



PHYSICS

BOOKS - KUMAR PRAKASHAN KENDRA

PHYSICS (GUJRATI ENGLISH)

FORCE AND LAWS OF MOTION

Activity 9 3

1. Place a water-filled tumbler on a tray

Hold the tray and turn around as fast as you

can.

We observe that the water spills.why?



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Activity 9 4

1. Ask two children to stand on two separate carts as shown in the figure



Give one of them a bag full of sand. Ask them to play a game of catch with the bag

Does each of them receive an instantaneous reaction as a result of the sand bag (action)?



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Intext Questions And Answers

1. (1) Which of the following has more inertia:

(a) a rubber ball and a stone of the same size?

(b) a bicycle and a train ?

(c) a five rupees coin and a one rupee coin?



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2. In the following example, try to identify the number of times the velocity of the ball changes :

"A football player kicks a football to another player of his team who kicks the football towards the goal. The goalkeeper of the opposite team collects the football and kicks it towards a player of his own team.

Also identify the agent supplying the force in each case.



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3. Explain why some of the leaves may get detached from a tree if we vigorously shake its

branch



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4. Why do you fall in the forward direction when a moving bus brakes to a stop and fall backwards when it accelerates from rest?



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5. If action is always equal to the reaction, explain how a horse can pull a cart.



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6. Explain, why is it difficult for a fireman to hold a hose, which ejects large amounts of water at a high velocity



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7. From a rifle of mass 4 k a bullet of mass 50g is fired with an initial velocity of 35 m s^{-1}
Calculate the initial recoil velocity of the rifle



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8. Two objects of masses 100 and 200 g are moving along the same line and direction with velocities 2 m s^{-1} and 1 m s^{-1} respectively. They collide and after collision, the first object moves at a velocity of 1.67 m s^{-1} . Determine the velocity of the second object.



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Questions And Answers Answer The Following Questions In Very Short

1. Define : Force



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2. What are balanced forces ?



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3. What is the resultant force of balanced forces ?



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4. What is friction ?



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5. What is the force resisting the motion of an object through the contact surface called ?



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6. What are unbalanced forces ?



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7. State Newton's first law of motion



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8. What is inertia ?



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9. What is the measure of inertia?



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10. Define : Momentum



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11. State the SI unit of momentum.



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12. What is the momentum of an object of mass m , moving with a velocity v ?



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13. State Newton's second law of motion.



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14. What is the SI unit of force ?



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15. Define one newton force.



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16. No force is required to move an object with a constant velocity. Why?



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17. State Newton's third law of motion and explain giving an example .



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18. "Action and reaction forces are equal in magnitude and opposite in direction, yet they do not cancel each other." Why?



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19. State the law of conservation of momentum.



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20. In which direction is the momentum of a moving body?



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Questions And Answers Choose The Correct Option From Those Given Below Each Question

1. Newton's II law of motion connects:

A. First

B. Second

C. Third

D. none

Answer:



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2. What is the momentum of an object of mass m , moving with a velocity v ?

A. $(mv)^2$

B. mv^2

C. $\frac{1}{2}mv^2$

D. mv

Answer:



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3. State the SI unit of momentum.

A. $kgms^{-1}$

B. kg,ms

C. $kg \text{ `ms}^{(-2)}$

D. ms^{-1}

Answer:



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4. 1 newton dyne

A. 10^3

B. 10^4

C. 10^5

D. 10^6

Answer:



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5. What is the product of force and the time period for which the force is acting called ?

A. Momentum

B. Acceleration

C. Inertia

D. Impulse of force

Answer:



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6. A constant force of 5N is applied on a body of 10 kg mass, with how much acceleration will it move?

A. $2ms^{-2}$

B. $0.5ms^{-2}$

C. $50ms^{-2}$

D. $5ms^{-2}$

Answer:



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7. Which of the following vehicles has the least Inertia?

A. Bicycle

B. Scooter

C. Car

D. Truck

Answer:



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8. How much force is needed to produce acceleration of 80 cm s^{-2} in a body of mass 500g ?

