Motion DPP - 1

1. What do you understand by the terms (i) rest (ii) motion? Support your answer by giving two examples each.

2. By giving an example, prove that rest and motion are relative terms.

3. Define (i) Scalar quantities (ii) Vector quantities. Give two differences between scalar and vector quantities.

4. Pick out the scalar and vector quantities from the following list:

a) mass **d)** distance **g)** temperature

b) density **e)** momentum **h)** time

c) displacement **f)** acceleration

5. Define **i)** Speed **ii)** velocity. Give two differences between speed and velocity.

6. Define **i)** Distance **ii)** Displacement. Give two differences between displacement and distance.

7. By giving one example each, define

a) variable velocity **c)** uniform velocity.

b) average velocity

8. What do you understand by the term acceleration? When is the acceleration i) positive ii) negative?

9. Define the term acceleration due to gravity. State its value in C.G.S. as well as in S.I. system. When is acceleration due to gravity **i)** positive **ii)** negative?

10. Give an example of a body which covers a certain distance, but its displacement is zero.

11. Give an example of an accelerated body, moving with a uniform speed.

12. What is the relation between distance and time when i) body is moving with uniform velocity ii) body is moving with variable velocity?

13. a) Distinguish between scalar and vector quantities.

b) State whether following are scalar or vector quantities.

i) speed **ii)** force **iii)** acceleration **iv)** energy

14. Copy the following table and fill in the blank spaces.

Quantity	**S.I. Unit**	**Scalar or Vector**
Displacement	……	…….
……..	Kgm^{-3}	…….

15. Draw a diagram to show the motion of a body whose speed remains constant. But velocity changes continuously.

NUMERICAL PROBLEMS

16. An aeroplane flies towards south and covers 324 km in 20 minutes. Calculate

i) Displacement of aeroplane

ii) Its velocity in a) kmh^{-1} b) ms^{-1}.

17. A car covers 90 km in $1\frac{1}{2}$ hours towards east. Calculate

i) displacement of car,

ii) its velocity in a) kmh^{-1} b) ms^{-1}.

18. A race horse runs straight towards north and covers 540 m in one minute. Calculate

i) displacement of horse,

ii) its velocity in a) ms^{-1} b) kmh^{-1}

19. The velocity of a car changes from 18 kmh^{-1} to 72 kmh^{-1} in 30 s. Calculate

i) change in velocity in ms^{-1}

ii) acceleration in a) kmh^{-2} b) ms^{-2}.

20. The change in velocity of a motor bike is 54 kmh^{-1} in one minute. Calculate its acceleration in

a) ms^{-2} b) kmh^{-2}

21. A speeding car changes its velocity from 108 kmh^{-1} to 36 kmh^{-1} in 4 s. Calculate its deceleration in a) ms^{-2} b) kmh^{-2}

Motion - Graphs DPP - 2

Select the correct option.

1. A graph is straight line parallel to the time axis in a distance- time graph. From the graph, it implies:

a) body is stationary

b) body is moving with a uniform speed

c) body is moving with a variable speed

d) none of these

2. The slope of displacement- time graph represents:

a) uniform speed

b) non-uniform speed

c) uniform velocity

d) uniform a acceleration

3. A body dropped from the top of a tower reaches the ground in 4s. Height of the tower is

a) 39.2m

b) 44.1 m

c) 58.8 m

d) 78.4 m

4. The speed of a car reduces from 15 m/s to 5 m/s over a displacement of 10 m. The uniform acceleration of the car is :

a) +10 m/s^2

b) 2 m/s^2

c) 0.5 m/s^2

d) -10 m/s^2

5. A body projected vertically up with a velocity 10 m/s reaches a height of 20 m. If it is projected with a velocity of 20 m/s, then the maximum height reached by the body is:

a) 20 m

b) 10 m

c) 80 m

d) 40 m

6. What does the area of an acceleration – time graph represent?

a) Uniform velocity

b) Displacement

c) Distance

d) Variable velocity

7. A driver applies brakes when he sees a child on the railway track, the speed of the train reduces from 54 km/h to 18km/h in 5 s. What is the distance travelled by the train during this interval of time?

