DELHI PUBLIC SCHOOL, DURGAPUR

QUESTION BANK & REVISION SHEET FOR PERIODIC ASSESSMENT-II (2018-19)

CLASS-IX

SUBJECT: PHYSICS

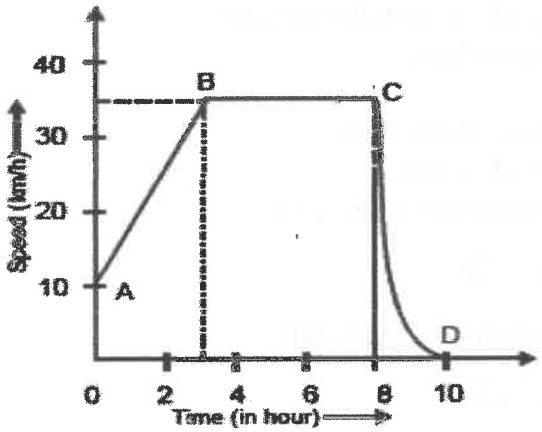
TOPIC: MOTION

1. Define uniform and non-uniform motion.
2. Under what condition, is the magnitude of average velocity of an object equal to its average speed?
3. Distinguish between speed and velocity.
4. Define uniform acceleration. Draw a velocity-time graph to present uniform acceleration.
5. What do the following devices measure in an automobile? Speedometer, Odometer.
6. Define: Instantaneous velocity, Average velocity.
7. Draw the displacement-time graph for the following cases:
   (i) A car is moving with constant velocity.
   (ii) A car is parked at a place.
   (iii) A car is moving with uniform acceleration.
8. Write down the three equations of motion.
9. Prove the following equations of motion analytically:
   (i) $s = ut + \frac{1}{2}at^2$ (ii) $v^2 = u^2 + 2as$
10. Prove the following equations of motion graphically:
    (i) $s = ut + \frac{1}{2}at^2$ (ii) $v^2 = u^2 + 2as$
11. Name the physical quantity, that tells us how fast or slow a body is moving.
12. What is the SI unit of acceleration?
13. If an athlete completes a round along a circular track, what can be said about the distance and displacement travelled by him?
14. Define acceleration and state its SI unit. For motion along a straight line, when do we consider the acceleration to be (i) positive (ii) negative? Give an example of a body in uniform acceleration.
15. What does the slope of the displacement-time graph represent?
16. What does the area under velocity-time graph represent?
17. Draw the displacement-time graph for an object, which moves a certain distance with uniform velocity then comes back to the starting point with the same velocity? How can you find the value of those velocities? What does the negative sign indicate in the expression of velocity in the second part?
18. Why is uniform circular motion called an accelerated motion? What is the name of that acceleration?
19. Is the motion of satellite around the earth uniform or accelerated?
20. An object has moved through a distance. Can it have zero displacement? Give one example in support of your answer.
21. What does the negative slope of a velocity-time graph represent?
22. Write down the equation of motion, which represents the distance covered by an object in n^{th} second.
23. A train moves from station A to B with a speed of v_1 and returns to A with a speed of v_2. What is the average speed and average velocity of the train?
24. What is the nature of the displacement-time graph, if the body is at rest?
25. What can you say about the motion of a body, if
    (i) its distance-time graph is a straight line, making a constant angle with the time axis?
    (ii) its velocity-time graph is a straight line parallel to time axis?
26. A body can have zero average velocity, but not zero average speed- explain.