A. 0.04 N

B. 0.4 N

C. 4N

D. 4000N

Answer:



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9. Unit of which physical quantity is same as that of unit of impulse of force?

A. Force

B. Acceleration

C. Momentum

D. Velocity

Answer:



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10. Newton's second and third law lead to which Important law of physics?

A. Law of pressure

B. Archimedes' principle

C. Law of conservation of momentum

D. Law of conservation of energy

Answer:



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11. For which type of surface magnitude of frictional force would be less?

A. Glass surface

B. Wooden surface

C. Sandy surface

D. Rocky surface

Answer:



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12. On which factor the frictional force does not depend?

- A. Mass of the object
- B. Type of material of the surface
- C. Area of contact surface
- D. None of these

Answer:



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13. Which substance cannot be used to reduce friction?

A. Oil

B. Grease

C. Gum

D. Graphite

Answer:



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14. How much acceleration is produced on applying a force of 0.5 N on an object of mass 250 g?

A. 0.125 ms^{-2}

B. 0.05 ms^{-2}

C. 2 ms^{-2}

D. 5 ms^{-2}

Answer:



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15. What change would occur in acceleration. if the external force acting on an object is doubled?

- A. Would be halved
- B. Would remain the same
- C. Would be doubled
- D. Would be four times

Answer:



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16. Which of the following physical quantity is scalar?

A. Mass

B. Force

C. Impulse of force

D. Momentum

Answer:



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17. If a force of 5N acts on an object of mass 2 kg for 2 s. then = what would be the change occurring in its momentum?

A. $20 \text{ kg } m s^{-1}$

B. $5 \text{ kg } m s^{-1}$

C. $10 \text{ mg } m s^{-1}$

D. $1.25 \text{ kg } m s^{-1}$

Answer:



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18. If a constant force is applied to an object of mass 0.9 kg in stationary state for 10s , it

covers distance of 250m, what magnitude of this force would be?

A. 18 N

B. 13.5 N

C. 9N

D. 4.5 N

Answer: D



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19. What is the momentum of an object of mass m , moving with a velocity v ?

A. velocity, time

B. mass, weight

C. mass, velocity

D. mass, distance

Answer:



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20. Momentum of an object is 28 kg ms^{-1} . If its velocity is 1.4 ms^{-1} , what would be the mass of the object?

A. 20 g

B. $2 \times 10^4 \text{ g}$

C. $0.2 \times 10^4 \text{ g}$

D. $0.2 \times 10^6 \text{ g}$

Answer:



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21. A ball of mass m collides with the ground with velocity and then comes up in the same direction with the same velocity. The change occurred in the momentum of this ball

A. $4mv$

B. $2mv$

C. mv

D. 0

Answer:



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22. When is the momentum of an object zero?

A. While in the state of motion

B. While in stationary position

C. While performing retarded motion

D. While performing motion with constant
velocity

Answer:



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23. kg ms^{-2} is the unit of which physical quantity?

- A. Force
- B. Work
- C. Momentum
- D. Acceleration

Answer:



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24. On applying force in opposite direction of motion of an object, what effect occurs on the state of motion ?

A. Would perform motion with uniform velocity

B. Would perform accelerated motion.

C. Would perform retarded motion,

D. Nothing can be said.

Answer:



25. On applying a force of 5N to an object, if acceleration equal to 10 ms^{-2} ? is produced in it. then mass of the object would be ...kg

- A. 5
- B. 50
- C. 0.05
- D. 0.5

Answer: D



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26. A goalkeeper in the game of the football move his hands backwards in order to catch the football coming towards him with force. Due to this the goalkeeper

A. can apply more force to the football.

B. can increase the force acting on the hands by the football

C. can increase the rate of change of momentum.

D. can decrease the rate of change of momentum.

Answer:



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27. Which of the following statements is not true for an object performing constant accelerated motion on a linear path?

- A. Its speed is changing constantly
- B. Its velocity changes always.
- C. It is going always away from the earth.
- D. Force is always exerted on it.

Answer: C



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28. According to the Newton's third law of motion action force and reaction force ..