a) 52 m

b) 50 m

c) 25 m

d) 80 m

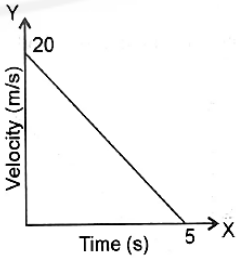
8. In velocity time graph, the acceleration is :

a) -4 m/s^2

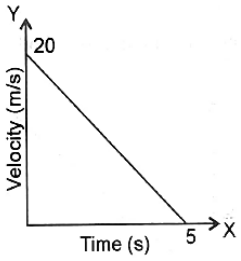
b) 4 m/s^2

c) 10 m/s^2

d) zero



9. The distance covered in adjoining velocity – time graph is:



- **a)** 25m
- **b)** 40 m
- **c)** 50 m
- **d)** 45 m

10. At the maximum height, a body thrown vertically upwards has:

- **a)** velocity not zero but acceleration zero.
- **b)** acceleration not zero but velocity zero.
- **c)** both acceleration and velocity are zero.
- **d)** both acceleration and velocity are not zero.

Subjective Questions

11. Draw displacement – time graphs for the following situations:

- **a)** When a body is stationary.
- **b)** When a body is moving with uniform velocity.
- **c)** When a body is moving with variable velocity.

12. Draw velocity- time graphs for the following situations:

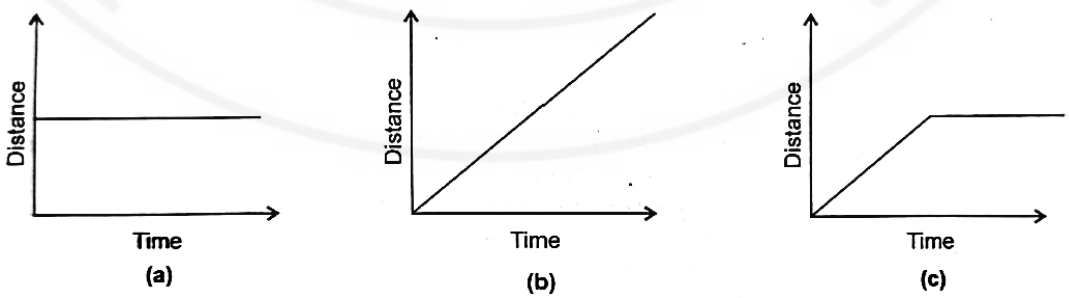
- **a)** When a body is moving with uniform velocity.
- **b)** When a body is moving with veriable velocity, but uniform acceleration.
- **c)** When a body is moving with veriable velocity, but uniform retardation.
- **d)** When a body is moving with veriable velocity, and veriable acceleration.

13. How can you find the following?

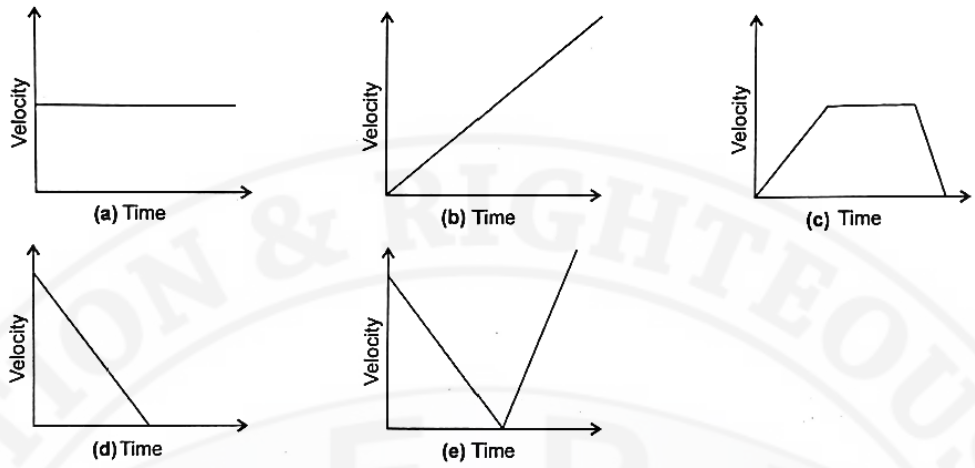
- **a)** Velocity from a displacement – time graph.
- **b)** Acceleration from velocity- time graph.
- **c)** Displacement from velocity-time graph.
- **d)** Velocity from acceleration- time graph.

