

Time : 1 Hour 15 Minute

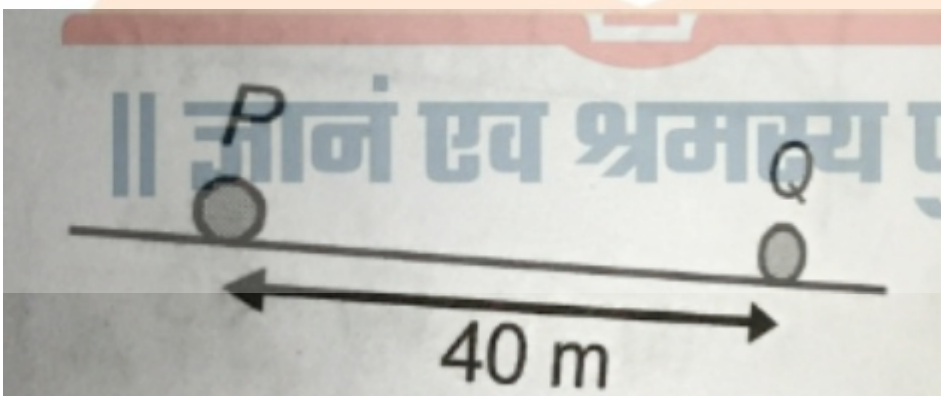
STD 11 Science Physics
Chapter Based Test

Total Marks : 40

Section A

* Choose The Right Answer From The Given Options.[1 Marks Each] [4]

- The distance travelled by a body is directly proportional to the square of the time taken. Its acceleration:
 - Increases.
 - Decreases.
 - Becomes zero.
 - Remains constant.
- The object is released from rest under gravity at $y = 0$. The equation of motion which correctly expresses the above situation is:
 - $v = -9.8t \text{ ms}^{-1}$
 - $v = (9.8 - 9.8t)\text{m/s}$
 - $v^2 = -19.6y^2\text{m}^2 - \text{s}^{-2}$
 - $v^2 = (v_0^2 + 29.6y)\text{m}^2/\text{s}^2$
- If the velocity of a particle is $v = At + Bt^2$, where A and B are constants, then the distance travelled by it in 1s is:
 - $3A + 7B$
 - $\frac{3}{2}A + \frac{7}{3}B$
 - $\frac{A}{2} + \frac{B}{3}$
 - $\frac{3}{2}A + 4B$
- Two particle P and Q are initially 40m apart P behind Q. Particle P starts moving with a uniform velocity 10m/s towards Q. Particle Q starting from rest has an acceleration 2ms^{-2} in the direction of velocity of P. Then the minimum distance between P and Q will be:



- (A) 45m (B) 15m (C) 35m (D) 30m

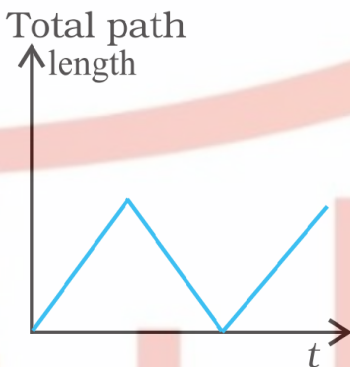
* Fill In The Blanks [3]

5. In uniform motion, position-time graph is _____ and velocity of the body remains _____.
6. In uniform motion, velocity-time graph is a straight line parallel to _____.
7. Distance travelled in the n^{th} interval of time in uniform accelerated motion is $S_n =$ _____.

* **Answer The Following Questions In One Sentence.[1 Marks Each]**

[4]

8. Give an example of uniformly accelerated linear motion.
9. Look at the graphs carefully and state, with reasons, which of these cannot possibly represent one-dimensional motion of a particle.



10. The displacement-time graph for two particles X and Y are straight lines making angles of 30° and 60° with the time axis. What is the ratio of the velocities of Y and X?
11. Why does the earth impart the same acceleration to all bodies?

Section B

* **Given Section consists of questions of 2 marks each.**

[6]

1. The velocity of a particle is given by equation $v = 4 + 2(c_1 + c_2 t)$, where c_1 and c_2 are constant. Find the initial velocity and acceleration of the particle.
2. Draw displacement-time graph for a uniformly accelerated motion. What is its shape?
3. Give examples where:
 - a. The velocity of a particle is zero but its acceleration is not zero.
 - b. The velocity is opposite in direction to the acceleration.
 - c. The velocity is perpendicular to the acceleration.

