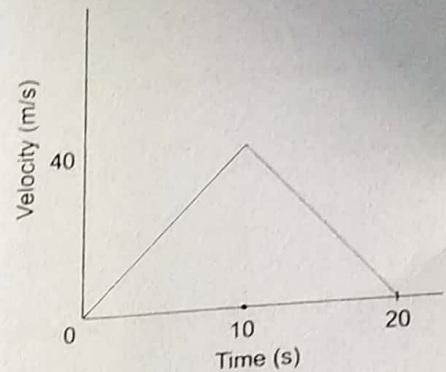


## HIGHER ORDER THINKING SKILLS QUESTIONS (HOTS)

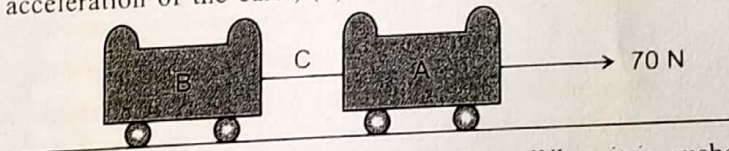
### MOTION (IX) PHYSICS

1. A body can have zero velocity but not zero acceleration. Explain.
2. Can an object be accelerated if it is moving with constant speed? Justify your answer.
3. A ball is thrown vertically upwards with 19.6 m/s and returns to the hand of the thrower in 4 s. Draw :  
(a) speed-time graph, (b) velocity-time graph
4. An object is moving with uniform speed in a circular path of radius ' $r$ '. Calculate the distance and displacement :  
(a) when object completes half the circle  
(b) when object completes one round  
(c) what is the nature of motion
5. The velocity-time graph for motion of an object is shown in figure. Calculate the distance travelled by the object :  
(a) in time 0-20 s  
(b) in time 5-10 s
6. A car starts from rest and moves along a straight line with uniform acceleration of  $5 \text{ m/s}^2$  for 8 s. Then it moves with constant velocity. Calculate the distance travelled by the car in 12 s, since it started from the rest?
7. Two balls are thrown vertically upwards simultaneously with initial velocities 10 m/s and 20 m/s respectively. Find the ratio of heights attained by the two balls.



### LAWS OF MOTION

1. A ten paise coin placed on a revolving table flies off tangentially. Explain why?
2. The gun must be held tightly with the shoulder while firing a bullet. Explain why?
3. An astronaut in open space is away from his space ship. How can he return to his space ship?
4. Can the momentum of an object change even though the speed and mass of the object remain the same? If yes, give example.
5. There are three solids made up of aluminium, steel and wood, of the same shape and same volume. Which of them would have highest inertia?
6. Two carts A and B of mass 10 kg each are placed on a horizontal surface. They are joined tightly by a light but strong string C. A force of 70 N pulls the cart A towards right. The force of friction between the surface and cart is 15 N. Find the : (a) acceleration of the carts, (b) force exerted by the string on the cart B.



7. A box of mass 20 kg is kept at rest on a horizontal floor. When it is pushed by a horizontal force  $F$ , it moves with a constant velocity. If it is pushed by a horizontal force of  $2F$ , it moves with an acceleration of  $2 \text{ m/s}^2$ . Find the value of  $F$ .
8. A nucleus is at rest. All of sudden it splits into two small nuclei. What is the angle at which these two nuclei fly apart?

### GRAVITATION

1. An apple attracts the earth and the earth also attracts the apple towards its centre. Then, why only apple falls towards the earth but earth is not moved towards the apple?
2. A box weighs  $W$  at some place near equator. Will it weigh same or more or less when taken to Antarctica? Explain.
3. The gravitational force between two objects placed at a distance ' $r$ ' apart is  $F$ . What should be the distance between the objects, so that the force between them becomes  $\frac{F}{2}$ ?
4. Calculate the height above the surface of earth, at which the value of acceleration due to gravity becomes one-fourth of the value at the surface of earth (Given  $R$  is the radius of earth).



(FLOATATION)  
An object experiences more buoyant force in a given liquid at the poles than at the equator. Why? Explain.

2. Two blocks, one made iron and other of wood, having equal volume are immersed in water.
- Will they experience same buoyant force?
  - Will they undergo same loss of weight in water?
  - Will they have same weight in air?
3. An object is put one by one in three liquids having densities  $d_1$ ,  $d_2$  and  $d_3$ . The object floats with  $\frac{1}{9}$ ,  $\frac{2}{11}$  and  $\frac{3}{7}$  parts of their volumes outside the liquid surfaces respectively. Write the relation between  $d_1$ ,  $d_2$  and  $d_3$ .
4. A ship is loaded in sea water to maximum capacity. If this ship is moved to river water, what happen to
- Upthrust acting on the ship.
  - Volume of ship immersed in water.
  - Weight of the ship in river water.
- Give reason to support your answer.

- (WORK, POWER, ENERGY)
- Two objects  $A$  and  $B$  of masses,  $m$  and  $2m$  are moving with same momentum. Find the ratio of their kinetic energy.
  - Can any object have mechanical energy even if its momentum is zero? Explain.
  - Can any object have momentum even if its mechanical energy is zero? Explain.
  - An object is dropped from a height of 20 m. If it losses 75% of energy after striking the ground, how high the object bounce back?
  - When an object moves along circular path the velocity of the object changes continuously. Does the kinetic energy of the object changes continuously? Explain.

- (SOUND)
- A loud sound can be heard upto long distance but soft a sound cannot be heard at a large distance. Explain. Why?
  - Two persons on the surface of the moon cannot talk to each other. Explain. Why?
  - Draw the graphs showing the variation of :
    - Two waves having same frequency but different amplitudes.
    - Two sound having same amplitude but different wavelength.
  - Speed of sound wave in hydrogen gas is greater than the speed of sound in oxygen gas.
  - Speed of sound increases just after rainfall. Why? Explain.
  - How moths are able to escape capture by bats?
  - Bats cannot see but even then they can catch their prey during high. Explain. Why?