Chapter- 8 and 9

MOTION AND FORCE AND LAWS OF MOTION

MCQ type:

1. Which of the following can sometimes be 'zero' for a moving body?
    a. Average velocity
    b. Distance travelled
    c. Average speed
    d. iv. Displacement
2. An object is thrown vertically upwards and rises to a height of 10 m. Calculate the velocity with which the object was thrown upwards? Take g=9.8 m/s^2
    a. 14m/s
    b. 16m/s
    c. 10m/s
    d. 9.8 m/s
3. The numerical ratio of displacement to distance for a moving object is :
    a. always less than 1
    b. equal to 1 or more than 1
    c. always more than 1
    d. equal to 1 or less than 1
4. A passenger in a moving train tosses a coin which falls behind him. Observing this statement what can you say about the motion of the train?
    a. Accelerated
    b. Retarded
    c. Along circular tracks
    d. Uniform
5. Suppose a boy is enjoying a ride on a merry-go-round which is moving with a constant speed of 10m/s. It implies that the boy is:
    a. At rest
    b. Moving with no acceleration
    c. In accelerated motion
    d. Moving with uniform velocity

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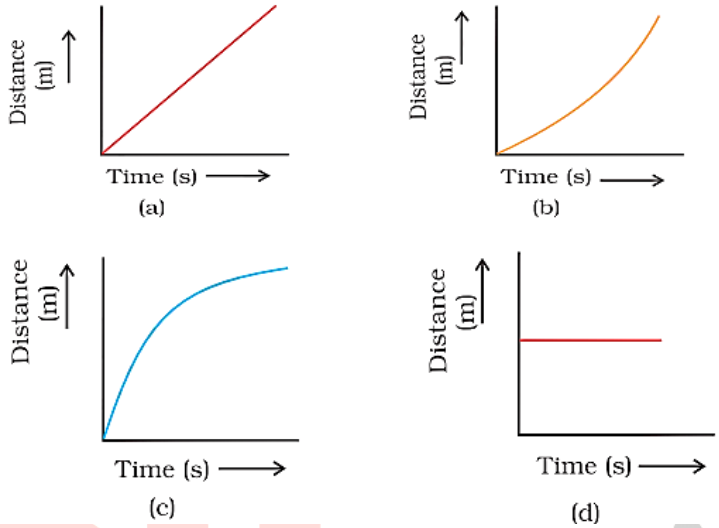
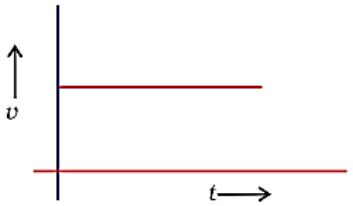
6. Which of the following figures represents uniform motion of a moving object correctly?



7. From the given v - t graph it can be inferred that the object is



   a. in uniform motion
   b. at rest
   c. in non-uniform motion U
   d. moving with uniform acceleration

8. The direction of the centripetal acceleration of an object in uniform circular motion is —
   a. in the direction of motion
   b. opposite the direction of motion
   c. radially outward from the center of the circle
   d. radially inward toward the center of the circle.

9. If a ball is thrown vertically upwards with 40m/s , the velocity after 2 s will be
   a. 10m/s
   b. 30m/s
   c. 20m/s
   d. 40m/s

10. Quantitative definition of force is given by
   a. Newton's first law of motion
   b. Newton's second law of motion
   c. Newton's third law of motion
   d. Newton's law of gravitation

11. A particle of mass 4kg is acted upon by steady force of 4N. Distance travelled by the particle in 4s is
    a. 16m
    b. 2m
    c. 8m
    d. 4m
12. Two objects of different masses falling freely near the surface of moon
    a. Have same velocities at any instant
    b. Have different accelerations
    c. Experience forces of same magnitude
    d. Undergo a change in their inertia
13. When an object falls freely towards earth
    a. The direction of motion doesnot change
    b. The speed of motion decreases
    c. The speed of motion remains constant
    d. The direction of motion changes.
14. If an object moves in a circular path with ……., its motion is called uniform circular motion.
    a. Uniform acceleration
    b. Uniform speed
    c. Variable speed
    d. Variable acceleration
15. What options are true about momentum
    a. Momentum is a vector quantity
    b. The Unit of Momentum is kgm/s
    c. Momentum is a scalar quantity
    d. It is the amount of motion contained in a body.
16. A rock is thrown straight up and reaches a height of 12 meters before starting to fall. When it is at rest at the to of its path, its acceleration is —
    a. 0
    b. 1.2 meters per second squared
    c. 9.8 meters per second squared
    d. 11 meters per second squared
17. Two pop cans are at rest on a stand. A firecracker is placed between the cans and lit. The firecracker explodes and exerts equal and opposite forces on the two cans. Assuming the system of two cans to be isolated, the postexplosion momentum of the system ____.
    a. is dependent upon the mass and velocities of the two cans
    b. is dependent upon the velocities of the two cans (but not their mass)
    c. is typically a very large value
    d. is definitely zero

