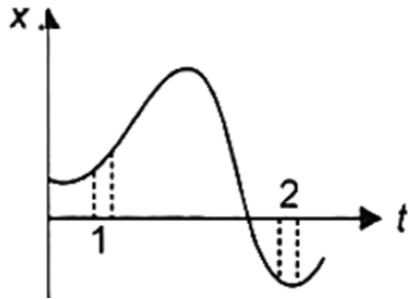


**MOTION WS 4**

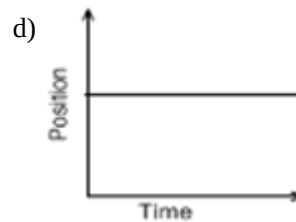
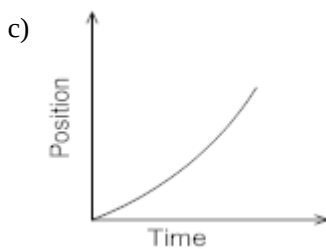
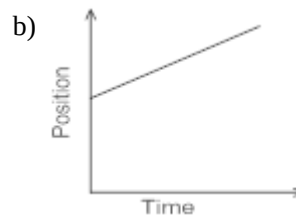
**Class 09 - Science**

**Section A**

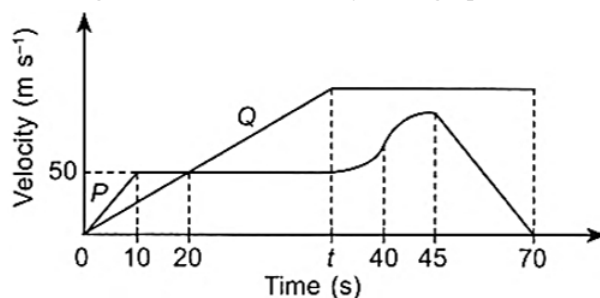
1. Figure shows the x-t plot of a particle moving along a straight line. Let  $v_1$  and  $v_2$  be average speeds in time intervals 1 and 2 respectively. Then [1]



- a) Data is insufficient  
b)  $v_1 = v_2$   
c)  $v_2 > v_1$   
d)  $v_1 > v_2$
2. The area below v-t graph is a measure of: [1]
- a) Angular speed  
b) Displacement  
c) Angular acceleration  
d) Acceleration
3. Which of the following is the position-time graph for a body at rest? [1]



4. The diagram shows the velocity-time graph of two moving cars P and Q. The graph indicates that [1]



a) After 20 s, P is behind Q.

b) Car Q is moving with a constant acceleration from 0 to 40 seconds.

c) Acceleration of the car Q is not zero at any point during whole journey.

d) The velocity of car P is increasing at a decreasing rate from 40 s to 45 s in same direction.

5. Slope of a velocity-time graph gives

[1]

a) the displacement

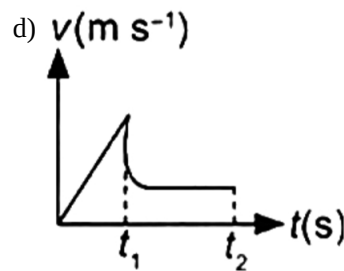
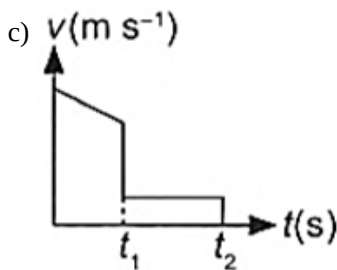
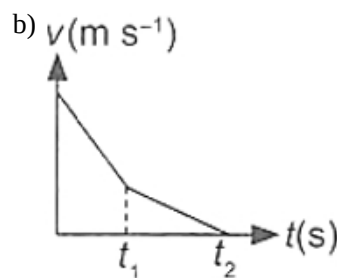
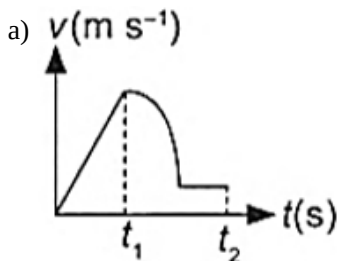
b) the acceleration

c) the distance

d) the speed

6. A parachutist jumps off the plane and opens up the parachute at time  $t_1$ . He eventually reaches a steady speed and finally hits the floor at time  $t_2$ . Which of the following shows the speed-time graph of the parachutist's descent?

