1. Motion

Very Short Answer Type Questions-Pg-19

1. Question

Is displacement a scalar quantity?

Answer

No, Displacement is a vector quantity because it has magnitude as well as direction.

2. Question

State whether distance is a scalar or a vector quantity.

Answer

distance is a scalar quantity since it does not depend on direction.

3. Question

Change the speed of 6 m/s into km/h.

Answer

Speed = 6m/s

To convert m into Km we divide it by 1000 and to convert s into hr we divide it by 3600

= (6 x 3600)/1000 = 21.6 Km/hr

4. Question

What name is given to the speed in a specified direction?

Answer

Velocity is a vector quantity hence it gives speed in a specified direction.

5. Question

Give two examples of bodies having non-uniform motion.

Answer

Two examples of bodies having non-uniform motion is

a. motion of car on a road

b. motion of an aeroplane

6. Question

Name the physical quantity obtained by dividing ‘Distance travelled’ by ‘Time Taken’ to travel that distance.

Answer

Speed is the physical quantity obtained by dividing ‘Distance travelled’ by ‘Time Taken’ to travel that distance

7. Question

What do the following measure in a car?

(a) Speedometer (b) Odometer

Answer

(a) speedometer measures instantaneous speed of the car.

(b) odometer is a device used to record the distance travelled by the car.

8. Question

Name the physical quantity which gives us an idea of how slow or fast a body is moving.

Answer

Speed is the physical quantity obtained by dividing ‘Distance travelled’ by ‘Time Taken’ to travel that distance

9. Question

Under what conditions can a body travel a certain distance and yet its resultant displacement by zero?

Answer

A body travel a certain distance and yet its resultant displacement by zero when the body comes back to its starting point.

10. Question

In addition to speed, what else should we know to predict the position of a moving body?

Answer

To predict the position of a moving body we should know the speed and direction of speed.

11. Question

When is a body said to have uniform velocity?

Answer

a body is said to have uniform velocity, when

1) Body covers equal distance in equal interval of time.

2) In particular direction

12. Question

Under which condition is the magnitude of average velocity equal to average speed?

Answer

the magnitude of average velocity is equal to average speed when body moves along a straight line path.

13. Question

Which of the two can be zero under certain conditions: average speed of a moving body or average velocity of a moving body?

Answer

Average velocity can be zero under certain conditions

14. Question

Give one example of a situation in which a body has a certain average speed but its average velocity is zero.

Answer

A car going from home to the market and then back home.

15. Question

What is the acceleration of a body moving with uniform velocity?

Answer

Acceleration = velocity/ time = 0/ time = zero

16. Question

What is the other name of negative acceleration?

Answer

The other name of negative acceleration is Deceleration.

17. Question

Name the physical quantity whose SI unit is :

(a) m/s (b) $ms/^2$

Answer

a) velocity/ speed – m/s

b) Acceleration or retardation – m/s^2

18. Question

What type of motion is exhibited by a freely falling body?

Answer

Uniformly accelerated motion is exhibited by a freely falling body.

19. Question

What is the SI unit of retardation?

Answer

Retardation is another name for acceleration and it is m/s^2

20. Question

Fill in the following blanks with suitable words:

(a) _____ is a vector quantity whereas _____is a scalar quantity.

(b) The physical quantity which gives both, the ___ and _____ of motion of a body is called its velocity.

(c) A motorcycle has a steady acceleration Of 3 m/s^2. This means that every second its ……increases by …… .

(d) _____ is the rate of change of displacement. It is measured in m/s.

(e) _____ is the rate of change of velocity . It is measured in …… .

Answer

a. Displacement, Distance

>Displacement depends on direction but distance does not.

b. speed, direction

>velocity = displacement/ time and is directional

c. speed, 3m/s

> acceleration = speed/time

d. Velocity

> Velocity is directional hence it is displacement/ time

e. Acceleration, m/s^2

>a = v/t

Short Answer Type Questions-Pg-20

21. Question

What type of motion, uniform or non-uniform, is exhibited by a freely falling body? Give reason for your

Answer

A freely falling body exhibits a non-uniform motion because it covers unequal distances in equal intervals of time.

22. Question

State whether speed is a scalar or a vector quantity. Give reason for your choice.

Answer

Speed is a scalar quantity as it has no direction but only magnitude.

23. Question

Bus X travels a distance of 360 km is 6 hours. Whereas bus Y travels a distance of 427 km in 7 hours. Which bus travels faster?