18. Two ice dancers are at rest on the ice, facing each other with their hands together. They push off on each other in order to set each other in motion. The subsequent momentum change (magnitude only) of the two skaters will be ____.
    a. greatest for the skater who is pushed upon with the greatest force
    b. greatest for the skater who pushes with the greatest force
    c. the same for each skater
    d. greatest for the skater with the most mass
19. Motion of an athlete along a circular path with constant speed is an accelerated motion because:
    a. Magnitude of motion is constant.
    b. Direction of motion is changing at every point.
    c. Athlete's displacement is zero.
    d. Magnitude of speed is changing.
20. Expression for the velocity of an object in uniform circular motion in terms of time period t is
    a. V=u+at
    b. V=u-at
    c. V=2πrt
    d. V=2πr/t
21. An athlete completes one round of a circular track of diameter 200m in 40 seconds. Distance covered by him after 2min 20 second is
    a. 750 π m
    b. 725m
    c. 890m
    d. 650 π m
22. For a particle performing a uniform circular motion the acceleration is
    a. Constant in Direction
    b. Constant in magnitude but not in direction
    c. Constant in magnitude and direction
    d. Constant in neither magnitude nor direction

ASSERTION- REASON TYPE

Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

a) Assertion and Reason both are correct statements and Reason is correct explanation for assertion.
b) Assertion and Reason both are correct statements but Reason is not correct explanation for assertion.
c) Assertion is correct statement but Reason is wrong statement.
d) Assertion is wrong statement but Reason is correct statement

1. **Assertion:** The acceleration of an object can be either positive, negative or zero.
   Reason: Acceleration has both the magnitude and direction.
2. **Assertion:** When the displacement of a body is directly proportional to the square of the time. Then the body is moving with uniform acceleration.
   Reason: The velocity-time graph during uniform acceleration is a straight line.
3. **Assertion:** Uniform circular motion is called accelerated motion.
   Reason: Speed remains constant but the direction keeps on changing in a uniform circular motion.
4. **Assertion:** The rate of change of linear momentum is directly proportional to the applied force.
   Reason: Force is the product of mass and velocity.
5. **Assertion:** The motion of a body moving in a circular path with constant speed is an example of variable acceleration.
   Reason: Acceleration varies due to change in direction.
6. **Assertion:** A body can have acceleration even if its velocity is zero at a given instant of time.
   Reason: A body is momentarily at rest when it reverses its direction of motion.
7. **Assertion:** A bomb explodes while being 'at rest. The momentum just after explosion is zero.
   Reason: In the absence of an external force, momentum remains conserved
8. **Assertion:** For stable equilibrium force has to be zero and potential energy should be minimum.
   Reason: For equilibrium, it is not necessary that the force is not zero.
9. **Assertion:** Force exerted by the ground on the man moves him forward.
   Reason: It is a reactional force.

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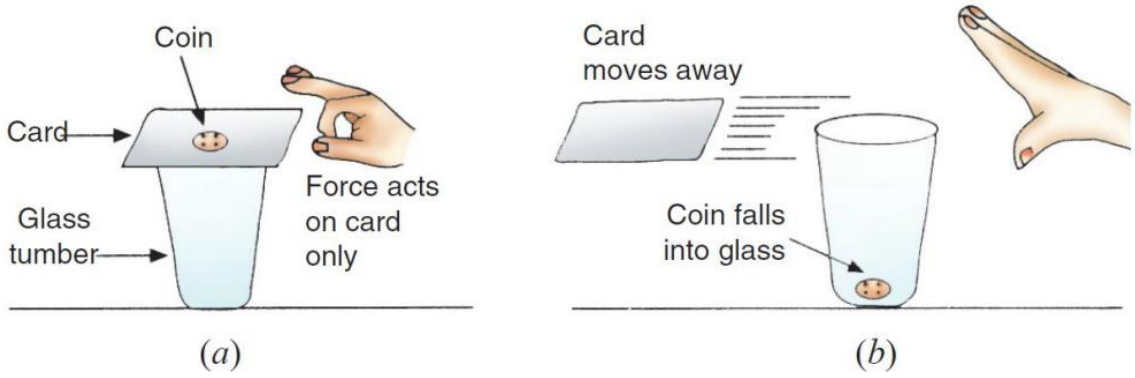
CASE STUDY BASED QUESTIONS:

Case Study: Read the following and answer any four questions from (1) to (5) One day Rahul decided to go his office by his car. He is enjoying the driving along with listening the old songs. His car is moving along a straight road at a steady speed. On a particular moment, he notices that the car travels 150 m in 5 seconds.