[1]



7. What does the area of the velocity-time graph give?

[1]

a) Displacement

b) Speed

c) Acceleration

d) Average speed

8. What does the slope of the position-time graph indicate?

[1]

a) Speed

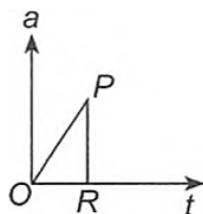
b) Speed or velocity

c) Acceleration

d) Velocity

9. What would you conclude about the variation in velocity of a cyclist from the given graph?

[1]



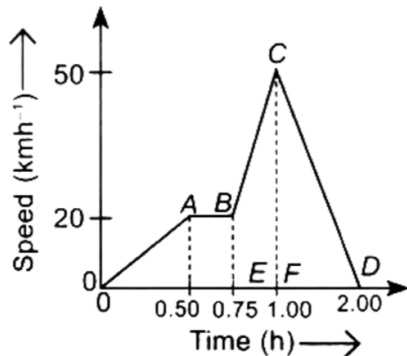
a) Velocity changes linearly if acceleration is changing non-linearly.

b) Velocity changes non-linearly if acceleration is changing linearly.

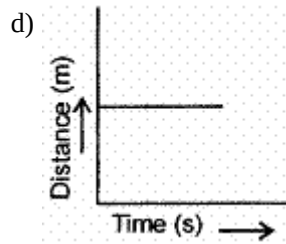
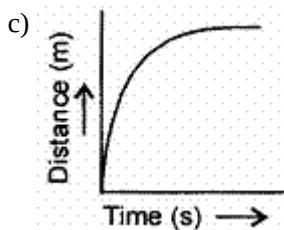
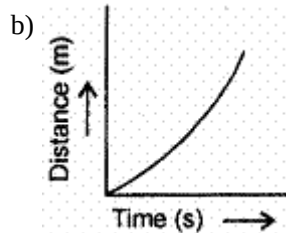
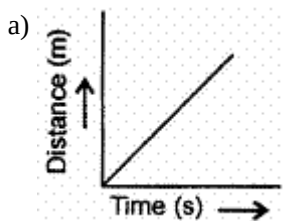
c) Velocity becomes uniform if acceleration becomes infinite.

d) Velocity becomes zero if acceleration becomes zero.

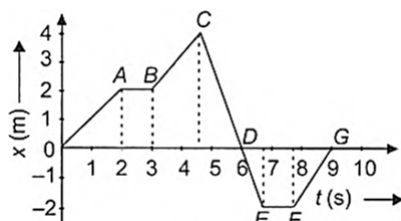
10. Area under a  $v - t$  graph represents a physical quantity which has the unit [1]
- a)  $\text{ms}^{-1}$  b)  $\text{m}^2$
- c)  $\text{m}$  d)  $\text{m}^3$
11. A train moves from one station to another in two hours time. Its speed-time graph during the motion is shown in figure. Identify the correct statement(s) regarding this graph. [1]
- 
- i. The maximum acceleration during the journey is  $120 \text{ km/h}^2$ .
- ii. The distance covered during the time interval from 0.75 hr to 1 hr is 8.75 km.
- iii. During the time interval from 0 to 0.5 hrs, the train moves with constant velocity.
- a) Only (i) is correct. b) All (i), (ii) and (iii) are correct.
- c) Only (ii) is correct. d) Both (i) and (ii) are correct
12. Which of the following figures represent uniform motion of moving object correctly? [1]



12. Which of the following figures represent uniform motion of moving object correctly? [1]



13. What does the slope of the velocity-time graph give? [1]
- a) acceleration                      b) force
- c) displacement                      d) distance
14. A dancer is demonstrating dance steps along a straight line. The position-time graph of the dancer is given here. [1]



The average speed for the dance step depicted by CD is

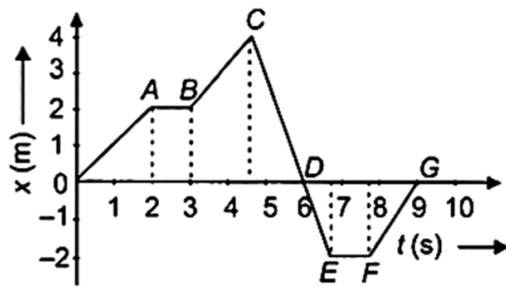
a)  $1 \text{ m s}^{-1}$

b)  $1.33 \text{ m s}^{-1}$

c)  $0.89 \text{ m s}^{-1}$

d)  $2.75 \text{ m s}^{-1}$

15. A dancer is demonstrating dance steps along a straight line. The position-time graph of the dancer is given here. [1]



