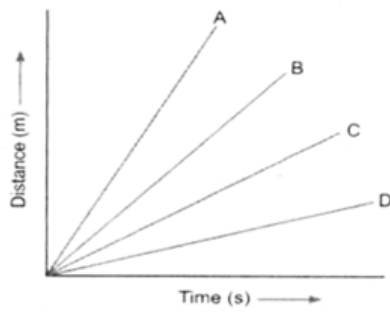


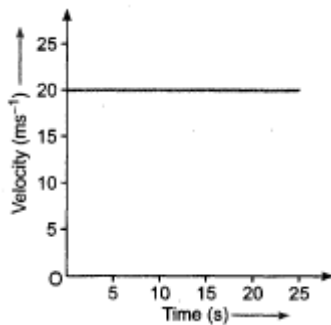
MYP | PHYSICS | MECHANICS | MOTION

Section A

1. A body starting at a point, say A, reaches, say B, ahead in a straight line and returns back to A. Then there is: [1]
 - a) negative displacement
 - b) cannot be said
 - c) zero displacement
 - d) positive displacement
2. Which of the following is the characteristic of distance travelled by an object? [1]
 - a) It has only magnitude and no specific direction
 - b) It has a magnitude as well as specific direction
 - c) It can be zero
 - d) The distance travelled by an object is less than the magnitude of the displacement of the object.
3. A car travels 10 m in 5 seconds, 20 m in the next 10 seconds, and 30 m in the last 10 seconds. The average speed of the motion is: [1]
 - a) 30 ms^{-1}
 - b) 2.2 ms^{-1}
 - c) 2.4 ms^{-1}
 - d) 2.0 ms^{-1}
4. The maximum speed of a train is 90 km/h. It takes 10 hours to cover a distance of 500 km. The ratio of its average speed to maximum speed is: [1]
 - a) 9:5
 - b) 5:9
 - c) 1: 5
 - d) 5:1
5. In which of the following cases of motion, the distance moved and the magnitude of displacement are equal? [1]
 - a) The earth is revolving around the Sun
 - b) The pendulum is moving to and fro
 - c) A car is moving on a straight road
 - d) A car is moving in a circular path
6. The displacement of a body is proportional to the cube of the time lapsed. The magnitude of the acceleration is: [1]
 - a) decreasing with time
 - b) increasing with time
 - c) constant
 - d) zero
7. If the displacement of an object is proportional to square of time, then the object moves with [1]
 - a) increasing acceleration
 - b) uniform velocity
 - c) uniform acceleration
 - d) decreasing acceleration
8. If the v-t graph is a straight line inclined to the time axis, then: [1]



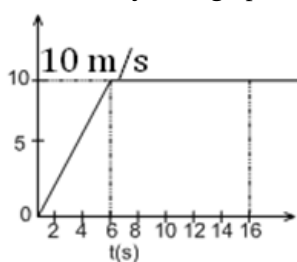
34. What can you say about the motion of an object whose distance-time graph is a straight line parallel to the time axis? [2]
35. The velocity-time graph shows the motion of a cyclist. Find [2]
- its acceleration
 - its velocity and
 - the distance covered by the cyclist in 15 seconds.



36. What are the characteristics of distance-time graph for an object moving with a non-uniform speed? [2]
37. A particle moves in a circle with O as centre and $AO = OB = 5$ cm, radius, as shown in the figure. It starts from A. Calculate. [3]

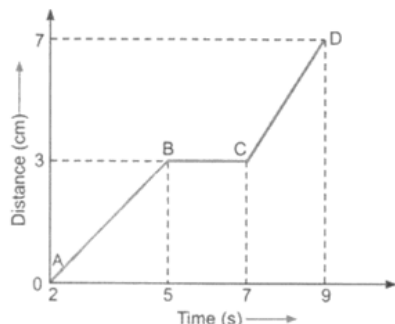


- the distance covered, and
 - the displacement, when it reaches B.
38. Suppose you go up a tower 80 m high and throw a ball horizontally with a velocity of 20m/s. What will be the shape of the path followed by the ball? While falling, the motion of the ball will be a combination of two independent motions. Name these two motions. [3]
39. The velocity time graph of runner is given in the graph. [3]



- a. What is the total distance covered by the runner in 16s?
- b. What is the acceleration of the runner at $t = 11\text{s}$?