Answer

For bus X,

Speed= Distance/Time

Speed=360/6=60km/h

For bus Y,

Speed= Distance/Time

Speed=427/7=61 km/h

Speed of bus X is less than that of bus Y. Hence, bus Y travels faster.

24. Question

Arrange the following speeds in increasing order (keeping the least speed first) :

(i) An athlete running with a speed of 20 m/s.

(ii) A bicycle moving with a speed of 400 m/min.

(iii) A scooter moving with a speed of 60 km/h.

Answer

Speed of athelete = 20 m/s

Speed of bicycle = 400 m/min = 400/60 m/s = 6.66 m/s

Speed of scooter = 60 km/h = 60000/3600 m/s = 16.66 m/s

6.66 m/s < 16.66 m/s <20 m/s

i.e. 400 m/min < 60 km/h < 20 m/s

25 A. Question

Write the formula for acceleration. Give the meaning of each symbol which occurs in it.

Answer

Acceleration=

$$a = \frac{v - u}{t}$$

Where v = final velocity

U = initial velocity

T = time taken

25 B. Question

A train starting from railway Station attains a speed of 30 m/s in one minute. Find its acceleration.

Answer

Given: v = 30 m/s

u = 0 m/s

a = ?

Formula used: a = (v-u)/t

a = (30 m/s - 0)/60 sec

a = (30 m/s)/60s

a = $0.5m/s^2$

Therefore, the acceleration is $0.5m/s^2$

26 A. Question

What term is used to denote the change of velocity with time?

Answer

Acceleration is the term used to denote the change of velocity with time

26 B. Question

Give one word which means the same as ‘moving with a negative acceleration”.

Answer

Retardation means the same as ‘moving with a negative acceleration

26 C. Question

The displacement of a moving object in a given interval of time is zero. Would the distance travelled by the object also be zero? Give reason for your Answer

Answer

the distance travelled by the object will not be zero asdistance is a scalar quantity having magnitude only and no specified direction.

27. Question

A snail covers a distance of 100 metres in 50 hours. Calculate the average speed of snail in km/h.

Answer

According to Question we have:-Total Distance= 100 metresWe know that 1000 metres= 1 km

∴ 1 metres= $\frac{1}{1000}km$

∴ 100 metres= $\frac{100}{1000} = \frac{1}{10}km$

Average speed = $\frac{Total\ Distance}{Total\ Time\ Taken}$

= $\frac{\frac{1}{10}}{50} = \frac{1}{500} = 0.002km/hr$

28. Question

A tortoise moves a distance of 1000 metres in 15 mintues. What is the average speed of tortoise in km/h?

Answer

Given: Total distance=1000 m

Total time taken=15 minutes= 15/60=0.25 hour

formula used:

$$S_{average} = \frac{Total\ distance\ travelled}{Total\ time\ taken}$$

We know

1 km=1000 m

Total distance traveled=1 km1 hour=60 minutes15 minutes=0.25 hours

Total time taken=0.25 hoursputting the values of distance and time in the equation:

$$S_{average} = \frac{1\ km}{0.25\ h} = 4\ km/h$$

hence, the speed of tortoise is 4 km/h

29. Question

If a sprinter runs a distance of 1000 metres in 9.83 seconds, calculate his average speed in km/h

Answer

Total distance travelled=1000m

Total time taken = 9.83 sec

Average speed = Total distance travelled/ Total time taken

=1000/9.83 =101.72m/s

Averge speed in km/h:

101.72 x(3600/1000)=366.2 km/h

30. Question

A motorcyclist drives from place A to B with a uniform speed of 30 km h^{-1} and returns from place B to A with a uniform speed of 20 km h^{-1}. Find his average speed.

Answer

Given:

speed from a to b=30 km/hspeed from b to a=20 km/h

Formula used :

1.average speed $S_{avg} = \frac{Total\ Distance\ traveled}{Total\ time\ taken}$

let distance from a to b be "D"as we know

2. speed of an object $S = \frac{D}{T}$

where s is the speed of the objectd is the distance traveled by the objectt is the time taken by the object to travel distance D

putting the value of s a to b in equation $2D=30 \times T_1$ (3)

putting the value of s b to a in equation $2D =20 \times T_2$ (4)

using equation 3 and 4,

we get

$30 \times T_1 = 20 \times T_2 T_2 = 1.5 \times T_1$

The total distance traveled by the body is D+D =2 × D

The total time taken by the body is $T_1 + T_{2=} T_1 +1.5\times T_1= 2.5 \times T_1$

putting the value in equation 1 , we get

$$S_{avg} = \frac{2\times D}{2.5\times T_1} = \frac{2\times 30}{2.5} = 24\ km/h$$

The average speed of the object is 24 km/h

31. Question

A motorcyclist starts from rest and reaches a speed of 12 m/s after travelling with uniform acceleration for 6 s. What is his acceleration?