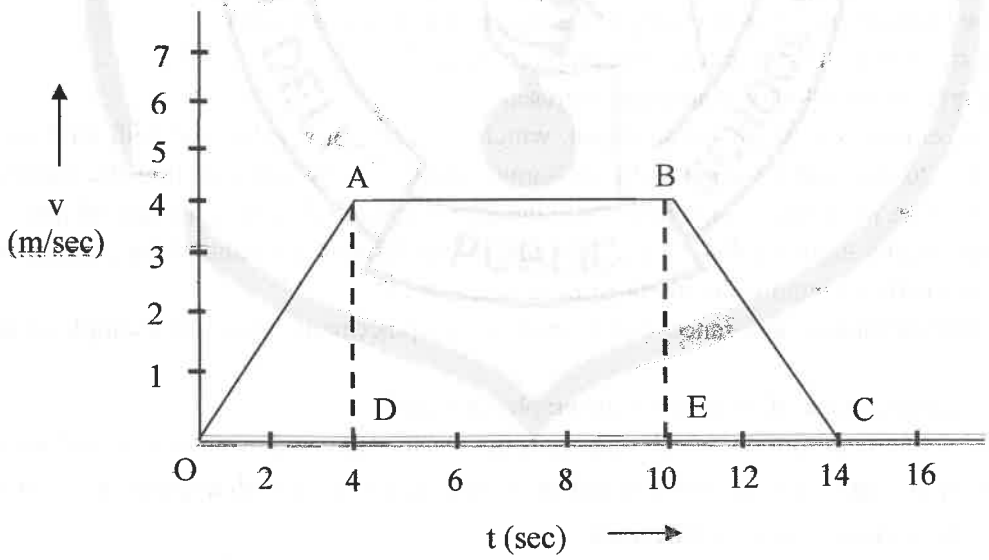
27. Can an object have acceleration, when it is moving with a constant speed? If yes, give one example.
28. Is it possible that the train, in which you are sitting, appears to move while it is at rest?
29. Can displacement be zero? If yes, give two examples of such situations.
30. What can you say about the motion of an object if its speed - time graph is a straight line parallel to the time axis?

Numerical-based questions

1. The graph given alongside shows how the speed of a car changes with time.
   (i) What is the initial speed of the car?
   (ii) What is the maximum speed attained by the car?
   (iii) Which part of the graph shows zero acceleration?
   (iv) Which part of the graph shows varying retardation?
   (v) Find the distance travelled in first 8 hours.



2. A ball starts from rest and rolls down 16m down an inclined plane in 4 s.
   (a) What is the acceleration of the ball? (b) What is the velocity of the ball at the bottom of the incline?
3. Velocity-time graph for the motion of a body is shown below:



   Answer the following questions:

   (a) Which part of the graph shows accelerated motion? Also, calculate the acceleration.

   (b) Which part of the graph shows retarded motion? Also, calculate the retardation.

   (c) Which part of the graph shows constant velocity? What is the value of that velocity?
4. Which of the two trains move faster, one having a speed of 54 km/h and another 15 m/s?