The average velocity of the dancer during time interval  $t = 2 \text{ s}$  to  $t = 9 \text{ s}$  is

a)  $2.75 \text{ m s}^{-1}$

b)  $-0.29 \text{ m s}^{-1}$

c)  $-0.57 \text{ m s}^{-1}$

d)  $1 \text{ m s}^{-1}$

16. The area under the velocity-time graph gives the value of: [1]

a) velocity

b) acceleration

c) mass

d) distance travelled

17. **Assertion (A):** The graph between two physical quantities P and Q is a straight line when  $P/Q$  is constant. [1]

**Reason (R):** The straight-line graph means that P is proportional to Q or P is equal to constant multiplied by Q.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

18. **Assertion (A):** The position-time graph of a body moving uniformly in a straight line is parallel to position-axis. [1]

**Reason (R):** The slope of the position-time graph in a uniform motion gives the velocity of an object.

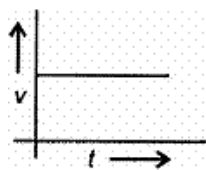
a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

19. From the given v-t graph, it can be inferred that the object is: [1]



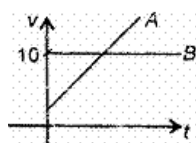
a) in non-uniform motion

b) at rest

c) Non of these

d) in uniform motion

20. The v-t graph shown here depicts the motion of A and B such that [1]



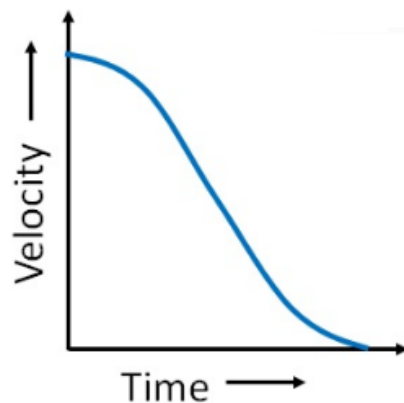
a) they collide when their velocity is  $10 \text{ ms}^{-1}$

b) both A and B have zero acceleration

c) both A and B have non-zero acceleration

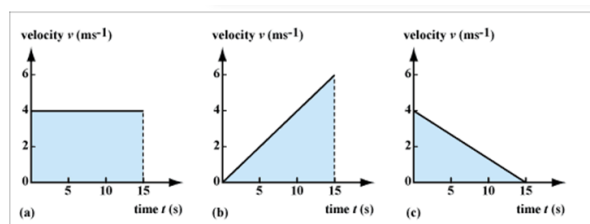
d) velocity of A exceeds beyond  $10 \text{ ms}^{-1}$

21. The graph shown in the image represents: [1]



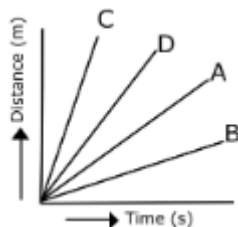
- a) Non-uniform retardation      b) Uniform retardation  
c) Non-uniform acceleration      d) Uniform acceleration

22. Which of the Velocity – Time graph shows uniform retardation? [1]



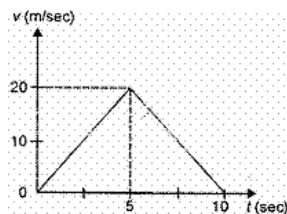
- a) b      b) a and b  
c) c      d) a

23. Four cars A, B, C and D are moving on a levelled road. Their distance-time graph is given as under. The correct statement is: [1]



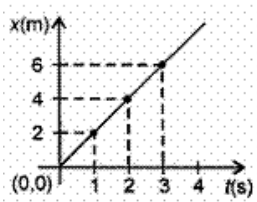
- a) Car B is slowest      b) Car C is slowest  
c) Car D is faster than Car C      d) Car A is slowest