14. What do you understand by the term acceleration due to gravity? What is its value in C.G.S. and S.I. systems?

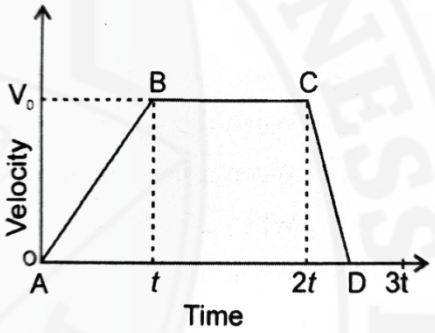
15. Can you suggest about the kind of motion of a body from the following distance-time graphs.



16. Can you suggest real life examples about the motion of a body from the following velocity- time graphs?



17. Diagram shows a velocity- time graph for a car starting from rest. The graph has three sections AB,BC and CD.



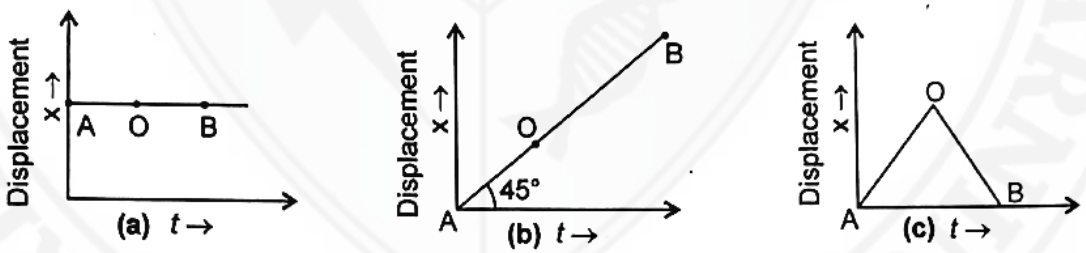
a) From a study this graph, state how the distance travelled in any section is determined.

b) Compare the distance travelled in section BC with distance travelled in section AB.

c) In which section, car has a zero acceleration?

d) Is the magnitude of acceleration higher or lower than that of retardation? Give reason.

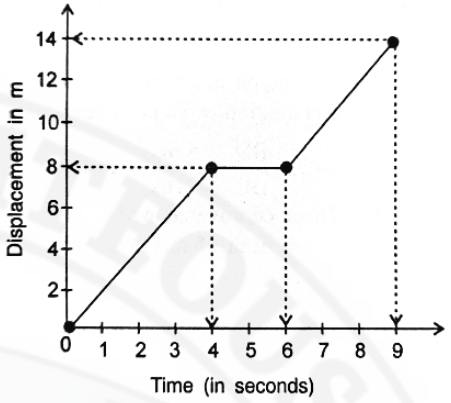
18. Write down the type of motion of a body along the A-O-B in each of the following distance-time graphs.