Answer

Initial velocity= 0m/s

Final velocity=12 m/s

Time= 6 sec

Acceleration =

$$\frac{\text{Final velocity} - \text{Initial velocity}}{\text{Time taken}}$$

$$\frac{(12-0)}{6} = \quad 2\ m/sec^2$$

32. Question

An aircraft traveling at 600 km/h accelerates steadily at 10 km/h per second. Taking the speed of sound as 1100 km/h at the aircraft's altitude, how long will it take to reach the 'sound barrier'?

Answer

According to the Question,We have:-Initial velocity, u = 600 km/h (Given)

Final velocity, v = 1100 km/h(Given)

Acceleration = 10 km/h/s

From relation, v = u+at,

On rearranging the terms, we get, v - u = at

or $t = \frac{v-u}{a}$

$$t = \frac{1100-600}{10} = \frac{500\frac{km}{hr}}{10\frac{km}{\frac{hr}{sec}}} = 50\ \text{sec}$$

∴ t = 50 secondsHence it will take the aircraft 50 seconds to reach the "sound barrier"

33. Question

If a bus travelling at 40 m/s is subjected to a steady deceleration of 5 m/s^2, how long will it take to come to rest?

Answer

Deceleration, a=-5m/s2

Initial velocity, u=40m/s

Final velocity, v=0m/s

t=?

$$a = \frac{v-u}{t}$$

$$-5 = \frac{0-40}{t}$$

$$t = \frac{40}{5} = 8 \text{ sec}$$

Long Answer Type Questions-Pg-21

34 A. Question

What is the difference between 'distance travelled' by a body and its 'displacement'? Explain with the help of a diagram.

Answer

Distance travelled is the actual length of the path covered by the body whereas displacement refers to the straight line path from the initial to the final positions.

A body goes from point A to B and then comes back to point A.

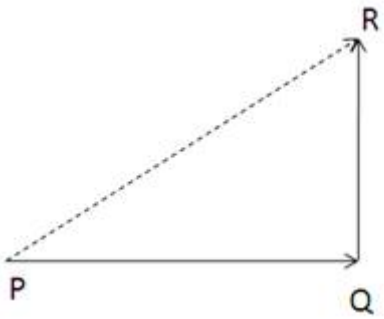
Distance = 200 m

Displacement = 0 m

34 B. Question

An ant travels a distance of 3 cm from P to Q and then moves a distance of 4 cm at right angles to PQ. Find its resultant displacement.

Answer



PQ=3cm

QR=4 cm

Resultant Displacement PR = sqrt (9 + 16)= 5 cm

35. Question

Define motion. What do you understand by the terms ‘uniform motion’? Explain with examples.

Answer

when the position of a body changes continuously with respect to a stationary object taken as reference point, the body is said to be in motion.

A body has uniform motion if it travels equal distances in equal intervals of time irrespective of the interval. Example: motion of earth around sun.

Non-uniform motion: A body has a non-uniform motion if it travels unequal distances in equal intervals of time. For example: dropping a ball from the roof of a tall building .

36 A. Question

Define speed. What is the SI unit of speed?

Answer

the distance travelled by a body per unit time is called speed. The SI unit of speed is m/s.

36 B. Question

What is meant by (i) average speed, and (ii) uniform speed?

Answer

(i) the total distance travelled divided by the total time taken to cover the distance by a body is called average speed.

(ii) A body has a uniform speed if it travels equal distance in equal intervals of time, irrespective of the interval of time.

37 A. Question

Define velocity. What is the SI unit of velocity?

Answer

the distance travelled by a body per unit time in a given direction is called velocity. SI unit of velocity is m/s.

37 B. Question

What is the difference between speed and velocity?

Answer

(i)

Speed	Velocity
scalar quantity	It is a vector quantity.
Speed of a body is distance travelled by it per unit time	It is the distance travelled by it per unit time in a given direction.
It is always positive	It can be both positive as well as negative.