5. A bus decreases its speed from 80 kmph to 50 kmph in 4s. Find the acceleration of the bus.
6. The minute hand of a wall clock is 10 cm long. Find its displacement and distance covered from 10:00 am to 10:30 am.
7. An object is moving with uniform speed in a circular track of radius r. calculate the distance and displacement (a) when it completes half the circle (b) when it completes full circle (c) what type of motion does the object posses?
8. A car travels first 30 km at a uniform speed of 40 kmph and next 30 km at a uniform speed of 20 kmph. Find its average speed.
9. On a 120 km track, a train travels the first 30 km at a uniform speed of 30 kmh. How fast must the train travel the next 90 km so as to achieve an average speed of 60 kmph for the entire trip?
10. Arrange the following speeds in ascending order:
    (i) 10 m/s (ii) 200 m/min (iii) 30 km/min (iv) 54 km/h (v) 10 m/h.
11. If the length of a minute hand in a wall clock is 35 cm long, calculate the speed of the minute hand.
12. A car is moving along a straight road at a steady speed. It travels 150 m in 5s.
    (i) What is its average speed?
    (ii) How far does it travel in 1s?
    (iii) How far does it travel in 6s?
    (iv) How long does it take to travel 240 m?
13. A ball hits a wall horizontally at 6 m/s. It rebounds back horizontally at 4.4 m/s. The ball is in contact with the wall for 0.04s. What is the acceleration of the ball?
14. A farmer moves along a boundary of a square field of side 10 m in 40 seconds. What will be the magnitude of displacement of the farmer at the end of 2 min 20s?
15. A child drops a ball from a height of 10 m. Assume that its velocity increases uniformly at the rate of 10 m/s^2. Find (i) the velocity with which the ball strikes the ground. (ii) the time taken by the ball to reach the ground.
16. The maximum speed of a train is 90 km/h. It takes 10 hours to cover a distance of 500 km. Find the ratio of its average speed to maximum speed?
17. A car start from rest and acquire a velocity of 54 km/h in 2 sec. Find
    (i) the acceleration
    (ii) distance travelled by car assume motion of car is uniform?
18. A ball is thrown upwards and it goes to the height 100 m and comes down
    1) What is the net displacement?
    2) What is the net distance?
19. Two cars A and B race each other. The Car A ran for 2 min at a speed of 7.5 km/h, slept for 56 min and again ran for 2 min at a speed of 7.5 km/h. find the average speed of the car A in the race.
20. Anand leaves his house at 8.30 a.m. for his school. The school is 2 km away and classes start at 9.00 a.m. If he walks at a speed of 3 km/h for the first kilometer, at what speed should he walk the second kilometer to reach just in time?
21. An object moves along a straight line with an acceleration of 2 m/s2. If its initial speed is 10 m/s, what will be its speed 2 s later?
22. A bullet hits a Sand box with a velocity of 20 m/s and penetrates it up to a distance of 6 cm. Find the deceleration of the bullet in the sand box.
23. A car travels at 54 km/h for first 20 s, 36 km/h for next 30 s and finally 18 km/h for next 10 s. Find its average speed.

24. A boy runs for 20 min. at a uniform speed of 18km/h. At what speed should he run for the next 40 min. so that the average speed comes 24km/hr.
25. A train starts from rest and accelerate uniformly at the rate of 5 m/s^2 for 5 sec. Calculate the velocity of train in 5 sec.

TOPIC: FORCES AND NEWTON'S LAWS OF MOTION

1. State two effects of force.
2. Establish the relation among dyne and Newton.
3. Explain the statement mass provides a measure of inertia.
4. A bullet is fired on a glass pane of a window, a circular hole is created in the glass but it does not break whereas a piece of stone is thrown the glass breaks. What is the reason?
5. If action and its reaction are always equal and opposite why do not they cancel each other?
6. A body resting on the floor of a train accelerates backward when the rain accelerates forward. What force is responsible for acceleration of a body?
7. Why is a man hit harder when he falls on a paved floor than when he falls on sand from same height?
8. A meteorite burns in the atmosphere before it reaches earth surface what happens to its momentum?
9. Why does an athlete in long jump event always run through a little distance before jumping?
10. If first law of motion holds true, why does a ball rolling on ground stop on its own?
11. What do you mean by inertia of rest and inertia of motion?
12. Why do passengers tend to fall sideways when the bus takes a sharp u turn?
13. Why does a passenger jumping out of a rapidly moving bus fall forward with his face downwards?
14. A metal ball is hung from the roof of a train compartment by a thread. Will the thread remain vertical when the train run in uniform speed?
15. A horse pulls a cart. According to Newton's third law cart also pulls the horse with an equal force and in the opposite direction. How do the horse and the cart move at all?
16. A boy sitting in a train moving with constant velocity throws a ball straight up into the air will the ball fall in front of him, into his hand or behind him?
17. Explain why to clean garments from dust particles it is suddenly set into motion?
18. Explain why a passenger alighting carelessly from a moving vehicle falls forward?
19. Explain why an apple decent to ground but under its reaction the earth does not move forward towards the apple?
20. Which one will have greater impact on the wall – a golf ball or a blob of mud both having same mass and velocity?
21. Which of Newton's Laws describes the amount of force applied to accelerate an object's mass?
22. Why is it advised to tie a rope on the luggage while you travel by the bus?
23. Why is it harder to push a van filled with bowling balls than it is to push van filled with basketballs?
24. Derive the law of conservation of momentum from Newton's third law of motion.
25. Why does boat move backward when the sailor jumps in forward direction?
26. Which of the Newton's laws explain swimming?
27. If the force acting on a body be zero will its momentum be zero?
28. Why does a person while firing a bullet holds the gun tightly to his shoulder?
29. Why is it difficult for a fireman to hose, which ejects large amount of water at a high velocity?
30. What do you mean by law of conservation of momentum?