1. What is its average speed?
    a. 20 m/s
    b. 30 m/s
    c. 10 m/s
    d. 40 m/s
2. How far does it travel in 1 second?
    a. 20 m
    b. 30 m
    c. 10 m
    d. 40 m
3. How far does it travel in 6 seconds?
    a. 120 m
    b. 130 m
    c. 180 m
    d. 140 m
4. How long does it take to travel 240 m?
    a. 2s
    b. 4s
    c. 6s
    d. 8s
5. Which of the following statement is correct regarding velocity and speed of a moving body ?
    a. velocity of a moving body is always higher than its speed
    b. speed of a moving body is always higher than its velocity
    c. speed of a moving body is its velocity in a given direction
    d. velocity of a moving body is its speed in a given direction

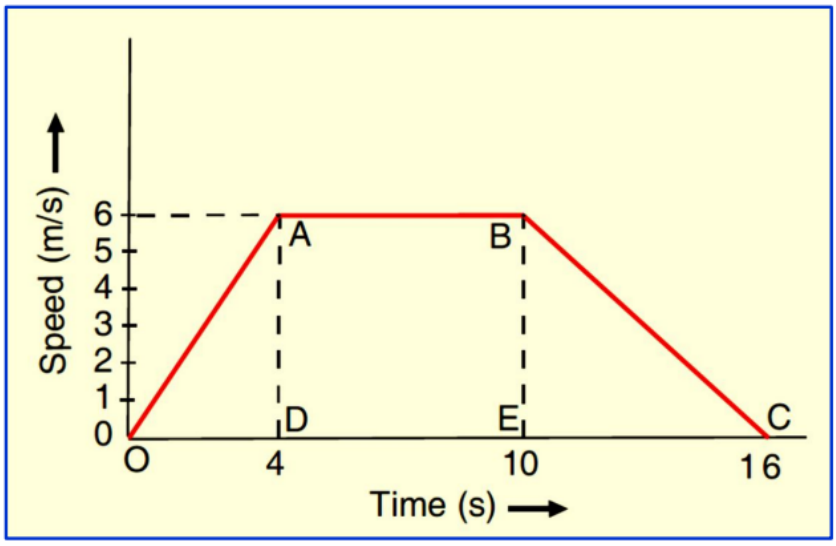
Case Study: We take a glass tumbler and place a thick square card on its mouth as shown in Figure (a). A coin is then placed above this card in the middle. Let us flick the card hard with our fingers. On flicking, the card moves away but the coin drops into the glass tumbler [see Figure (b)].



1. Give Reason for the above observation.
    a. The coin possesses inertia of rest, it resists the change and hence falls in the glass.
    b. The coin possesses inertia of motion; it resists the change and hence falls in the glass.
    c. The coin possesses inertia of rest, it accepts the change and hence falls in the glass.
    d. The coin possesses inertia of rest, it accepts the change and hence falls in the glass.
2. Name the law involved in this case.
    a. Newton's second law of motion.
    b. Newton's first law of motion.
    c. Newton's third law of motion.
    d. Law of conservation of energy
3. If the above coin is replaced by a heavy five rupee coin, what will be your observation. Give Reason.
    a. Heavy coin will possess more inertia so it will not fall in tumbler.
    b. Heavy coin will possess less inertia so it will fall in tumbler.
    c. Heavy coin will possess more inertia so it will fall in tumbler.
    d. Heavy coin will possess less inertia so it will not fall in tumbler
4. Name the law which provides the definition of force.
    a. Law of conservation of mass
    b. Newton's third law.
    c. Newton's first law
    d. Newton's second law.
5. State Newton's first law of motion.
    a. Energy can neither be created nor be destroyed, it can be converted from one form to another, total amount of energy always remains constant.

b. A body at rest remains at rest or, if in motion, remains in motion at constant velocity unless it is acted upon by an external unbalanced force.
c. For every action in nature there is an equal and opposite reaction.
d. The acceleration in an object is directly related to the net force and inversely related to its mass

Case Study: Aditya started driving his car. He increases the speed till 4 seconds and then he kept his card in constant speed for 6 seconds. Then after he decreased the speed of the car upto another 6 seconds. After reaching at the starting place, he draws the speed-time graph of his 16 seconds driving as shown below:



1. What type of motion is represented by OA ?
   a. uniform velocity
   b. uniform acceleration
   c. negative acceleration
   d. no acceleration
2. What type of motion is represented by BC ?
   a. uniform velocity
   b. uniform acceleration
   c. negative acceleration
   d. no acceleration
3. Find out the acceleration of the body.
   a. 1.5 m/s^2
   b. 2 m/s^2
   c. 3 m/s^2
   d. 1 m/s^2

4. Calculate the retardation of the body.
    a. 1.5 m/s^2
    b. 2 m/s^2
    c. 3 m/s^2
    d. 1 m/s^2
5. Find out the distance travelled by the body from A to B.
    a. 15 m
    b. 30 m
    c. 36 m
    d. 60 m

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