37 C. Question

Convert a speed of 90 km/h into m/s.

Answer

90 km) x (1000 m / 1 km) x (1 hr / 60 min) x (1 min / 60 sec)= **25 meters / second**

38 A. Question

What is meant by the term ‘acceleration’? State the SI unit of acceleration.

Answer

Acceleration of a body is defined as the rate of change of its velocity with time. SI unit of acceleration is m/s^2.

Acceleration = Rate of change of velocity/ time

38 B. Question

Define the term ‘uniform acceleration’. Give one example of a uniformly accelerated motion.

Answer

uniform acceleration is the motion of a body in a straight line whose velocity increases by equal amounts in equal intervals of time. For example: Motion of a freely falling body.

39. Question

The distance between Delhi and Agra is 400 km. A train travels the first 200 km at a speed of 100 km/h. How fast must the train travel the next 200 km, so as to average 70 km/h for the whole journey?

Answer

total distance =400 km

average speed = 70 km/h

time taken = 400/70=40/7 h

1) During the first 200 km speed= 100 km/h time taken t_1 =200/100=2 h

2) During the second 200 km $t_1 + t_2 =$ 40/7

$2 + t_2 =$ 40/7

$t_{2=}$ 26/7 h

speed = distance / time= 200×7/26=1400/26 =53.84 km/h

The speed of train during second 200 Km is 53.84 km/h to maintain an average speed of 70 km/h

40. Question

A train travels the first 15km at a uniform speed of 30 km/h; the next 75 km at a uniform speed of 50 km/h; and the last 10 km at a uniform speed of 20 km/h. Calculate the average speed for the entire train journey.

Answer

(a) For the first partIn the first part, the train travels 15 km at a speed of 30 km h^{-1}

The speed of the train is given by

$$Speed,\ S = \frac{Distance\ travelled,\ D}{time\ taken,\ T}$$

We know the speed of train =30 km/h

The distance travelled by tain= 15 km

$$Time\ taken = \frac{Distance,\ D}{Speed,\ S}$$

Time taken by train in the first part, T_1=15/30=0.5 h

(b) For the second part

The distance, D= 75 km

The speed, S=50 km/h

Putting the values in the formula to calculate time taken

Time taken, T_2=75/50=1.5 h

(c) for the third part

The distance, D=10 km

The speed, S=20 km/h

Putting the values in the formula to calculate time taken

Time taken by train, $T_3=10/20=0.5$ h.

$$Average\ Speed,\ S = \frac{Total\ distance\ travelled}{Total\ time\ taken}$$

Total distance travelled by train= 15 +75+10 =100 km

Total time taken by train=$T_1+T_2+T_3$ =0.5 +1.5+0.5=2.5 h

Putting the values in the above formula, we get

Average speed, S=100/2.5=40 km h^{-1}

41. Question

A car is moving along a straight road at a steady speed. It travels 200 m in 5 seconds :

(a) What is its average speed?

(b) How far does it travel in 1 second?

(c) How far does it travel in 6 seconds?

(d) How long does it take to travel 240 m?

Answer

(a) Average speed, $v_{av}=\frac{\text{Total distance travelled}}{\text{Total time taken}}=\frac{200}{5}=40$ m/s

(b) Time=1s

Distance = v_{av} x time = 40 x 1 = 40 m/s

(c) Time=6s

Distance = v_{av} x time = 40 x 6 = 240m/s

(d) Distance=240m

$\text{Time}=\frac{\text{Distance}}{v_{av}}=\frac{240}{30}=8$s

Multiple Choice Questions (MCQs)-Pg-21

42. Question

A particle is moving in a circular path of radius *r*. The displacement after a circle would be:

A. 0

B. p*r*

C. 2*r*

D. 2p*r*

Answer

Displacement is directional.

43. Question

The numerical ratio of displacement to distance for a moving object is :

A. < 1

B. = 1 or > 1

C. > 1

D. = 1 or < 1

Answer

displacement to distance for a moving object is equal or less than 1

44. Question

A boy is sitting on a merry-go-round which is moving with a constant speed of 20 ms^{-1}. This means that the boy is :

A. at rest

B. moving with no acceleration

C. in accelerated motion

D. moving with uniform velocity

Answer

constant speed gives accelerated motion.

45. Question

In which of the following cases of motion, the distance moved and the magnitude of displacement are equal?