24. The displacement of the body after 7.5 seconds from the beginning of the motion is [1]



- a) 12.5 m      b) 75 m  
c) 100 m      d) 87.5 m

25. The slope of the x-t graph is a measure of [1]



a) velocity =  $2\text{ms}^{-1}$

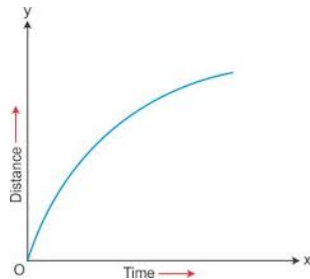
b) acceleration =  $2\text{ms}^{-2}$

c) acceleration =  $\frac{1}{2}\text{ms}^{-2}$

d) velocity =  $\frac{1}{2}\text{ms}^{-2}$

26. The given image shows a graph of distance travelled against time is a curved line. This graph is meant for:

[1]



a) Uniform acceleration

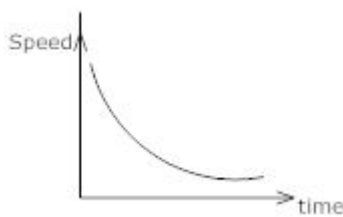
b) Uniform speed

c) Non-uniform speed

d) Non-uniform acceleration

27. The below graph represents

[1]



a) constant retardation

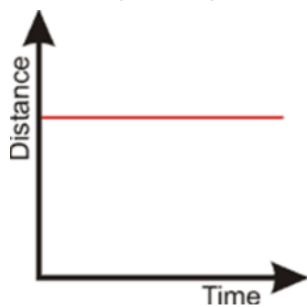
b) non – uniform retardation

c) constant acceleration

d) constant velocity

28. According to the given image of a Distance-Time graph, the speed of a moving body:

[1]



a) Decreases

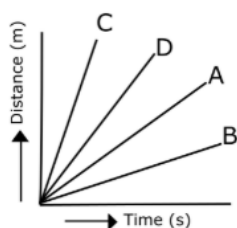
b) First increases and then decreases

c) Increases

d) Becomes zero

29. Four cars A, B, C and D are moving on the levelled road. Their distance-time graph is given as under. The correct statement is:

[1]



a) Car D is faster than Car C

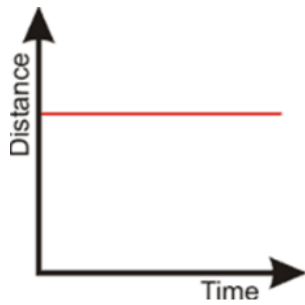
b) Car A is faster than car D

c) Car C is slowest

d) Car B is slowest

30. The given image of Distance – Time graph represents that

[1]



a) a body is travelling with non-uniform speed

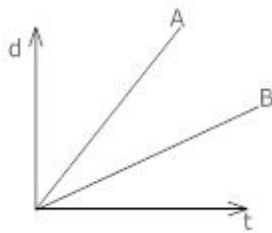
b) a body moving

c) a body stops moving

d) a body is travelling with uniform speed

31. Which of the following is correct about the following distance-time graph?

[1]



a) speed of A is equal to speed of B

b) None of these.

c) speed of A is greater than speed of B

d) speed of A is less than speed of B

32. Match the following with the correct response.

[1]

(a) Non- uniform motion	(i) The slope of the graph
(b) Speed from the distance-time graph	(ii) $\frac{\text{Initial velocity} + \text{Final velocity}}{2}$
(c) Distance covered from the speed-time graph	(iii) The area under the speed-time graph
(d) Average velocity	(iv) If a body covers unequal distances in equal intervals of time.

a) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)

b) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)

c) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)

d) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)

33. Match the following with the correct response:

[1]

(a) Graph showing uniform velocity	(i) Straight-line sloping upwards
(b) Graph showing uniformly accelerated velocity	(ii) Curved line
(c) Graph showing uniformly retarded	(iii) Straight-line sloping downwards
(d) Graph showing non-uniform motion	(iv) Straight-line parallel to the x-axis

a) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)

b) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)

c) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)

d) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)

34. Match the following with correct response.

[1]

Column A	Column B





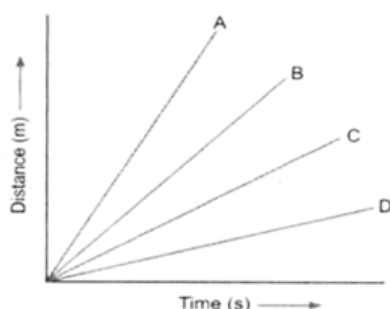
(b) \_\_\_\_\_ of a body can be obtained from the slope of the distance-time graph. [1]

44. Match the following Column A with Column B: [2]

Column A	Column B
(a) The variation in velocity with time for an object moving in a straight line	(i) Equation For Position – Time Relation
(b) The change in the position of an object with time	(ii) Equation For Position – Velocity Relation
(c) $2as = v^2 - u^2$	(iii) Distance – Time Graph
(d) $s = ut + \frac{1}{2} at^2$	(iv) Velocity – Time graph

45. Mention some uses of velocity time graphs. [2]

46. Four cars A, B, C and D are moving on a leveled road. Their distance versus time graphs are shown in figure. [2]  
Which car is the slowest?



