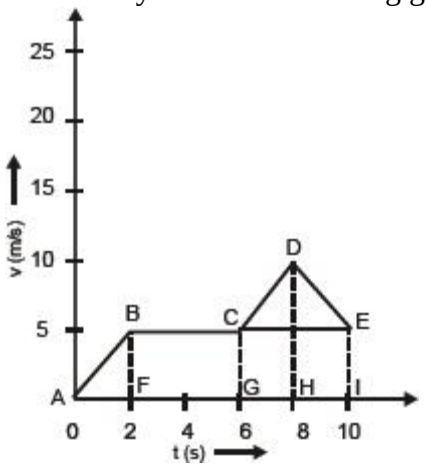
FATHER AGNEL SCHOOL, VAISHALI
CLASS IX QUESTION BANK
PHYSICS

Topic : MOTION

1. 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.
2. Find the total displacement of the body from the following graph:



3. 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.
4. Define acceleration and give its SI unit. When is acceleration of a body negative? Give two examples of situations in which acceleration of the body is negative.
5. Distinguish between uniform motion and non, uniform motion. Is uniformly accelerated motion uniform motion? Give one example each of uniform and non-uniform motion.
6. The speedometer readings of a car are shown below. Find the acceleration of the car and its displacement.

Time	**Speedometer**
9:25 am	36 km/h
9:45 am	72 km/h

7. Define uniform circular motion and give example of it. Why is it called accelerated motion?

Fill in the blanks:
1. When s-t graph is parallel to x-axis, the body is_____.
2. When v-t graph is parallel to x-axis, the body is_____.
3. The slope of v-t graph for a body in uniformly accelerated motion is_____.
4. The slope of displacement-time graph for a car parked in a parking area is_____.
5. Acceleration is a_____quantity,

True/False:
6. Velocity of an object in uniform circular motion is constant.
7. A car moving on a crowded road with a number of traffic red signals is in non-uniform motion.
8. Displacement of a body can be positive or zero, but never negative.
9. Angular displacement is measured in radians.
10. A freely falling body is uniformly accelerated.

1. (a) Identify the kind of motion in the following cases:
(i) A car moving with constant speed turning around a curve.
(ii) An electron orbitting around nucleus.

(b) An artificial satellite is moving in a circular orbit of radius 36,000 km. Calculate its speed if it takes 24 hours to revolve around the earth.

2. (a) Define average speed.
(b) A bus travels a distance of 120 km with a speed of 40 km/h and returns with a speed of 30 km/h. Calculate the average speed for the entire journey.

3. Define uniform and non-uniform motion. Write one example for each.

4. What does the odometer of an automobile measure? Which of the following is moving faster? Justify your answer.
(i) A scooter moving with a speed of 300 m per I minute.
(ii) A car moving with a speed of 36 km per hour.

5. A car travels from stop A to stop B with a speed of 30 km/h and then returns back to A with a speed of 50 km/h. Find
(i) displacement of the car.
(ii) distance travelled by the car.
(iii) average speed of the car.

6. Velocity-time graph for the motion of an object in a straight path is a straight line parallel to the time axis.
(a) Identify the nature of motion of the body.
(b) Find the acceleration of the body.
(c) Draw the shape of distance-time graph for this type of motion.

7. Draw the shape of the distance-time graph for uniform and non-uniform motion of object. A bus of starting from rest moves with uniform acceleration of 0.1 ms^{-2} for 2 minutes. Find
(a) the speed acquired.
(b) the distance travelled.

8. (a) Define uniform acceleration. What is the acceleration of a body moving with uniform velocity?
(b) A particle moves over three quarters of a circle of radius r. What is the magnitude of its displacement?

9. A bus accelerates uniformly from 54 km/h to 72 km/h in 10 seconds Calculate
(i) acceleration in m/s^2
(ii) distance covered by the bus in metres during this interval.

10. A car moves with a speed of 30 km/h^{-1} for half an hour, 25 km/h^{-1} for one hour and 40 km/h^{-1} for two hours. Calculate the average speed of the car.

11. Derive the equation for velocity-time relation ($v = u + at$) by graphical method.

12. A car is travelling at 20 km/h, it speeds upto 60 km/h in 6 seconds. What is its acceleration?

13. A car accelerates from 6 ms^{-1} to 16 ms^{-1} in 10 sec. Calculate
(a) the acceleration and

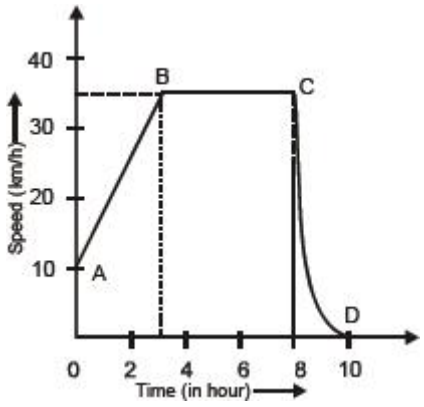
(b) the distance covered by the car in that time.