A. if the car is moving on straight road

B. if the car is moving on circular road

C. if the pendulum is moving to and fro

D. if a planet is moving around the sun

Answer

the distance moved and the magnitude of displacement are equal if the car is moving on straight road

46. Question

The speed of a moving object is determined to be 0.12 m/s. This speed is equal to :

A. 2.16 km/h

B. 1.08 km/h

C. 0.432 km/h

D. 0.0216 km/h

Answer

0.12m/s x 3600/1000 = 0.432 Km/hr

47. Question

A freely falling object travels 4.9 m in 1^{st} second, 14.7 m in 2^{nd} second, 24.5 m in 3^{rd} second, and so on. This data shows that the motion of a freely falling object is a case of:

A. uniform motion

B. uniform acceleration

C. no acceleration

D. uniform velocity

Answer

increase in velocity is with increase in time.

48. Question

When a car runs on a circular track with a uniform speed, its velocity is said to be changing. This is because:

A. the car has a uniform acceleration

B. the directions of car varies continuously.

C. the car travels unequal distances in equal time intervals

D. the car travels equal distances in unequal time intervals

Answer

Velocity is vector quantity.

49. Question

Which of the following statement is correct regarding velocity and speed of a moving body?

A. velocity of a moving body is always higher than its speed

B. speed of a moving body is always higher than its velocity

C. speed of a moving body is its velocity in a given direction

D. velocity of a moving body is its speed in a given direction.

Answer

velocity is a vector quantity.

50. Question

Which of the following can sometimes be ‘zero’ for a moving body?

(i) average velocity

(ii) distance travelled

(iii) average speed

(iv) displacement

A. only (i) B. (i) and (ii)

C. (i) and (iv) D. only (iv)

Answer

velocity and displacement are directional.

51. Question

When a car driver travelling at a speed of 20 m/s applies brakes and brings the car to rest in 40 s, then retardation will be :

A. + 2 m/s^2

B. -2 m/s^2

C. - 0.5 m/s^2

D. + 0.5 m/s^2

Answer

a = v/t

52. Question

Which of the following could not be a unit of speed?

A. km/h B. s/m

C. m/s D. mm s^{-1}

Answer

speed = distance /time

53. Question

One of the following is not a vector quantity. This one is :

A. displacement B. speed

C. acceleration D. velocity

Answer

displacement , acceleration and velocity are vector quantity.

54. Question

Which of the following could not be a unit of acceleration?

A. km/s^2

B. $cm\ s^2$

C. km/s

D. $m/\ s^2$

Answer

$a = v/t = distance / s^2$

Questions Based on High Order Thinking Skills (HOTS)-Pg-22

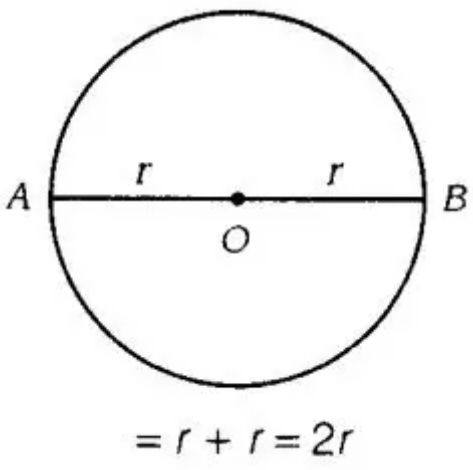
55. Question

A body is moving along a circular path of a radius *R*. What will be the distance travelled and displacement of the body when it completes half a revolution?

Answer

When the body is completing half a revolution of a circular path of radius r then the:-Distance traveled in half a rotation of a circular path is equal to the circumference of semi-circle= $\frac{2\Pi r}{2} = \Pi r$

Displacement is known as the shortest distance between two points,as we can see the figure the shortest distance between point A and point B is along the diameter of the circle thus displacement is **2r**



56. Question

If on a round trip you travel 12 km and then arrive back home:

(a) What distance have you travelled?

(b) What is your final displacement?

Answer

(i) Distance travelled = 12 km

(ii) Displacement = zero (since final position is same as initial position)

57. Question

A body travels a distance of 3 km towards East, then 4 km towards North and finally 9 km towards east.