47. What can you say about the motion of an object whose distance-time graph is a straight line parallel to the time axis? [2]

48. Draw a velocity versus time graph of a stone thrown vertically upward and then coming downwards after attaining the maximum height. [2]

49. What are the characteristics of distance-time graph for an object moving with a non-uniform speed? [2]

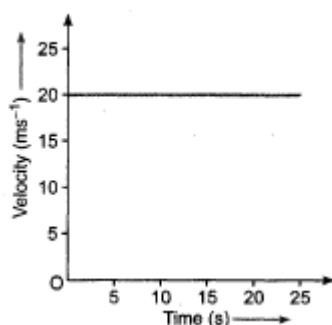
50. What is the nature of the distance time graphs for uniform and non-uniform motion of an object? [2]

51. The velocity-time graph shows the motion of a cyclist. Find [2]

i. its acceleration

ii. its velocity and

iii. the distance covered by the cyclist in 15 seconds.



### Section C

52. The velocity of a body in motion is recorded every second as shown- [3]

time (s)	0	1	2	3	4	5	6	7	8	9	10
velocity (m/s)	60	54	48	42	36	30	24	18	12	6	

Calculate the -

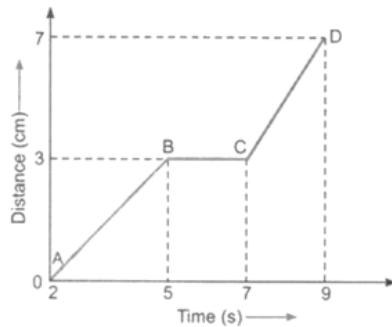
- acceleration
- distance travelled and draw the graph.

53. 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

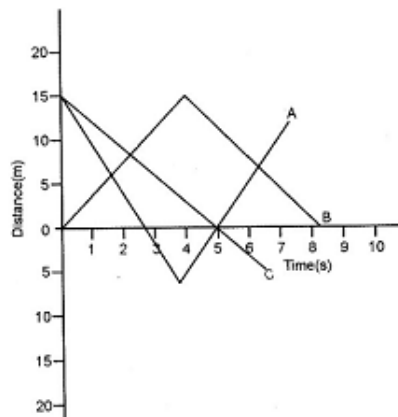
ii. B to C

iii. C to D

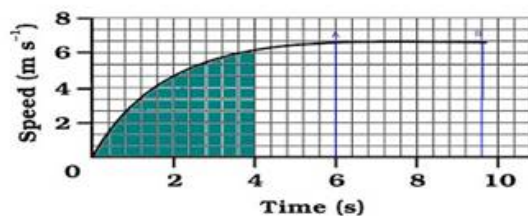


54. A driver of a car travelling at  $52 \text{ km h}^{-1}$  applies the brakes and accelerates uniformly in the opposite direction. The car stops in 5 s. Another driver going at  $3 \text{ km h}^{-1}$  in another car applies his brakes slowly and stops in 10 s. On the same graph paper, plot the speed versus time graphs for the two cars. Which of the two cars travelled farther after the brakes were applied? [3]

55. Discuss the graphs A, B and C shown in the figure. Compare the total distance travelled and the displacements. Which graph represents a motion with negative acceleration? [3]



56. The speed-time graph for a car is shown in Fig. [3]



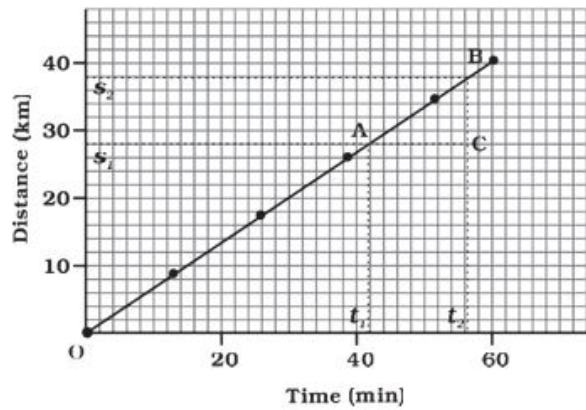
- Find how far does the car travel in the first 4 seconds? Shade the area on the graph that represents the distance travelled by the car during the period.
- Which part of the graph represents uniform motion of the car?