40. The graph given below shows the positions of a body at different times. Calculate the speed of the body as it moves from [3]
- i. A to B
 - ii. B to C
 - iii. C to D



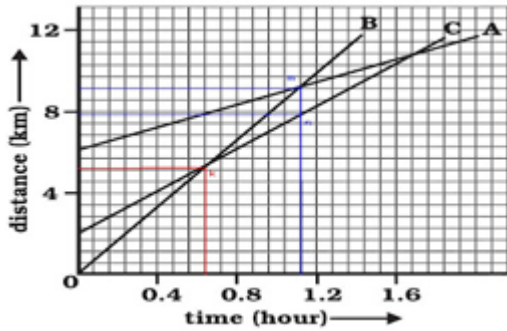
41. A driver of a car travelling at 52 km h^{-1} applies the brakes and accelerates uniformly in the opposite direction. The car stops in 5 s. Another driver going at 3 km h^{-1} in another car applies his brakes slowly and stops in 10 s. On the same graph paper, plot the speed versus time graphs for the two cars. Which of the two cars travelled farther after the brakes were applied? [3]
42. A body is dropped from a height of 320 m. The acceleration due to the gravity is 10 m/s^2 . [3]
- (a) How long does it take to reach the ground?
 - (b) What is the velocity with which it will strike the ground?
43. The driver of a car travelling along a straight road with a speed of 72 Km/h observes a signboard which give the speed limit to be 54 Km/h . The signboard is 70 m ahead, when the driver applies the brakes. Calculate the acceleration of the car which will cause the car to pass the signboard at the stated speed limit. [3]
44. An electron moving with a velocity of $5 \times 10^4\text{ ms}^{-1}$ enters into a uniform electric field and acquires a uniform acceleration of 10^4 ms^{-2} in the direction of its initial motion. [3]
- i. Calculate the time in which the electron would acquire a velocity double of its initial velocity.
 - ii. How much distance the electron would cover in this time?
45. A bus starting from rest moves with a uniform acceleration of 0.1 m s^{-2} for 2 minutes. Find: [3]
- a. the speed acquired.
 - b. the distance travelled.
46. An iron ball of density 7800 kg m^{-3} and volume 200 cm^3 is totally immersed in water. [3]
- i. Calculate the weight of the iron ball in the air.
 - ii. Calculate the upthrust.
 - iii. Its apparent weight in water.
 - iv. Its apparent density in water.
47. State with reasons, if it is possible or impossible for an object in motion to have: [5]
- i. Zero distance covered and may have non zero displacements.
 - ii. Zero speed covered and may have non zero acceleration at the same time.
 - iii. Zero speed and may have non zero velocity.

iv. Acceleration opposite to the direction of motion.

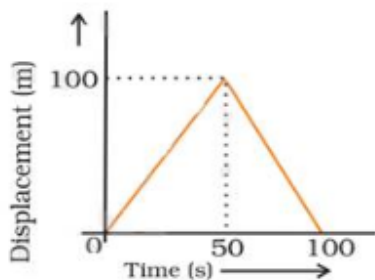
48. Soham is moving in his car with a velocity of 90 km/h. How much distance will be covered in [5]
 i. One minute
 ii. one second.

49. On a 100 km track, a train travels the first 30 km at a uniform speed of 30 km/h. How fast must the train travel [5]
 the next 70 km, so as to average 40 km/h for the entire trip?

50. Fig shows the distance-time graph of three objects A, B and C. Study the graph and answer the following [5]
 questions:



- a. Which of the three is travelling the fastest?
 b. Are all three ever at the same point on the road?
 c. How far has C travelled when B passes A?
 d. How far has B travelled by the time it passes C?
51. A girl walks along a straight path to drop a letter in the letterbox and comes back to her initial position. Her [5]
 displacement–time graph is shown in Fig. Plot a velocity-time graph for the same.