A. always act on an object

B. always act on different objects in mutually opposite direction.

C. are of equal magnitude and in same direction.

D. act on an object perpendicularly

Answer:



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29. The object due to the property of Inertia can.....

A. Increase its speed.

B. decreases its speed

C. oppose change in the state of motion.

D. start retarded motion due to friction

Answer: C



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30. A traveller tosses a coin in upward direction during his journey in a train in motion. As a result coin falls backward. It means that motion of a moving train would be

A. accelerated

B. uniform

C. uniform

D. on a circular path

Answer: A





31. An object of mass 2 kg is moving with constant velocity of 4 m s^{-1} on a frictionless horizontal surface. If the object is to be kept moving with the same velocity, the magnitude of the external force required would be N.

A. 32

B. 0

C. 2

D. 8

Answer:



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32. On which principle of conservation does a rocket work?

A. Mass

B. Energy

C. Momentum

D. Velocity

Answer: C



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33. A tanker, moving with uniform speed on a horizontal linear road is filled with water only up $\frac{2}{3}$ to height. If brakes are applied suddenly to the tanker, water in the tanker..... .

A. would be pushed backward

B. would be pushed forward

C. would have no effect

D. would be pushed upward

Answer:



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34. A batsman hits a cricket ball which then rolls on a level ground. After covering a short distance, the ball comes to rest. The ball slows to a stop because...

A. the batsman did not hit the ball hard enough.

B. velocity is proportional to the force exerted on the ball

C. there is a force on the ball opposing the motion.

D. there is no unbalanced force on the ball so the ball would want to come to rest.

Answer:



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Questions And Answers Fill In The Blanks

1. If the velocity of an object is made thrice, then its momentum would become times.



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2. 10^6 dyne newton.



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3. Newton's.. . law of motion shows the relation between external force acting on the object and change in its momentum.



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4. if force of 150 N is applied on an object. acceleration of 3 ms^{-2} ? is produced in it, then its mass would be ...



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5. A boy pushes the wall in North direction with force 20 N. The magnitude of force acting on the boy would beN and would be in direction.



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6. Velocity of a car of mass 1500 kg increases regularly from 36 km h^{-1} to 72 km h^{-1} then change in its momentum would be kg m s^{-1}



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7. After firing bullet, the recoil velocity of gun is than that of the bullet.



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8. The unit of Impulse of force is



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9. A constant force of 100 N should be applied to a stationary object of mass 20 kg for

duration of so that its velocity would be
 100 ms^{-1}



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10. The property of maintaining the state of an object is called.....



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**Questions And Answers Fill In The Blanks By
Selecting The Correct Alternative From Those
Given In The Bracket**

1. When force is applied to an object, there is no effect on its(mass, shape, velocity)



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2. The magnitude of external force acting on an object is equal to product of.....

(mass and velocity, mass and acceleration, velocity and time)



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3. The external force necessary to produce acceleration 5 m s^{-2} in an object of mass 2 kg is F_1 , and that to produce acceleration 2 m s^{-2} in an object of mass 4 kg is F_2 , then....hold.

$$(F_1 = F_2. F_1 > F_2. F_1 < F_2)$$



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4. The change in momentum of an object acted upon the force for 10 s is 10 kg m s^{-1}

then the magnitude of this force would be.....

(1dyne , 10^5 dyne , $10^2 N$)



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5. A bullet of 10g is fired from a rifle of 5 kg mass with velocity 250 ms^{-1} . then its recoil velocity (reaction velocity) would be ms^{-1}

(5.0.2,0.5)



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6. 30 N of force is needed to increase the velocity of a body of mass 5 kg from 10 m s^{-1} to 22 m s^{-1} for the time duration of.....

(2s,6s,12s)



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7. A hammer of mass 500g strikes an iron nail with speed of 50 m/s. If the nail stops , the hammer in a short duration of 0.01s , then find the force acting on the nail by the hammer .





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8. When a bus at rest starts motion suddenly, passengers standing in it are pushed backward. It is an illustration of Newton's law of motion.