### Section D

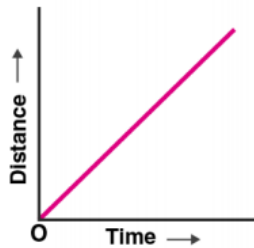
57. Read the passage and answer any four questions: [4]

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.

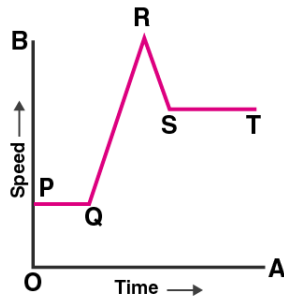


i. What conclusion can you draw about the speed of a body from the following distance-time graph?



- Uniform speed
  - Non-uniform speed
  - Uniform velocity
  - Non-uniform velocity
- ii. Which of the following statement is incorrect about the graphical representation of motion?
- A straight line graph helps in solving a linear equation
  - Line graphs show the dependence of one physical quantity
  - In the distance-time graph, time is taken along the y-axis
  - In the distance-time graph, distance is taken along the x-axis
- (I) and (II)
  - (II) and (III)
  - (II) and (IV)
  - (III) and (IV)
- iii. The area under a speed-time graph represents a physical quantity which has the unit of :
- m
  - $m^2$
  - $ms^{-1}$
  - $ms^{-2}$
- 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 :
- 8 m/s
  - 12 m/s
  - 16 m/s
  - 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?

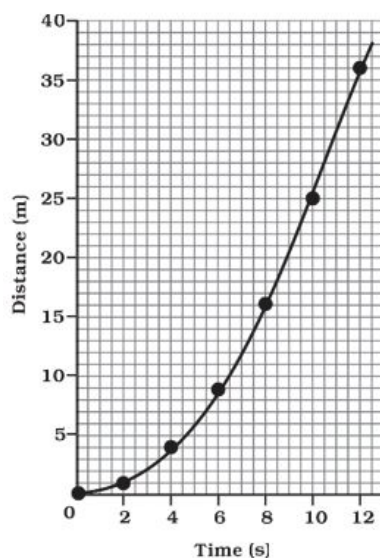


- The scooter has uniform speed in this section
- The distance travelled by scooter is the maximum in this section
- The distance travelled by scooter is the minimum in this section
- The distance travelled by scooter is zero in this section

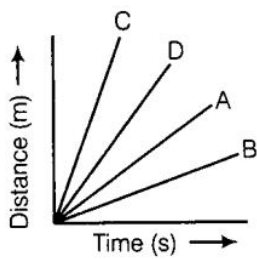
58. **Read the passage and answer any four questions:**

[4]

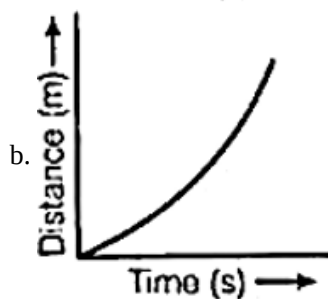
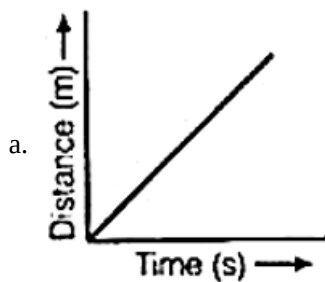
The change in the position of an object with time can be represented on the distance-time graph adopting a convenient scale of choice. In the distance-time graph, time is taken along the x-axis and distance is taken along the y-axis.

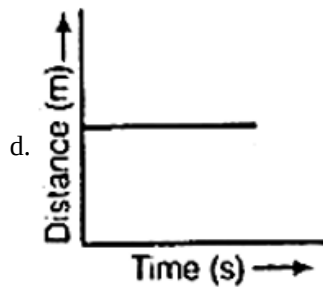
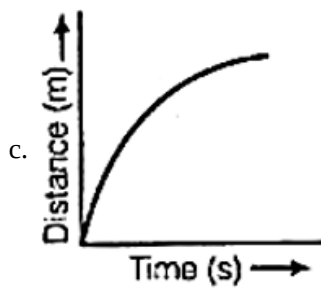


- A man travels a distance of 1.5 m towards East, then 2.0 m towards South and finally 4.5 m towards East. What is the total distance traveled?
  - 8m
  - 16m
  - 5m
  - 7m
- Four cars A, B, C and D are moving on a levelled road. Their distance versus time graphs are shown in the adjacent figure. Choose 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?