14. A circular track has a circumference of 3140 m with AB as one of its diameter. A scooterist moves from A to B alone the circular path with a uniform speed of 10 m/s. Find
(a) distance covered by the scooterist,
(b) displacement of the scooterist, and
(c) time taken by the scooterist in reaching from A to B.

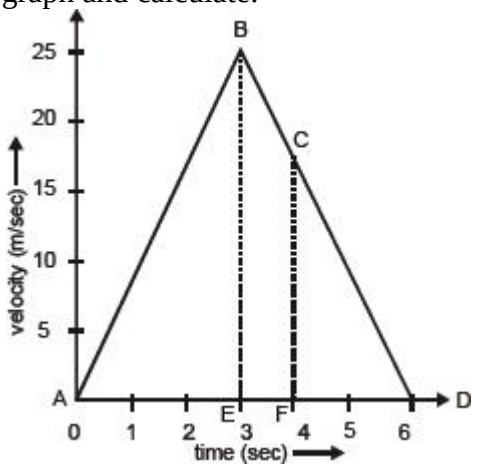
15. (a) Differentiate between uniform linear and uniform circular motion.
(b) Write any four examples of uniform circular motion.
(c) Is uniform circular motion accelerated motion?

16. (a) Differentiate between speed and velocity.
(b) When is a body said to have uniform velocity?
(c) How can we describe the position of an object?
Illustrate with suitable example.

17. 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.



18. Study the velocity-time graph and calculate.



(a) The acceleration from A to B
(b) The acceleration from B to C

(c) The distance covered in the region ABE
(d) The average velocity from C to D
(e) The distance covered in the region BCFE

19. The following table gives the data about motion of a car.

Time (h)	11.00	11.30	12.00	12.30	1.00
Distance (km)	0	30	30	65	100

Plot the graph.
(i) Find the speed of the car between 12.00 hours and 12.30 hours.
(ii) What is the average speed of the car?
(iii) Is the car's motion an example of uniform motion? Justify.

20. (a) Derive the equation of motion v = u +at, using graphical method.
(b) A train starting from rest attains a velocity of 72 km/h in 5 minutes. Assuming the acceleration is uniform, find
(i) the acceleration.
(ii) the distance travelled by the train for attaining this velocity.

Topic: <u>FORCE AND LAWS OF MOTION</u>

Q1. Define force and its SI unit?

Q 2. Distinguish between balanced and unbalanced force?

Q3. State three laws of motion?

Q 4. What is inertia? Is inertia vector quantity. Justify?

Q5. What is impulse? Prove that Impulse is equal to change in momentum?

Q. 6. Define momentum and Prove that F = ma

Q 7. Is it possible that a body keeps on moving with uniform velocity with? If yes give reason also name scientist who explained this statement?

Q 8. Why a person sitting in bus fall forward when moving bus suddenly stops?

Q9. Why people sitting in bus fall backward when bus suddenly starts?

Q10. Why dust fall on beating carpet with stick?

Q11. Why leaves fall when we are shacking branch of tree?

Q12. Why an athlete runs certain distance before taking long jump?

Q13. When bus takes u turn, passengers sitting inside thrown a side. Why?

Q14. Explain why it is difficult for a fireman to hold a hose, which ejects large amount of water at a high velocity.

Q15. How a karate player can break a pile of tiles with a single blow of his hand?

Q.16. Why does a bullet when fired against a glass window pane make a hole in it, and the glass pane will smash it?

Q.17. Why is it advised to tie a rope on the luggage while you travel by the bus?

Q18.Why vehicles are provided with shocker?

Q19. Why does a bicycle begin to slow down when we stop pedaling?

Q20. State and verify the law of conservation of momentum?

Q21. When we hit at the bottom of the pile of carom coins, other coins fall vertically on the carom board why?

Q22. Two balls A and B of masses 'm' and '2 m' are in motion with velocities '2 v' and 'v' respectively. Compare

(i) their inertia (ii) their momentum and (iii) the force needed to stop them in the same time

Q 23. A 8000 kg engine pulls a train of 5 wagons, each of 2000 kg, along a horizontal track. If the engine exerts a force of 40,000 N and the track offers a friction force of 5,000 N then calculate:
(a) the net accelerating force (b) the acceleration of the train (c)the force of the wagon 1 on rest of the wagons.

Q 24.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 road side, 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.

Q25.A machine gun can fire 50 g bullets with a velocity of 150 m/s. A 60 kg stone is moving towards the machine gun velocity of 10 m/s. How many bullets must be fired from the gun to just stop the stone in its tracks?

Q27. A bullet of mass 10 gm moving with a velocity of 400 m/sec gets embedded in a freely suspended wooden block of mass 900 gm. Calculate the velocity of wooden block acquired.

Q28. If action is always equal to reaction, explain why a cart pulled by a horse can be moved.

Q29. A truck started from rest and rolls down a hill with constant acceleration it travel a distance of 400 m in 20 sec. find its acceleration and force acting on it if the mass of the truck is 1 metric tones.