31. Among pushing and pulling which one is easy? Why?
32. Explain how rockets achieve escape velocity, based on principle of conservation of linear momentum?

Numerical-based questions

1. A body of mass 5 kg starts and roll down 32 m on an inclined plane in 4 sec. Find the force acting on the body?
2. On a certain planet, a small stone tossed up at 15m/s vertically upwards takes 7.5 s to return the ground. What is the acceleration due to gravity on the planet?
3. With what speed must a ball be thrown vertically up in order to rise to a maximum height of 45m? And for how long will it be in air?
4. A body of mass 10 kg starts from rest and rolls down an inclined plane. It rolls down 10 m in 2 sec. What is the acceleration of the body? What is the force acting on the body?
5. A bullet travelling at 360 m/sec strikes a block of soft wood. The mass of the bullet is 2 gm. The bullet comes to rest after penetrating 10 cm in the wood. Find avg. deceleration offered by wood and time taken by bullet to come to rest.
6. An astronaut has 80 kg of mass on earth. What is his weight on Mars? What will be his mass and weight on Mars if g=3.7 m/sec^2 on Mars?
7. A boy throws a stone with a velocity 60 m/sec. How long will it take to achieve maximum height?
8. A car is moving with velocity 16 m/sec when brakes are applied. The force applied by the brake is 1000N. The mass of the car with its passenger is 1200 kg. How far does the car travel before it comes to rest?
9. A body of mass 2kg is at the origin of a frame of reference. A force of 5N acts on it at t=0. The force acts for 4 sec. What is the acceleration produced by the force on the body?
10. A force acts for 20 second on a body of mass 5 kg and then ceases to act. The body moves uniformly and then describes 10meter in next 5 second. Find the magnitude of the force.
11. What shall be the upward force in Newton exerted on a 50kg body so that it causes the body to fall with acceleration of 7.8mt/sec^2?
12. A bullet of mass 25gram is fired from a gun with a velocity 400mt/sec. After passing through a target 20cm thick it velocity drops to 100mt/sec. Calculate the resistance offered by the target.
13. A force of 100dyne acts on a mass 10gm for 5sec. Find the change of momentum and the distance travelled during the time.
14. A cricket ball of mass 70 g moving with a velocity of 0.5 m/s is stopped by a player in 0.5 s. What is the force applied by the player to stop the ball?
15. A force of 200N acts on a body for 10sec and it gives a velocity of 40meter/sec. Find the mass of the body.
16. A bullet of mass 100gm leaves the gun with velocity 500m/s. The velocity of recoil of the gun is 10m/s. Calculate the mass of the gun.
17. A body of mass 200gm is moving with velocity of 100cm/sec. Calculate the magnitude of force required to stop it in 10sec.
18. 1kg hammer travelling at a speed of 500cm/sec strikes a nail and drives it 2cm into a block of wood. Find acceleration of the hammer and resisting force.
19. What is the momentum of a body of mass 200gm moving with the velocity of 15m/s.
20. A force of 25N acts on a mass of 500gm resting on a frictionless surface. What is the acceleration produced?
21. A force of 15N acts for 5sec on a body of 5kg which is initially at rest. Calculate final velocity of the body and displacement of the body.
22. A stone is brought from 100m high tower. How long does it takes to fall-
23. (a)The first 50m and (b)The second 50m.