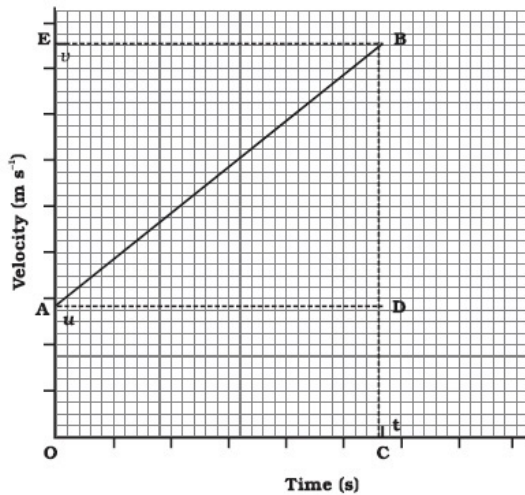




59. Read the following and answer any four questions:

[4]

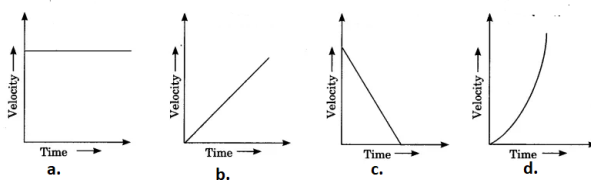
In the velocity-time graph of an object that moves under uniform acceleration as the initial velocity of the object is  $u$  (at point A) and then it increases to  $v$  (at point B) in time  $t$ . The velocity changes at a uniform rate  $a$ .



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

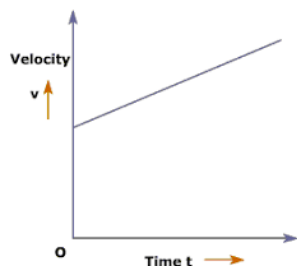
- less than one
- greater than one
- equal to one
- greater than or equal to one

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

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

- a. (I) and (II)
- b. (II) and (III)
- c. (IV) and (I)
- d. (III) and (IV)

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

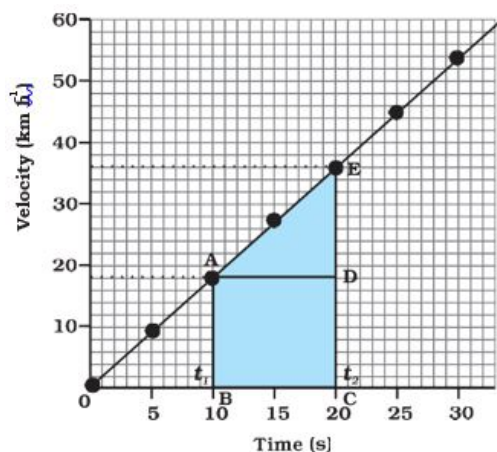


- a. is moving with uniform velocity
- b. has some initial velocity
- c. is moving uniformly with some initial velocity
- d. is at rest

60. Read the following and answer any four questions:

[4]

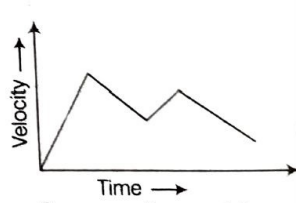
In the velocity-time graph for the motion of the car. The nature of the graph shows that velocity changes by equal amounts in equal intervals of time. For all uniformly accelerated motion, the velocity-time graph is a straight line.



- i. The slope of a velocity-time graph gives
  - a. the distance
  - b. the displacement
  - c. the acceleration
  - d. the speed
- ii. Which of the following statement is correct regarding the velocity and speed of a moving body?
  - a. The velocity of a moving body is always higher than its speed.
  - b. The speed of a moving body is always higher than its velocity.