Section C

* **Given Section consists of questions of 3 marks each.**

[9]

1. Explain clearly, with examples, the distinction between: Magnitude of average velocity over an interval of time, and the average speed over the same interval. [Average speed of a particle over an interval of time is defined as the total path length divided by the time interval]. Show in both (a) and (b) that the second quantity is either greater than or equal to the first. When is the equality sign true? [For simplicity, consider one-dimensional motion only]
2. Water drops fall freely from a tap at a height of 4.9m. If time interval between successive drops is equal and the 4th drop is released when the first lands on the ground, find the separation between the second and third drops.

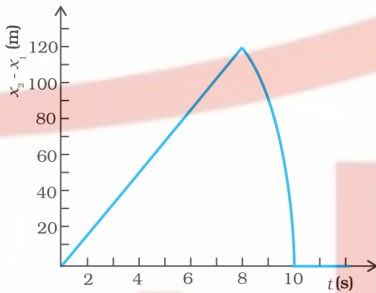
3. Four persons K, L, M and N start from the vertices of a square of side 'a', simultaneously and move towards the neighbour in order always with the same speed of v. When and where do they meet?

Section D

* Given Section consists of questions of 5 marks each.

[10]

1. Two stones are thrown up simultaneously from the edge of a cliff 200m high with initial speeds of 15 m s^{-1} and 30 m s^{-1} . Verify that the graph shown in correctly represents the time variation of the relative position of the second stone with respect to the first. Neglect air resistance and assume that the stones do not rebound after hitting the ground. Take $g = 10\text{ m s}^{-2}$. Give the equations for the linear and curved parts of the plot.



2. If a body moving with uniform acceleration in straight line describes successive equal distance in time interval t_1 , t_2 and t_3 , then show that

$$\frac{1}{t_1} - \frac{1}{t_2} + \frac{1}{t_3} = \frac{3}{t_1 + t_2 + t_3}$$

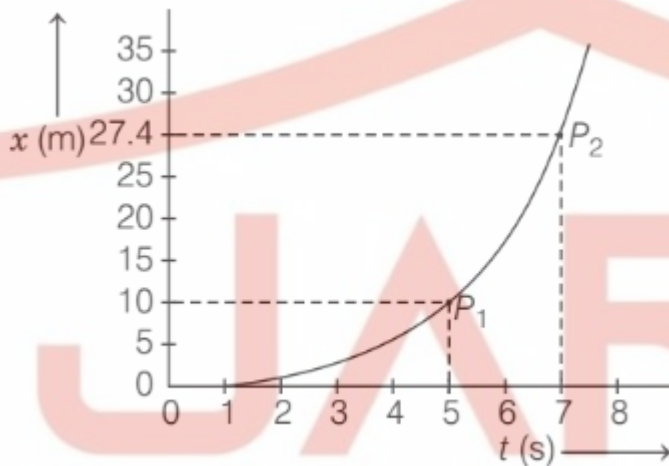
Section E

* Case study based questions

[4]

1. When an object is in motion, its position changes with time. So, the quantity that describes how fast is the position changing w.r.t. time and in what direction is given by average velocity. It is defined as the change in position or displacement (Δx) divided by the time interval (Δt) in which that displacement occur. However, the quantity used to describe the rate of motion over the actual path, is average speed. It defined as the total distance travelled by the object divided by the total time taken.
- i. A 250m long train is moving with a uniform velocity of 45 km h^{-1} . The time taken by the train to cross a bridge of length 750m is:
 - a. 56s
 - b. 68s
 - c. 80s
 - d. 92s
 - ii. A truck requires 3hr to complete a journey of 150km. What is average speed?
 - a. 50km/h
 - b. 25km/h
 - c. 15km/h
 - d. 10km/h
 - iii. Average speed of a car between points A and B is 20 m/s , between B and C is 15 m/s and between C and D is 10 m/s . What is the average speed between A and D, if the time taken in the mentioned sections is 20s, 10s and 5s, respectively?
 - a. 17.14 m/s

- b. 15m/s
c. 10m/s
d. 45m/s
- iv. A cyclist is moving on a circular track of radius 40m completes half a revolution in 40s. Its average velocity is:
- a. Zero
b. 2ms^{-1}
c. $4\pi\text{ms}^{-1}$
d. $8\pi\text{ms}^{-1}$
- v. In the following graph, average velocity is geometrically represented by:



- a. Length of the line $P_1 P_2$.
b. Slope of the straight line $P_1 P_2$.
c. Slope of the tangent to the curve at P_1 .
d. Slope of the tangent to the curve at P_2 .

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