Motion - Graphs DPP - 3

NUMERICAL PROBLEMS

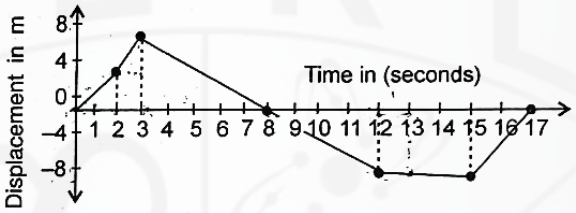
1. From the displacement-time graph given in fig. calculate



- **a)** Velocity between 0-4s.
- **b)** Velocity between 4s-6s.
- **c)** Velocity between 6s-9s.
- **d)** Average velocity between

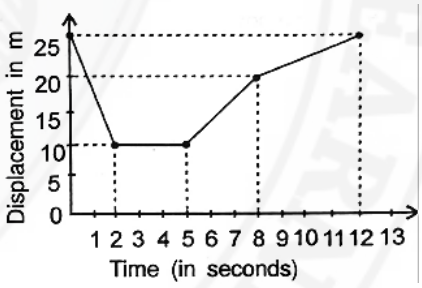
  a) 0 - 4s b) 0 - 6s c) 0 - 9s

2. From the displacement –time graph shown alongside calculate:



- **a)** Average velocity in first three seconds.
- **b)** Displacement from initial position at the end of 13s.
- **c)** Time after which the body is at the initial position.
- **d)** Average velocity after 8s**.**

3. From the displacement –time graph shown alongside calculate:



- **a)** Velocity between 0 - 2s.
- **b)** Velocity between 8s - 12s.
- **c)** Average velocity between 5s - 12s.

4. A cyclist is cycling at a uniform rate of 8 ms^{-1} for 8 seconds. He then stops pedalling and the cycle comes to rest in next ten seconds.

- **a)** Draw a velocity-time graph
- **b)** Calculate the average retardation.
- **c)** Distance covered with uniform velocity.
- **d)** Distance covered with variable velocity
- **e)** Average velocity of cyclist.

5. A train starting from rest, picks up a speed of 20 ms^{-1} in 200s. It continues to move at the same rate for next 500s, and is then brought to rest in another 100s.

- **I.** Plot a speed-time graph.
- **II.** From graph calculate

a) uniform rate of acceleration

b) uniform rate of retardation

c) Total distance covered before stopping

d) average speed.

6. A ball is thrown up vertically, and returns back to thrower in 6s. Assuming there is no air friction, plot a graph between velocity and time. From the graph calculate

a) deceleration

b) acceleration

c) Total distance covered by stone

d) average velocity.

7. A racing car is moving with velocity of 50m/s. On applying brakes, it is uniformly retarded and comes to rest in 20 seconds. Calculate its acceleration.

8. A body falls freely downward from a certain height. Show graphically the relation between the distance fallen and square of time. How will you determine 'g' from the graph?

9. A body at rest is thrown downward from the top of tower. Draw a distance-time graph of its free fall under gravity during first 3 seconds. Show your table of values starting t = 0 with an interval of 1 second. ($g = 10\ ms^{-2}$)

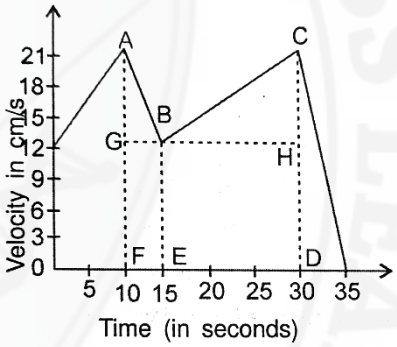
10. From the diagram, calculate:

a) Deceleration in region AB.

b) Acceleration in the region BC.

c) Total distance travelled in the region ABC

d) Average velocity between 10s and 30s.

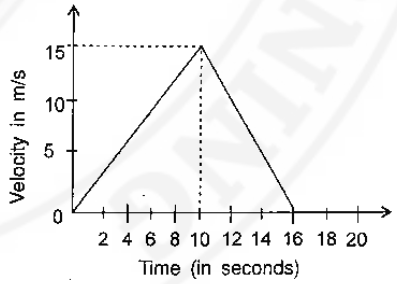


11. From the diagram given alongside, calculate

a) acceleration

b) deceleration

c) distance covered by body.