24. A cricket ball of mass 156gm travelling at 1.5m/s is moving towards a fielder who reduces the speed of the ball to 0.5m/s. What force did the fielder apply on ball if it was in contact with his hand for 0.25sec?
25. A body of mass 100gm has momentum of 200gm cm/sec. What is its velocity?

TOPIC: GRAVITATION

1. Define gravitation. What is the difference between gravitation and gravity?
2. State and explain Newton's law of gravitation.
3. Why is Gravitational constant called universal?
4. Write down the value and unit of 'G' in SI unit.
5. How will the force of gravitation be affected between two fixed masses, if the distance between them is halved?
6. How can the value of acceleration due to gravity be derived from Newton's law of gravitation.
7. Write some natural evidences in support of the existence of gravitational force.
8. Find out the value of 'g' from the relation between 'g' and 'G'.
9. What do you mean by free fall?
10. How will the weight and mass of a body change, if it is taken from earth to moon?
11. Gravitational force acts on all objects in proportion to their masses. Why then, a heavy object does not fall faster than a light object?
12. If the moon attracts the earth, why does the earth not move towards the moon?
13. Why will a sheet of paper fall slower than one that is crumbled into a ball?
14. The acceleration of a freely falling body does not depend on the mass of the body. Prove this.
15. What is the acceleration of a freely falling body?
16. Write down the equations of motion for a body falling freely under gravity.
17. Name the instruments, which measure the mass and weight of an object.
18. What are the differences between the mass of an object and its weight?
19. What is the value of gravitational constant G on the surface of earth and moon?
20. Can a body have mass but no weight? Give reason for your answer.
21. Define Thrust. Write down its SI unit.
22. How is pressure related to thrust? Write the relevant formula.
23. Define a pressure of 1 Pa. State Archimedes' principle.
24. Why are the bases of the pillars of a bridge made broader?
25. Why is it difficult to hold a school bag having a strap made of thin and strong string?
26. What do you mean by buoyancy? Name the principle used to design a submarine.
27. Why does an object float or sink, when it is paced on the surface of water?
28. Define relative density of an object. If the relative density of an object is 'd', what is its density in CGS and SI system of units?
29. What do we understand from the knowledge of relative density of an object?
30. Name the two forces acting on an object, when placed in water.
31. Amit buys few grams of gold at the poles per the instruction of one of his friends. He hands over the same when he meets him at the equator. Will the friend agree with the weight of gold bought? If not, why?

Numerical-based questions

1. If the weight of a body on the surface of earth is 72 N, find its mass and weight on the surface of moon.
2. The weight of a body on the surface of earth is 392 N. What will be its weight on a planet whose mass is double than that of earth and the radius is four times that of earth?
3. Find the distance between two objects having a mass of 2 kg each, so that the gravitational force between them is 1 N.
4. If the earth attracts the moon with a gravitational force of 10^{20} N, then find the gravitational force of attraction given by moon on earth.
5. An imaginary planet has a mass 5 times that of earth and radius 3 times that of earth, what will be the value of the acceleration due to gravity on that planet, if the value of the same on earth is 10 m/s^2?