(first,second,third)



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9. Inertia of an object depends on

(mass, volume, shape)



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10. State Newton's first law of motion



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Questions And Answers State Whether The Following Statements Are True Or False

1. State Newton's first law of motion



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2. Inertia is a scalar quantity



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3. Momentum is a vector quantity



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4. The resultant force of unbalanced forces is zero.





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5. The magnitude of action and reaction are same.



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6. "Action and reaction forces are equal in magnitude and opposite in direction, yet they do not cancel each other." Why?



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7. The property of maintaining the state of an object is called.....



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8. If the momentum of a moving body is changed four times, then Impulse of force becomes one-fourth



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9. The force, acting on a body performing uniform motion on a linear path, is constant.



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10. The magnitude of external force acting on an object is equal to product of.....

(mass and velocity, mass and acceleration, velocity and time)



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Questions And Answers Answer The Following Questions In Short

1. Using a horizontal force of 200 N. we intend to move a wooden cabinet across a floor at a constant velocity. What is the friction force that will be exerted on the cabinet?



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2. An object experiences a net zero external unbalanced force. Is it possible for the object

to be travelling with a nonizer velocity? If yes, state the conditions that must be placed on the magnitude and direction of the velocity .If no,provide a reason.



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3. When a carpet is beaten with a stick, dust comes out of it. Explain.



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4. Why is it advised to tie any luggage kept on the roof of the bus with a rope ?



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5. According to the third law of motion when we push on an object, the object pushes back on us with an equal and opposite force. If the object is a massive truck parked along the roadside, it will probably not move. A student justifies this by answering that the two

opposite and equal forces cancel each other.

Comment on this logic and explain why the

truck does not move.



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6. Akhtar, Kiran and Rahul were riding in a motorcar that was moving with a high velocity

on an expressway when an insect hit the windshield and got stuck on the windscreen.

Akhtar and Kiran started pondering over the situation. Kiran suggested that the insect

suffered a greater change in momentum as compared to the change in momentum of the motorcar (because the change in the velocity of the insect was much more than that of the motor-car). Akhtar said that since the motorcar was moving a larger velocity. It exerted a larger force on the insect. And as a result the insect died. Rahul while putting an entirely new explanation said that both the motorcar and the insect experienced the same force and a change in their momentum. Comment on these suggestions.



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7. Two similar trucks, one loaded and the other empty, are moving on a straight road with the same velocity. Which of the two will require a larger force to stop it? Why?



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8. An automobile vehicle has a mass of 1500 kg. What must be the force between the

vehicle and road if the vehicle is to be stopped with a negative acceleration of $1.7 \text{ m s}^{-1}??$



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9. How much momentum will a dumb-bell of mass 10 kg transfer to the floor if it falls from a height of 80 cm ? Take its downward acceleration to be $10 \text{ m s}^{-1}??$



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Questions And Answers Give Scientific Reasons For The Following Statements

1. We jerk wet clothes before spreading them as string.



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2. When a bus performing linear motion takes a sharp turn suddenly, the passengers tend to get thrown to one side. Explain.



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3. It is dangerous to alight from a moving bus.



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4. A fielder pulls his hands gradually with the moving ball while holding a catch



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5. If a balloon filled with air and its mouth untied, is released with its mouth in the downward direction, it moves upwards.



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6. In a long jump, an athlete runs a good distance before taking a long jump.



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7. A karate player can break a pile of tiles with a single blow of his hand.



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8. Safety (seat) belts are used to prevent accident while driving . Why ?



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9. One cannot walk or run with skates in feet
(or by wearing skating shoes)



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10. A person slip,if he step on a banana skin.



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11. The tyres of vehicles are made rough.



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12. The spray nozzle of the water sprinkler starts rotating as soon water reaches to the lawn grass.



