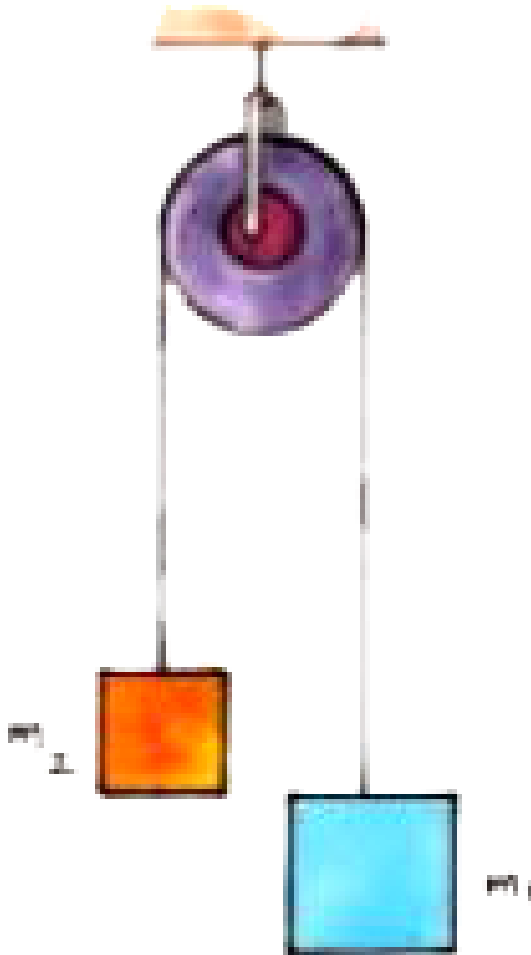
2. A mat of mass 1kg and length 1m is placed on the floor. One end of the mat is pulled with a constant speed of 1m/s towards the other end till the other end comes in to motion (till

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 Newton's

laws of motion. Atwood machine consists of two loads of masses m_1 and m_2 attached to the ends of a limp of inextensible string as shown in figure 11. The string runs over a pulley. Find the acceleration of each load and tension in the string ($m_1 > m_2$)



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4. A cannon of mass $m_1 = 12000\text{kg}$ located on a smooth horizontal platform fires a shell of mass $m_2 = 300\text{kg}$ in horizontal direction

with a velocity $v_2 = 400\text{ms}/\text{s}$. 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. Air bags are used in cars for safety. Why?



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Let Us Improve Our Learning Reflections On Concepts

1. Explain the reasons for the following (AS_1)

(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 Application Of Concepts

1. Two objects have masses 8 kg 25 kg. Which one has more 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 200 N.

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 applied so that in 20 s, it attains a velocity of 25ms^{-1} . What is the force applied on the object ?



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6. A hammer of mass 400 g, moving at 30ms^{-1} . strikes 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 vehicle is to be stopped 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. Three 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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