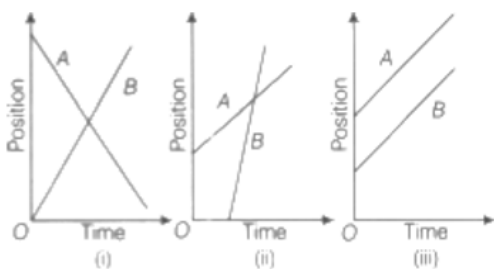


52. Using following data, draw time-displacement graph for a moving object: [5]

Time (s)	0	2	4	6	8	10	12	14	16
Displacement(m)	0	2	4	4	4	6	4	2	0

Use this graph to find average velocity for first 4s, for next 4s and for last 6s.

53. The position-time graphs of two objects A and B in three different situations for a particular duration are shown [5]
 as below:



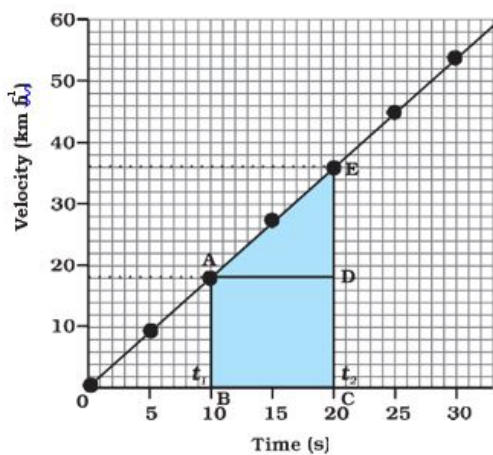
- i. In which situation the distance between them will remain same?
 ii. In which situation they are moving in opposite directions?

- iii. Is the velocity of object A positive or negative in situation (ii)?
- iv. Are they crossing each other in any situation (s)? If so, why?
54. Derive the second equation of motion $S = ut + at^2$ graphically? [5]
55. A driver of a car travelling at 52 km h^{-1} applies the brakes and accelerates uniformly in the opposite direction. The car stops in 5s. Another driver going at 3 km h^{-1} in another car applies his brakes slowly and stops in 10s. On the same graph paper, plot the speed versus time graphs for the two cars. Which of the two cars travelled further after the brakes were applied? [5]
56. Two stones are thrown vertically upwards simultaneously with their initial velocities u_1 and u_2 respectively. Prove that the heights reached by them would be in the ratio of $u_1^2 : u_2^2$ (Assume upward acceleration is $-g$ and downward acceleration to be $+g$). [5]
57. Derive the third equation of motion ($v^2 - u^2 = 2as$) graphically. [5]
58. The driver of train A travelling at a speed of 54 kmh^{-1} applies brakes and retards the train uniformly. The train stops in 5 seconds. Another train B is travelling on the parallel with a speed of 36 kmh^{-1} . Its driver applies the brakes and the train retards uniformly; train B stops in 10 seconds. Plot speed-time graphs for both the trains on the same axis. Which of the trains travelled farther after the brakes were applied? [5]

Section G

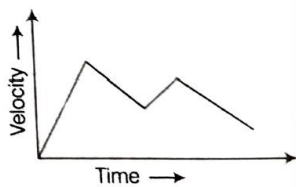
59. Read the following and answer any four questions: [4]

In the velocity-time graph for the motion of the car. The nature of the graph shows that velocity changes by equal amounts in equal intervals of time. For all uniformly accelerated motion, the velocity-time graph is a straight line.



- The slope of a velocity-time graph gives
 - the distance
 - the displacement
 - the acceleration
 - the speed
- Which of the following statement is correct regarding the velocity and speed of a moving body?
 - The velocity of a moving body is always higher than its speed.
 - The speed of a moving body is always higher than its velocity.
 - The speed of a moving body is its velocity in a given direction.
 - The velocity of a moving body is its speed in a given direction.

iii. The following graphs shows:



- a. uniformly accelerated motion
- b. non-uniformly accelerated motion
- c. non-uniformly decelerated motion
- d. uniformly decelerated motion

iv. If the displacement of an object is proportional to square of time, then the object moves with

- a. uniform velocity
- b. uniform acceleration
- c. increasing acceleration
- d. decreasing acceleration