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Questions And Answers Match The Following

1. Match the following

Column I	Column II
1. Law of inertia	a. Newton's second law of motion
2. Principle of rocket	b. Newton's first law of motion
3. Magnitude of force = Time rated change of momentum	c. Newton's third law of motion
	d. Law of conservation of energy



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2. Match the following

Q. 11 - 13, 12 - 14, 14 - 15

Column I	Column II
1. Unit of acceleration	a. kg m s^{-1}
2. Unit of momentum	b. kg m s^{-2}
3. Unit of force	c. m s^{-2}

Ans. 11 - 13, 12 - 14, 14 - 15



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3. Match the following

Q.13 (1) (2) (3) (4) (5)

Column I	Column II
1. Definition of force	a. Newton's third law of motion
2. Action and reaction forces	b. Newton's second law of motion
3. Magnitude of force	c. Newton's first law of motion

Q.13 (1) (2) (3) (4) (5)



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Questions And Answers Distinguish Between The Following

1. velocity and Momentum



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2. Force and momentum



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3. Balanced force and unbalanced force



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4. Newton's first law of motion and Newton's second law of motion



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Questions And Answers Answer The Following Questions In Brief

1. State the effects produced by a force on a body



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2. State Newton's first law of motion, Passengers are jerked forward when a moving bus stops suddenly. Explain why.



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3. State Newton's second law of motion. Write its mathematical expression. Explain how can we obtain first law from it.



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4. Define SI unit of force. A force of 2N acting on a body changes its velocity uniformly from

2 ms^{-1} to 5 ms^{-1} in 10 s. Calculate the mass of the body.



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5. State the law of conservation of momentum. Explain the conservation of momentum in each of the following cases:

(i) A bullet is fired from the gun

(ii) A rocket taking off from the ground'



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6. Derive the mathematical formulation of Newton's second law of motion $F = ma$.



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7. Two balls A and B of masses $3m$ and $2m$ are in motion with velocities 2 and 30 respectively. Compare (i) their inertia (ii) their momentum (iii) the force needed to stop them in the same time.

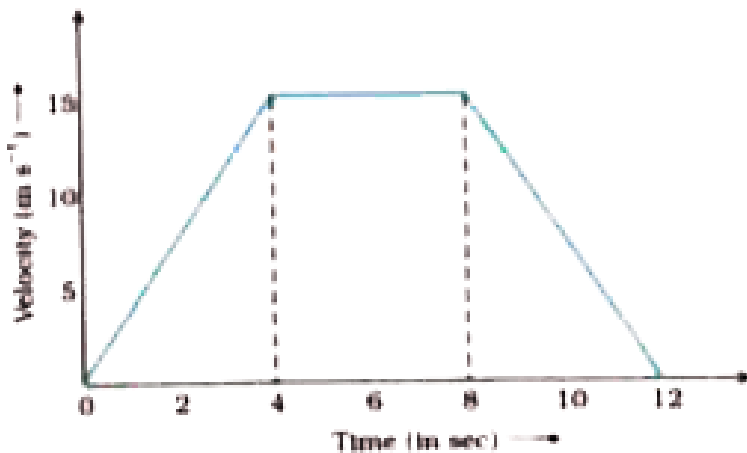


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Questions And Answers Answer The Following Questions In Detail

1. (a) Define : Force

(b) The velocity -time graph of a car of mass 1000 kg is given below:



(i) When is the maximum force acting on the

car>Why?

(ii)What is the retarding force?



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2. (a) State the law of conservation of momentum. Write the expression for it. (b)

Explain giving reason why does cricketer moves his hands backwards after catching a

ball? (c) A body of mass 30 kg has a momentum 150 km ms^{-1} What is its velocity?



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3. State the law of conservation of momentum.



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4. (a) Define SI unit of force. (b) Mention any two effects of force. (c) A body of mass 60 kg has a momentum of 300 kg ms^{-1} . Calculate its velocity. (d) Why does a carpet beaten with a stick release dust?



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Questions And Answers Solve The Following Examples Numericals

1. A constant force acts on an object of mass 5kg for a duration of 2s. It increases the object's velocity from 3 ms^{-1} to 7 ms^{-1} . Find the magnitude of the applied force. Now if the force was applied for a duration of 5s, what would be the final velocity of the object?



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2. Which would require a greater force-accelerating a 2kg mass at 5 m s^{-2} or a 4kg mass at 2 m s^{-2} ?