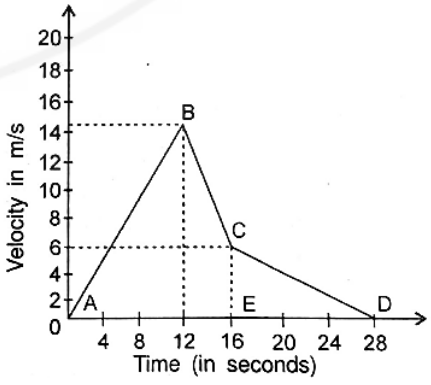
12. From the velocity – time graph given alongside, calculate:

a) Acceleration in the region AB

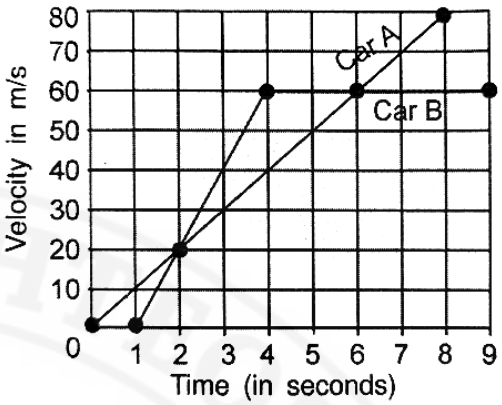
b) Deceleration in region BC.

c) Distance covered in the region ABCE.

d) Average velocity in region CED.



13. Diagram alongside shows a velocity – time graph of two cars A and B, which start from the same place and move along a straight road in the same direction. Calculate :



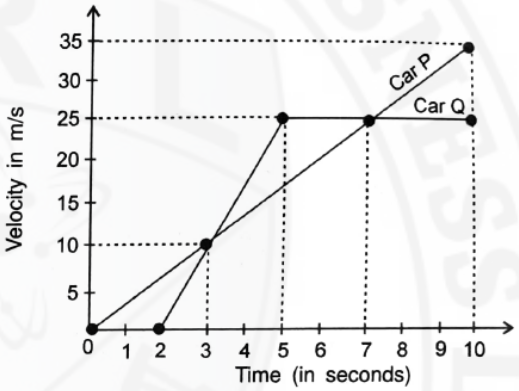
a) Acceleration of car A.

b) What is the acceleration of car B between 2s to 4s?

c) At what time intervals both cars have same velocity?

d) Which of the two cars is ahead after 8 seconds and by how much?

14. Diagram alongside shows velocity – time graphs of car P and Q, starting from same place and in same direction. Calculate :



a) Acceleration of car P.

b) Acceleration of car Q between 2s - 5s.

c) At what time intervals both cars have same velocity?

d) Which car is ahead after 10s and by how much?

Motion – Equations of Motions DPP - 4

1. A car initially at rest picks up a velocity of 72 kmh^{-1}, over a distance of 25 m. Calculate

a) acceleration of car **b)** time in which it picks up above velocity.

2. A motor bike, initially at rest, picks up a velocity of 72 kmh^{-1} over distance of 40 m. Calculate

a) acceleration **b)** time in which it picks up above velocity.

3. A cyclist driving at 5ms^{-1}, picks a velocity of 10 ms^{-1}, over a distance of 50 m. Calculate

a) acceleration **b)** time in which the cyclist picks up above velocity

4. An aeroplane lands with a velocity of 270 kmh^{-1} and comes to rest, after covering a runway of 1000m. Calculate :

a) retardation **b)** time in which aeroplane comes to rest.

5. An aeroplane lands at 216 km h^{-1} and stops after covering a runway of 2 km. Calculate the acceleration and the time, in which it comes to rest.

6. A truck running at 90 km h^{-1}, is brought to rest over a distance of 25 m. Calculate the retardation and time for which brakes are applied.

7. A car, initially at rest, picks up a velocity of 72 km h^{-1} in $\frac{1}{4}$ minute. Calculate

a) acceleration **b)** distance covered by car.

8. A racing car, initially at rest, picks up a velocity of 180 km h^{-1} in 4.5 s minute. Calculate

a) acceleration **b)** distance covered by car.