- c. The speed of a moving body is its velocity in a given direction.  
 d. The velocity of a moving body is its speed in a given direction.

iii. The following graphs shows:

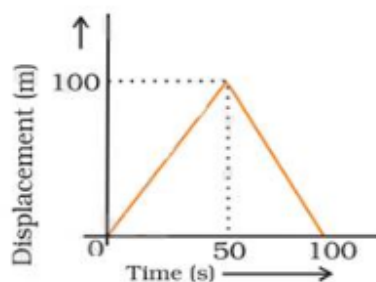


- a. uniformly accelerated motion  
 b. non-uniformly accelerated motion  
 c. non-uniformly decelerated motion  
 d. uniformly decelerated motion
- iv. If the displacement of an object is proportional to square of time, then the object moves with
- a. uniform velocity  
 b. uniform acceleration  
 c. 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

### Section E

61. A girl walks along a straight path to drop a letter in the letterbox and comes back to her initial position. Her displacement–time graph is shown in Fig. Plot a velocity-time graph for the same. [5]



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

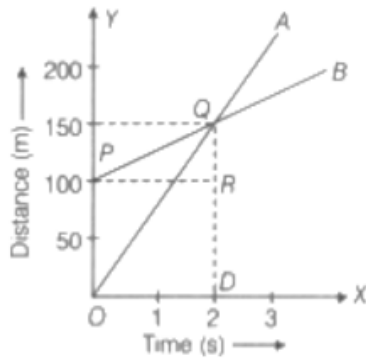
Time (s)	0	2	4	6	8	10	12	14	16
Displacement(m)	0	2	4	4	4	6	4	2	0

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

63. The distance-time graph of the two trains is shown in the figure. The trains start simultaneously in the same direction. [5]

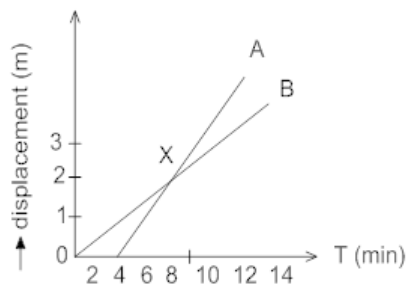


- i. How much A is ahead of B when the motion starts?
- ii. What is the speed of B?
- iii. When and where will A catch B?



- iv. What is the difference between speeds of A and B?
- v. Is the speed of both the trains uniform or non-uniform? Justify your answer.

64. Two boys A and B, travel along the same path. The displacement - time graph for their journey is given in the following figure: [5]

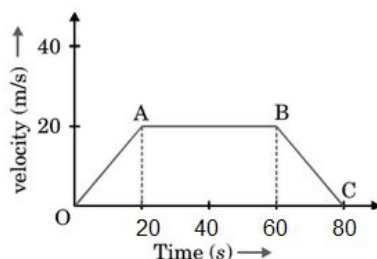


- a. How far down the road has B travelled when A starts the journey?
- b. Without calculation, the speed, state who is travelling faster A or B?
- c. What is the speed of A?
- d. What is the speed of B?
- e. Are the speed of A and B uniform?
- f. What does point X on the graph represent?
- g. What is the speed of approach of A towards B?
- h. What is the speed of separation of A from B?

65. Draw a distance-time graph for an object moving with uniform and non-uniform speed. [5]

66. The velocity-time graph of a body is shown in the following figure. [5]

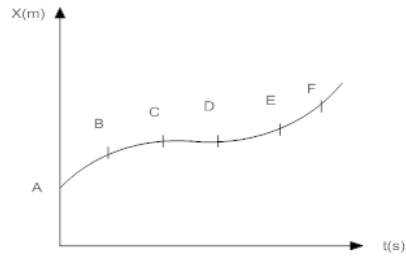
Answer the following questions:



- i. State the kind of motion represented by OA and AB
- ii. What is the velocity of the body after the 20s and after 80s?
- iii. Calculate the negative acceleration of the body.
- iv. Calculate the distance covered by the body between 20<sup>th</sup> and 60<sup>th</sup> seconds.

67. The displacement - time graph for a body is given below. State whether the velocity and acceleration of the body [5]

in the region BC, CD, DE and EF are positive, negative or zero.



68. How will you show that the slope of the displacement-time graph gives the velocity of the body? [5]

69. Give one example of each of the following situations: [5]

i. Uniformly accelerated motion.

ii. Motion with uniform retardation.

iii. Accelerated motion with uniform magnitude of velocity.

iv. Motion in a direction with acceleration in perpendicular direction.

v. Motion in which  $v$ - $t$  graph is a horizontal line parallel to  $X$ -axis.