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3. A motorcar is moving with a velocity of 108 km h^{-1} and it takes 4s to stop after the brakes are applied .Calculate the force exerted by the breakes on the motorcar if its mass along with the passengers is 1000 kg.





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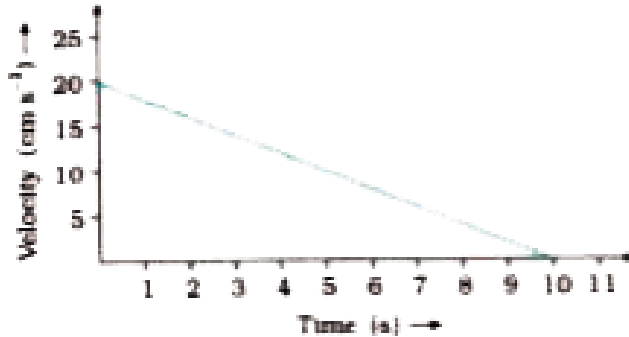
4. A force of 5 N gives a mass m_1 , an acceleration of 10 ms^{-2} ? and a mass m_2 , an acceleration of 20 ms^{-2} ? What acceleration would it give if both the masses were tied together?



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5. The velocity -time graph of a ball of mass 20 g moving along a straight line on a long table

is given in



How much force does the table exert on the ball to bring it to rest?



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6. A bullet of mass 20 g is horizontally fired with a velocity 150 ms^{-1} from a pistol of mass 2 kg. What is the recoil velocity of the pistol?



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7. A girl of mass 40 kg jumps with a horizontal velocity of 5ms^{-1} onto a stationary cart with frictionless wheels. The mass of the cart is 3kg. What is her velocity as the cart starts moving? Assume that there is no external unbalanced force working in the horizontal direction



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8. Two hockey players of opposite teams, while trying to hit a hockey puck, collide and immediately become entangled. One has a mass of 60 kg and velocity 5.0 m s^{-1} while the other has a mass of 55 kg and was moving faster with a velocity 6.0 m s^{-1} in the opposite direction. In which direction and with what velocity will they move after they become entangled? Assume that the frictional force acting between the feet of the two players and ground is negligible.



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Additional Solved Numericals

1. A truck starts from rest and rolls down a hill with a constant acceleration. It travels a distance of 400 m in 20 ms. Find its acceleration 6 tones (Hint: 1 tonne = 1000 kg)



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2. A stone of 1 kg is thrown with a velocity of 20 ms^{-1} across the frozen surface of a lake and comes to rest after travelling a distance of

50 m. What is the force of friction between the stone and the ice?



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3. A 8000 kg engine pulls a train of 5 wagons. Each of 2000 kg .along a horizontal track .If the engine exerts a force a 40000 N.and the track offers a friction force of 5000N.Then calculate:

(a)the net accelerating force:

(b) the acceleration of the train and

(c) The force of wagon 1 on wagon 2.



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4. Two objects each of mass 1.5 kg are moving in the same straight line but in opposite directions. The velocity of each object is 2.5 ms^{-1} before the collision during which they stick together. What will be the velocity of the combined object after collision?



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5. A hockey ball of mass 200 g travelling at 10 m s^{-1} is struck by a hockey stick so as to return it along its original path with a velocity at 5 m s^{-1} . Calculate the change of momentum occurred in the motion of the hockey ball by the force applied by the hockey stick.



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6. A bullet of mass 10 g travelling horizontally with a velocity of 150 ms^{-1} strikes a stationary wooden block and comes to rest in 0.03 s. Calculate the distance of penetration and the magnitude of the force exerted by the wooden block on the bullet.



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7. An object of mass 1 kg travelling in a straight line with a velocity of 10 ms^{-1}

collides with and sticks to a stationary wooden block mass 5 kg. Then they both move off together in the same straight line. Calculate the total momentum just before the impact and just after the impact. Also, calculate the velocity of the combined object.



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8. An object of mass 100 kg is accelerated uniformly from a velocity of 5 m s^{-1} to 8 m

s^{-1} in 6 s of the object. Find the magnitude of the force exerted on the object.