9. A motor bike running at 5 ms^{-1}, picks up a velocity of 30 ms^{-1} in 5 s. Calculate

a) acceleration **b)** distance covered during acceleration.

10. An aeroplane touches down at 225 kmh^{-1} and stops after 2 minutes. Calculate

a) acceleration **b)** length of runway.

11. A motor bike running at 90 kmh^{-1} is slowed down to 18 kmh^{-1} in 2.5 s. Calculate

a) acceleration

b) distance covered during slow down.

12. A cyclist driving at 36 km h^{-1} stops his motion in 2s, by the application of brakes. Calculate

a) retardation

b) distance covered during the application of brakes.

13. A car running at 72 km h^{-1} is slowed down to 18 km h^{-1} by the application of brakes over a distance of 20 m. Calculate deceleration of car. If the brakes are applied with the same force calculate.

a) total time in which car stops and

b) total distance covered by it.

14. A motor bike running at 90 kmh^{-1}, is slowed down to 54 kmh^{-1} by the application of brakes, over a distance of 40 m. If the brakes are applied with the same force, calculate

a) total time in which bike comes to rest

b) total distance travelled by bike.

15. A motor car slows down from 72 kmh^{-1} to 36 km h^{-1} over at distance of 25 m. If the brakes are applied with the same force calculate

a) total time in which car comes to rest

b) distance travelled by it.

16. A stone dropped from the top of a tower, takes 4 seconds to reach ground level. Calculate

a) Final velocity of stone

b) height of the tower (take g = $10ms^{-2}$)

17. A packet is dropped from a stationary helicopter, hovering at a height 'h' from ground level, reaches ground in 12s. Calculate

a) value of h

b) final velocity of packet on reaching ground. (Take g = 9.8 ms^{-2})

18. A boy drops a stone from a cliff, reaches the ground in 8 seconds. Calculate

a) final velocity of stone

b) height of cliff. (Take g = 9.8 ms^{-2})

19. A stone projected vertically upwards, takes 1.5 seconds to reach highest point. Calculate

a) initial velocity of stone and

b) maximum height attained by it. (Take g = 10 ms^{-2})

20. A stone thrown vertically upwards, takes 3s to attain maximum height. Calculate

a) initial velocity of the stone

b) maximum height attained by the stone. (Take g = 9.8 ms^{-2})

21. A stone thrown vertically upwards, takes 4 s to return to thrower. Calculate

a) initial velocity of the stone

b) maximum height attained by stone. (Take g = 10 ms^{-2})

22. A spaceship travelling in space at 300 km s^{-1}, fires its engine for 15 seconds, such that its final velocity is 600 km s^{-1}. Calculate the total distance travelled by the ship in one minute starting from the time of firing.

23. A spaceship is moving in space with a velocity of 50 km s^{-1}. Its engine fires for 10s, such that its velocity increases to 60 kms^{-1}. Calculate the total distance travelled by spaceship in $\frac{1}{2}$ minute, from the time of firing its engine.

24. A spaceship is moving in space with a velocity of 60 km s^{-1}. It fires its retro engines for 20 second and velocity is reduced to 55 kms^{-1}. Calculate the distance travelled by the spaceship in 40 s, from the time of firing of the retro – rockets.

Motion DPP - 5

1. A particle moves through a distance of 3 m due east and then 4 m due north.
   a) How much is the net distance?
   b) What is the magnitude of the net displacement?

2. A car covers 30 km in 30 minutes and the next 30 km in 40 minutes. Calculate the average speed for the entire journey.

3. A car covers 30km at a uniform speed of 30km/h. What should be its speed for the next 90 km if the average speed for the entire journey is 60km/h?

4. A boy runs for 10 min at a uniform speed of 9 km/h. At what speed should he run for the next 20 min so that the average speed comes to 12 km/h?