Q30. Explain the Newton's second law of motion.

Q31. Why we use seat belts in car?

Q32. A man throws a ball weighing 500 gm vertically upwards with the speed of 10 m/sec find:
(a) What will be its initial momentum?
(b)What would its momentum at the highest point?

Q33. The velocity of a body of mass 10 kg increases form 4 m/sec to 8 m/sec When a force act on it for 2 sec. find
(a) What is the momentum before the force act?
(b)What is the momentum after the force act?
(c) What is the momentum gain in momentum per sec.
(d)What is the value of force?

Topic: GRAVITATION

Multiple choice Questions

1) Which of the following is true?
a) The acceleration due to gravity acting on a freely falling body is directly proportional to the mass of the body
b) Mass of the object is same on Moon and Earth
c) G value is always constant
d) The weight of an object at the center of earth will be zero

2) A big stone and small are dropped from the roof of the house at the same time. Which one will reach the ground first?
a)Big Stone
b)Small stone
c)Both at the same time
d) Not able to determine with the given data

3)The value of acceleration due to gravity of earth
a)Same on equator and poles
b)Is the least at equator
c)Is the least on poles
d) Increase from pole to equator

4) 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

5) The time taken by the object to reach the highest point in the above question
a) 1.42s
b) 1.5 s
c) 1 s
d) 1.43 s

6) Which of the them is true for two bodies separated by some distance?
a) When the distance between them is halved, Gravitational force becomes 4 times
b) When one of the mass becomes halved, Gravitational force becomes halved
c) When the distance between them is increased four times, Gravitational force becomes 1/16 times
d) None of the above

7)The Weight of the body at a certain place is 30 N. The acceleration due to gravity at that point is 10 m/s. Find out the mass and weight of the object at the place where acceleration due to gravity is zero?
a)3,0
b)3,30
c)3,3
d) None of these

8) The acceleration due to gravity at three point A,B and C are 9.8 m/s^2 ,10m/s^2 and 5 m/s^2 on the earth surface?
Which of the following is true?

a. B is at least distance out of three point from the center of the earth
b. C is at farthest distance out of three point from the center of the earth
c. Weight of the object is lowest at point C out of three point
d. The weight of the object varies as
$W_B > W_A > W_C$

Short Questions

1. What is the difference between mass and Weight?

2. Define ‘G’ and give its value.

3. A ball is thrown up with speed of 10 m/s. How high will it go before it begins to falls? Take g=10m/s^2

4. The weight of the man on earth is 150 N and on certain planet is 25 N. Take g=10m/s^2 on earth

i. Find the mass of the man on earth and planet
ii. Find the acceleration due to gravity on the planet

5. Is acceleration due to gravity (g) constant? Tell us how it is there at different places on earth?
   What are these :
   (i) Product Rule
   (ii) Inverse Square rule
   (iii) Universal gravitational constant
   (iv) Universal law of gravitation
6. Define:

i. Buoyancy
ii. Factor of buoyant force
iii. Archimedes Principle and its use

7. Explain why
   1) Pressure on ground more when man is walking than he is standing?
   2) A bucket of water is lighter when in water than when it is taken out of water?
   3) An iron nail floats on mercury but sink in water
   4) It is easy to walk on sand with flat shoes than with high heel shoes?

8. A iron cube of side 10 cm is kept on a horizontal table. If the density of iron is 8000 kg/m^3. Find the pressure on the portion of the table where cube is kept.Take g=10m/s^2

9. The dimension of wooden block is 2m X 0.25 m X 0.10 m. If relative density of wood is 0.6 calculate the mass of the block in kg.

10. Differentiate between density and relative density.

11. A 100 cm^3 block has a mass of 395g. Find its relative density.

12. A block of wood is kept on the table top. The mass of wooden block is 5 kg and its dimension are 40 cmX20cmX10 cm. Find the pressure exerted by the wooden block on the table if it made it lie on the table top with its sides of dimension

1) 20 cm × 10 cm
2) 40 cm × 20 cm

Take g=9.8 m/s^2

HOTS

1. Two bodies of mass 1kg and 2 kg respectively are placed at a separation of 1m. Find the accelerations of the bodies assuming that only gravitational forces act.

2. Communication satellites moves in orbits of radius 44000 km around the earth. Find the acceleration of such a satellite assuming that the only force acting on it is that due to the earth.

   Mass of the earth $=6\times10^{24}$kg.

3. A particle of mass m_1 is kept at x = 0 and another of mass m_2 at x = d. When a third particle is kept at x = d/4, it experiences no net gravitational force due to the 2 particles. Find m_1/m_2.

4. If the distance between 2 particles is increased by 2%, then the force of attraction between them will be decrease or increase and how much?

5. If mass of one particle is increased by 50% and mass of other particle is decreased by 50%, the force between them will decrease or increase and how much?

6. The gravitational force between 2 bodies is decreased by 36% when the distance between them is increased by 3m. The initial distance between them will be?