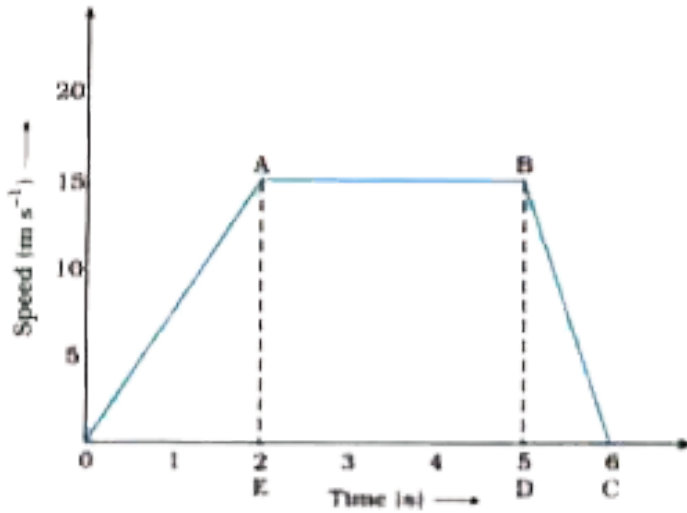
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9. The speed-time graph of a car is given the car weights 1000 kg.

(a) What is the distance travelled by the car in first 2 seconds?

(b) What is the braking applied at the end of 5 second to bring the car to stop within one

second?



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Additional Exercise

1. The following is the distance-time table of an object in motion:

Time in seconds	Distance in metres
0	0
1	1
2	8
3	27
4	64
5	125
6	216
7	343

(a) What conclusion can you draw about the acceleration? Is it constant. Increasing or decreasing or zero? (b) What do you infer about the force acting on the object?



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2. Two persons manage to push a motor car of mass 1200 kg at a uniform velocity along a level road. The same motorcar can be pushed by three persons to produce an acceleration of $0,2\text{ms}^{-2}$. With what force does each person push the motorcar? (Assume that all persons push the motorcar with the same muscular effort.)



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3. A hammer of mass 500 g.moving at 500 m s^{-1} . Strickes a nail .The nall stops the hammer in a very short time of 0.01 s .What is the force of the nail on the hammer?



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4. A motorcar of mass 1200 kg is moving along a straight line with a uniform velocity 90 km h^{-1} is slowed down to 18 km h^{-1} in 4s by an unbalanced external force. Calculate the

acceleration and change in momentum . Also calculate the magnitude of the force required .



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Additional Numericals For Practice

1. The velocity of an object of mass 50 kg increases from 3 ms^{-1} to 12 ms^{-1} . What will be the force required for this?



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2. If an object of mass 10 kg is performing linear motion with acceleration of $4ms^{-2}$, find out change occurring in its momentum in 5 s.



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3. If a force of 120N is applied to a stationary object of mass 20 kg, then (1) What would be its velocity after 5s? (2) What distance would it cover in 5s?



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4. A sphere of mass 4 kg is fired from a canon of mass 600 kg. If the canon is pushed back with a velocity of 4 ms^{-1} then find out the velocity of the sphere.



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5. A sphere of mass 4kg, moving with velocity 5 ms^{-1} collide with another sphere of mass 2 kg moving with velocity 2 ms^{-1} in the same direction on linear path. After the collision the

first sphere is moving in the same direction with velocity 3 m s^{-1} . What would be the velocity of the second sphere after collision?



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6. Two objects of mass 1 kg and 0.5 kg are moving on linear path with velocity 4 m s^{-1} and 2 m s^{-1} in the same direction respectively collide with each other. After collision, velocity of first object is 3 m s^{-1} in the same direction. Find out the velocity of the second object.



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7. On a stationary body of mass 10 kg, the constant force of 50N is applied. How much distance would the body travel in 2s?



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8. An object of mass 5 kg is moving with velocity 4 ms^{-1} . A constant force of 20 N acts on the object. What would be its velocity after 3s?