5. A particle was at rest from 9.00 a.m. to 9.30 a.m. It moved at a uniform speed of 10km/h from 9.30 a.m. to 10.00 a.m. Find the average speed between
   a) 9.00 a.m. and 20.00 a.m.,
   b) 9.15 a.m. and 10.00 a.m.

6. An insect moves along a circular path of radius 10cm with constant speed. If it takes 1 minute to move from a point on the path to the diametrically opposite point, find
   a) the distance covered,
   b) the speed,
   c) the displacement, and
   d) the average velocity.

7. The distance-time table for a car is given. Assuming that the car moved with uniform speed the indicated times, answer the following questions.
   a) Plot the graph of the distance travelled with time.
   b) During which period was the car travelling at the greatest speed?
   c) During which period was the car moving with the least speed?
   d) What is the average speed of the car between 10.05 a.m. and 11.00 a.m.?
   e) What is the average speed of the car for the entire journey?

8. A train is moving at a speed of 40 km/h at 10.00 a.m. and at 50 km/h at 10.02 a.m. Assuming that the train moves along a straight track and the acceleration is constant, find the value of the acceleration.

9. A particle with a velocity of 2m/s at t=0 moves along a straight line with constant acceleration of 0.2 m/s^2. Find the displacement of the particle in 10s.

10. A particle is pushed along a horizontal surface in such a way that it starts with a velocity of 12m/s. Its velocity decreases at a rate of 0.5m/s^2. A) Find the time it will take to come to rest. b) Find the distance covered by it before coming to rest.

11. A train accelerates from 20 km/h to 80 km/h in 4 minutes. How much distance does it cover in this period? Assume that the tracks are straight.

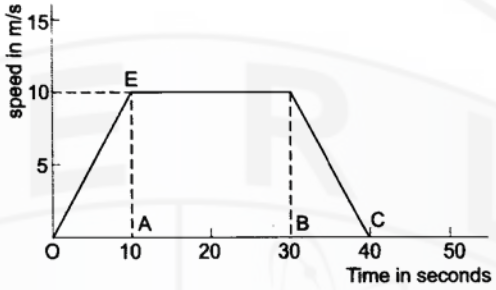
12. A car moving along a straight line at a speed of 54 km/h stops in 5 seconds after the brakes are applied.

a) Find the acceleration, assuming it to be constant.

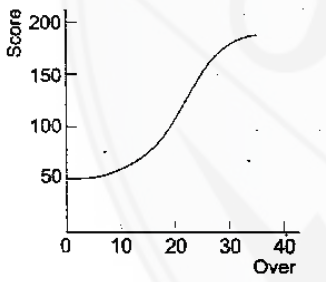
b) Plot the graph of speed versus time.

c) Using the graph, find the distance covered by the car after the brakes are applied.

13. Figure shows the speed –time graph of particle. Find the distance travelled in the time interval 0 to 40s.

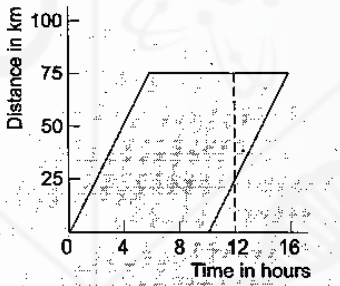


14. What is wrong in the following graphs?



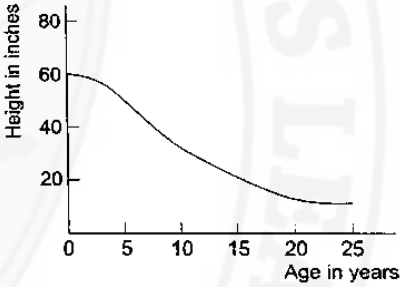
Score–over graph in a one-day cricket match

(a)



Distance–time graph for an object

(b)



Height–age graph for a person

(c)

15. The velocity-time graph of a particle moving along a straight line is shown in Figure

a) Is the motion uniform?

b) Is the acceleration uniform?

c) Does the particle change its direction of motion?

d) Find the distances covered from 0 to 4s and from 4 to 6s.