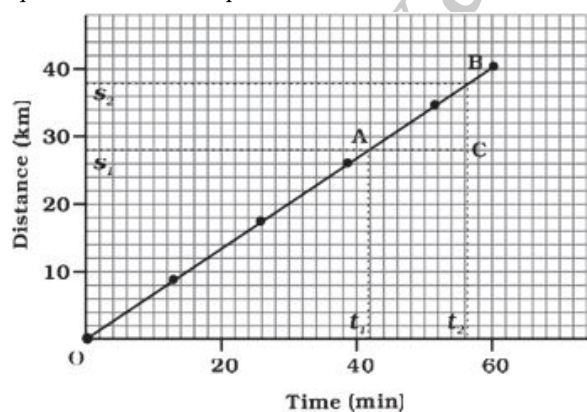
v. which of the following is an incorrect match:

	column I	column II
a.	Straight-line parallel to time axis in the velocity-time graph	Scalar quantity
b.	The slope of the velocity-time graph gives	Shortest distance between the initial and final position
c.	Uniform circular motion	Rate of change of velocity with respect to time
d.	Displacement	Body in uniform motion

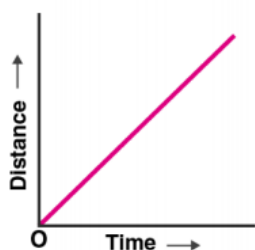
60. Read the passage and answer any four questions:

[4]

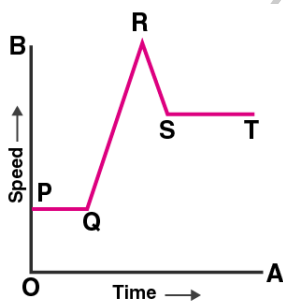
Graphical representation of the distance-time graph of moving body at a uniform speed. when an object travels equal distances in equal intervals of time, it moves with uniform speed.



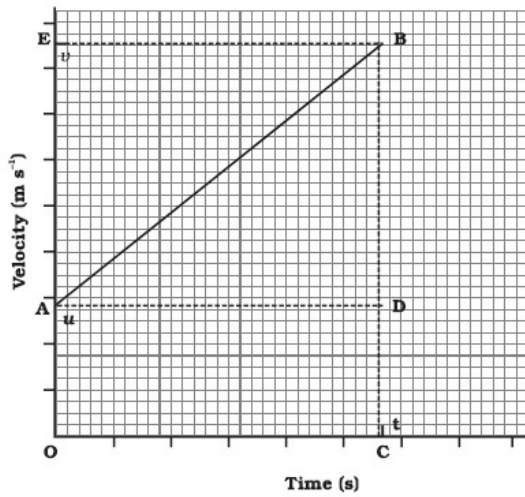
i. What conclusion can you draw about the speed of a body from the following distance-time graph?



- a. Uniform speed
 - b. Non-uniform speed
 - c. Uniform velocity
 - d. Non-uniform velocity
- ii. Which of the following statement is incorrect about the graphical representation of motion?
- i. A straight line graph helps in solving a linear equation
 - ii. Line graphs show the dependence of one physical quantity
 - iii. In the distance-time graph, time is taken along the y-axis
 - iv. In the distance-time graph, distance is taken along the x-axis
- a. (I) and (II)
 - b. (II) and (III)
 - c. (II) and (IV)
 - d. (III) and (IV)
- iii. The area under a speed-time graph represents a physical quantity which has the unit of :
- a. m
 - b. m^2
 - c. ms^{-1}
 - d. ms^{-2}
- iv. A bus moving along a straight line at 20m/s undergoes an acceleration of $4 m/s^2$. After 2 seconds, its speed will be :
- 1. 8 m/s
 - 2. 12 m/s
 - 3. 16 m/s
 - 4. 28 m/s
- v. A student draws a distance-time graph for a moving scooter and finds that a section of the graph is a horizontal line parallel to the time axis. Which of the following conclusion is correct about this section of the graph?