6. A stone is dropped from the roof of a building. It takes 4 s to reach the ground. Find the height of the building.
7. A child drops a coin from the top of a building, 50 m high. Calculate (i) the velocity of the coin when it falls through 20 m distance and (ii) the velocity with which the coin strikes the ground.
8. An object is thrown vertically upward and rises to a height of 20 m. Calculate (i) the velocity with which it was thrown. (ii) the time taken by the object to reach the highest point.
9. A stone is thrown vertically with a speed of 29.4 m/s. Taking $g = 9.8\ m/s^2$, find
   (i) The time taken by the stone to reach the maximum height.
   (ii) Maximum height reached by the stone.
   (iii) Show that the time of ascent is equal to the time of descent.
   (iv) What is the net displacement and the distance covered by the stone, when it comes back to the hand?
10. A stone is allowed to fall from the top of a tower 100 m high and at the same time, another stone is projected vertically upward from the ground with a velocity of 25 m/s. Calculate when and where these two stones will meet each other.
11. A ball thrown up vertically returns to the thrower after 6 s. Find (i) the velocity with which it was thrown up (ii) the maximum height it reaches, and (iii) its position after 4 s.
12. A stone is released from the top of a tower of height 19.6 m. Calculate its final velocity just before touching the ground. (Take $g = 9.8\ m/s^2$)
13. The gravitational force between the two objects is 200 N. How should the distance between the object be changed, so that the force between them reduces to 100 N?
14. A rectangular iron block of mass 10 kg is placed on the top of a table. The dimensions of the block are 20 cm $\times$ 10 cm $\times$ 5 cm. Find the minimum and maximum pressure exerted by the block on the table.
15. The pressure exerted by the weight of a cubical block of side 3 cm on the surface is 5 Pa. Calculate the weight of the block.
16. A drawing pin is pushed against a wooden table with a force of 10 N. Calculate the pressure exerted by the pin at a point on the table, if the area of the point is 0.01 mm^2.
17. A sealed cane of mass 600 g has a volume of 500 cm^3. Will this cane sink in water? (Density of water is $1 g/cm^3$.)
18. The density of water is 1000 kg/m^3. If relative density of iron is 7.874, then calculate the density of iron.
19. A solid cube with 10 cm edge is made of a material of density 7000 kg/m^3. Answer the following questions:
   (i) Calculate the volume of the cube in m^3.
   (ii) Calculate the mass of the cube on earth.
   (iii) What will be its mass on the surface of moon?
   (iv) Calculate the weight of the cube on earth.
   (v) If the cube is placed with one of the faces on a table, calculate the pressure exerted by the cube on the table in N/m^2.
20. The volume of a solid of mass 500 g is 350 cm^3.
   (i) What will be the density of the solid?
   (ii) What will be the mass of the water displaced by the solid?
   (iii) What will be the relative density of the solid?
   (iv) Will it float or sink in water?
21. An object is put in three liquids having different densities, one by one. The object floats with 1/9, 2/11 and 3/7 parts of its volume outside the surface of liquids of densities x, y and z respectively. Which of the following is the correct order of the densities of the three liquids?
   (a) $x > y > z$ (b) $y > z > x$ (c) $x < y < z$ (d) $z > y > x$.
22. A body floats in kerosene of density $0.8 \times 10^3\ kg/m^3$ up to a certain mark. If the same body is placed in water of density $1 \times 10^3\ kg/m^3$, will it sink more or less? Give reason for your answer.
23. Four balls A, B, C and D displace 10 ml, 24 ml, 15 ml and 12 ml of a liquid respectively, when immersed completely. The ball which will undergo the maximum apparent loss in weight will be
   (a) A (b) B (c) C (d) D.

24. A solid of density 900 kg/m^3 floats in a oil. The oil floats on water of density 1000 kg/m^3. The density of oil in kg/m^3 could be
    (a) 850 (b) 900 (c) 950 (d) 1050.
25. The volume of a solid of mass 50 g is 20 cm^3. If the density of water is 1 g/cm^3, will the substance float or sink in water?
26. A car falls of a ledge and drops to the ground in 0.5 s. Let g= 10 ms^{-2}
    a. What is its speed on touching the ground?
    b. What is its average speed during 0.5s?
    c. How high is the ledge from the ground?
27. The mass of earth is 6x10^{24} kg and that of the moon is 7.4x 10^{22}kg. If the distance between the earth and the moon is 3.84x10^{5}km. Calculate the force exerted by the earth and the moon. (G=6.67x10^{-11} Nm^2 kg^{-2})

- **SYLLABUS:**
  1. **MOTION**
  2. **FORCES AND NEWTON'S LAWS OF MOTION**
  3. **GRAVITATION**