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9. A ball of 150g is thrown with velocity of 20 ms^{-1} towards the batsman. He hits the ball in the direction opposite to its initial direction of motion with velocity 25 ms^{-1} . If the ball is hit in 0.01s, then find out the change in momentum of the ball and force applied by the batsman to the ball.



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10. A bullet of 20g is fired horizontally from a pistol of 2 kg mass with velocity 150m s^{-1} How much would be the velocity of pistol in backward direction after firing the bullet?



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11. When 15N force is applied to a body of mass m_1 , the acceleration produced in it is 3m s^{-2} . Now it is tied with a body of mass m_2 , and the same force is applied on a composite body and

acceleration produced is 2 ms^{-2} . Find mass of both the bodies



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12. A motor-cycle moving with 90 kmh^{-1} speed stops after 10s on applying brakes. If the total mass of motor-cycle including the rider is 200 kg, then find force applied by brakes to the motor cycle.



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13. A body of 10 kg mass is moving with 15 ms^{-1} . In 10 s its velocity increases to 25 ms^{-1} . Find change in momentum and hence find external force required for this change.



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14. Two balls of masses 100 g and 200g are moving along the same line and direction with velocities 1 ms^{-1} and 2 ms^{-1} respectively. They collide and after the collision, the first

ball moves at a velocity of $2ms^{-1}$ Determine the velocity of the second ball.



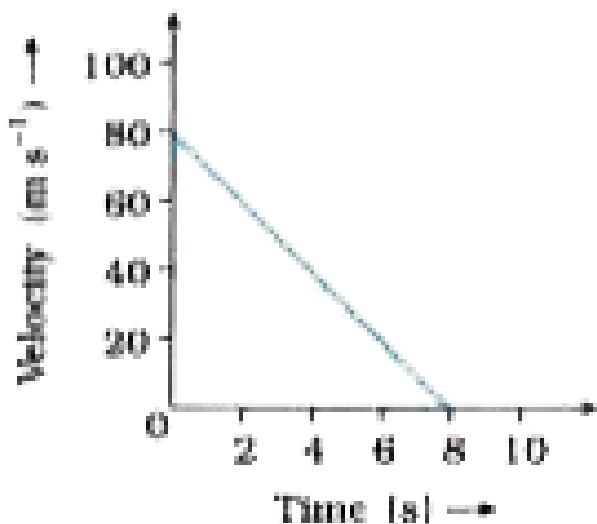
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15. A bullet of mass 10g is fired from a rifle. The bullet passes through a barrel in 0.003s and moves with the velocity of $300 ms^{-1}$ Find out the force applied to the bullet by the rifle



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16. A ball of mass 50g rolls on a horizontal concrete surface. Its velocity time graph is shown below. Calculate the acceleration of the ball and frictional force exerting on the ball by the surface.



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17. A bullet of mass 10g travelling horizontally with a velocity of 10 ms^{-1} strikes a bag filled with sand and penetrates 5 m inside and comes to rest, then

(1) Calculate the resistant force on the bullet by the bag filled with sand.

(2) Calculate the time for the bullet to come to rest.



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18. A force of 5N produces an acceleration of 8 ms in an object of mass m_1 , and produces an acceleration of 24 m s^{-2} in object of mass m_2 . What acceleration would be produced if both the masses were tied together and applied force would be 5 N.



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**Question Based On Practical Skill With Answers
Select The Appropriate Option And Complete
The Sentence**

1. Newton's II law of motion connects:

A. First

B. Second

C. Third

D. None of these

Answer: B



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2. What is the acceleration produced in a body of mass 0.5 kg if a constant force of 2 N acts on it?

A. $1ms^{-2}$

B. $0.25ms^{-2}$

C. $2.5ma^{-2}$

D. $4ms^{-2}$

Answer: D



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3. How much force is needed to produce an acceleration of 80 cm s^{-2} ? in a body of mass 50 g?

A. 0.04 N

B. 0.4 N

C. 4N

D. 4000N

Answer: A



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4. What is not effected by the force acting on a body? (shape, velocity, mass, acceleration)

A. Shape

B. velocity

C. Mass

D. Acceleration

Answer: C



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