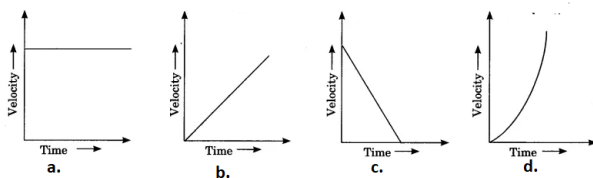


- a. The scooter has uniform speed in this section
 - b. The distance travelled by scooter is the maximum in this section
 - c. The distance travelled by scooter is the minimum in this section
 - d. The distance travelled by scooter is zero in this section
61. **Read the following and answer any four questions:** [4]
- In the velocity-time graph of an object that moves under uniform acceleration as the initial velocity of the object is u (at point A) and then it increases to v (at point B) in time t . The velocity changes at a uniform rate a .



- i. A boy goes from A to B with a velocity of 20 m/min and comes back from B to A with a velocity of 30 m/min. The average velocity of the boy during the whole journey is
- 24 m/min
 - 25 m/s
 - Zero
 - 20 m/min

- ii. A car is moving along a straight road with uniform velocity. It is shown in the graph.



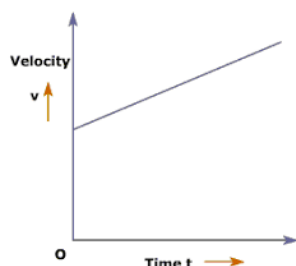
- iii. The ratio of speed to the magnitude of velocity when the body is moving in one direction is
- less than one
 - greater than one
 - equal to one
 - greater than or equal to one

- iv. Which of the following statement is correct with respect to the velocity-time graph given above?

- the perpendicular lines BC and BE are drawn from point B on the time
- initial velocity is represented by OA
- the final velocity is represented by OC
- the time interval t is represented by OB.

- (I) and (II)
- (II) and (III)
- (IV) and (I)
- (III) and (IV)

- v. According to the given velocity-time graph, the object

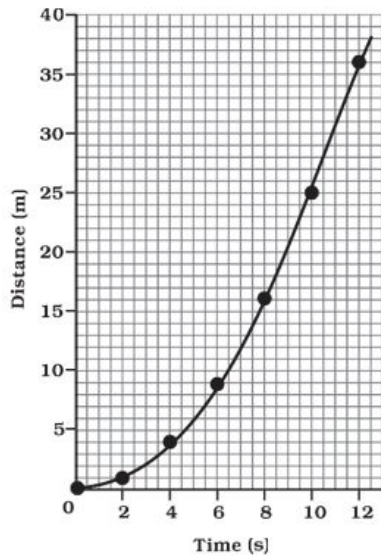


- a. is moving with uniform velocity
- b. has some initial velocity
- c. is moving uniformly with some initial velocity
- d. is at rest

62. Read the passage and answer any four questions:

[4]

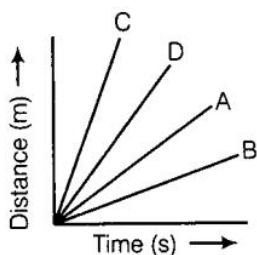
The change in the position of an object with time can be represented on the distance-time graph adopting a convenient scale of choice. In the distance-time graph, time is taken along the x-axis and distance is taken along the y-axis.



i. A man travels a distance of 1.5 m towards East, then 2.0 m towards South and finally 4.5 m towards East. What is the total distance traveled?

- a. 8m
- b. 16m
- c. 5m
- d. 7m

ii. Four cars A, B, C and D are moving on a levelled road. Their distance versus time graphs are shown in the adjacent figure. Choose the correct statement.



- a. Car A is faster than car D
- b. Car B is the slowest
- c. Car D is faster than car C
- d. Car C is the slowest

iii. If the displacement of an object is proportional to the square of time, then the object is moving with:

- a. uniform velocity
- b. uniform acceleration
- c. increasing acceleration
- d. decreasing acceleration

iv. Which of the following statement is correct for distance-time graph?

- I. Time is taken along the x-axis
 - II. When an object travels equal distances in equal intervals of time, it moves with uniform speed
 - III. Distance-time graphs can be employed under various conditions
 - IV. For uniform speed, a graph of distance travelled against time is a curved line
- a. (I), (II) and (III)
 - b. (II) and (IV)
 - c. (III) and (II)
 - d. (I) and (III)

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