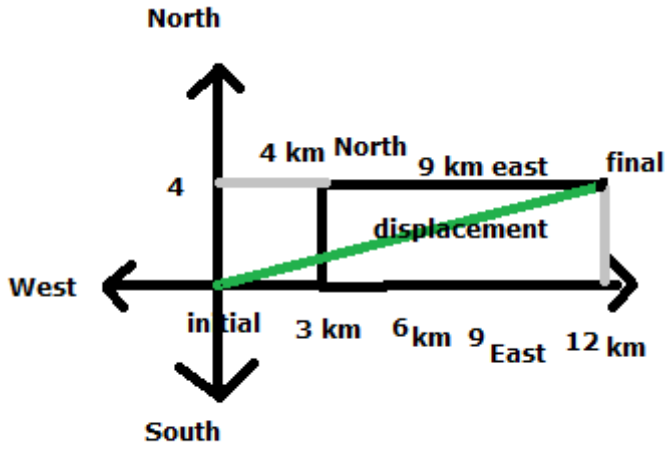
(i) What is the total distance travelled?

(ii) What is the resultant displacement?

Answer

1) Total distance =3+ 4 + 9 = 16 Km

2) Total displacement = 12.6 km



The net displacement in east direction is 3+9=12 km

The net displacement in north direction is 4 km

The net displacement in south and west direction is zero

Using,

pythagorean theoremdisplacement(d)=$\sqrt{(12^2+ 4^2)}=\sqrt{(144+16)}=\sqrt{(160)}$=12.6 km

Hence, The displacement of body is 12.6 km in north-east direction

58. Question

A boy walks from his classroom to the bookshop along a straight corridor towards North. He covers a distance of 40 m in 50 seconds to reach the bookshop. After buying a book, he travels the same distance in

the same time to reach back in the classroom. Find (a) average speed, and (b) average velocity, of the boy

Answer

(a) Total distance covered in going to the bookshop and coming back to the classroom = 40 + 40 = 80m

Total time taken= 50 + 50 = 100sec

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}} = 80/100 \text{ m/s} = 0.8 \text{ m/s}$$

$$\text{(b) Average velocity} = \frac{\text{Total displacement}}{\text{Total time}} = 0/100 \text{ m/s} = 0 \text{ m/s}$$

59. Question

A car travels 100 km at a speed of 60 km/h and returns with a speed of 40 km/h. Calculate the average speed for the whole journey.

Answer

In the first case, car travels at a speed of 60 km/h for a distance of 100 km

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$t_1 = \frac{100}{60}$$

In the second case, car travels at a speed of 40 km/h for a distance of 100 km

$$t_2 = \frac{100}{40}$$

Total distance travelled = 200

Total Time Taken= t_1+t_2

$$= \frac{100}{60} + \frac{100}{40} = \frac{500}{120}$$

$$Average\ Speed = \frac{Total\ Distance}{Total\ Time\ Taken} = \frac{200}{\frac{500}{120}} = \frac{200 \times 120}{500} = 48km/$$

60. Question

A ball hits a wall horizontally at 6.0 m/s^{-1}. It rebounds horizontally at 4.4 $m\ s^{-1}$. The ball is in contact with the wall for 0.040 s. What is the acceleration of the ball?

Answer

According to the Question:-

Initial velocity, u=6m/s

Final velocity ,v=(-4.4m/s) (the ball rebounds in opposite direction)

Time, t = 0.040 s

We know that **v= u+at**

$$\therefore Acceleration = \frac{v-u}{t} = \frac{-4.4-6}{0.040} = \frac{(-10.4)}{0.040} = -260 ms^{-2}$$

Very Short Answer Type Questions-Pg-39

1 A. Question

What remain constant in uniform curcular motion?

Answer

Speed remains constant in uniform circular motion.

1 B. Question

What change continuously in uniform circular motion?

Answer

Direction (of motion) change continuously in uniform circular motion.

2. Question

State whether the following statement is true of false:

Earth moves round the sun with non- uniform velocity.

Answer

True

3. Question

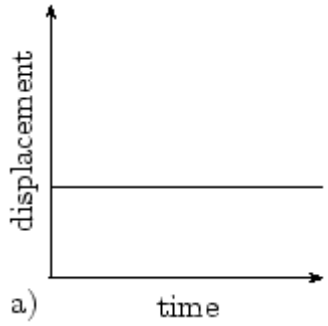
A body goes round the sun with constant speed in a circular orbit. Is the motion uniform or accelerated?

Answer

the motion is accelerated when a body goes round the sun with constant speed in a circular orbit

4. Question

What conclusion can you draw about the velocity of a body from the displacement-time graph shown below :



Answer

It shows the graph for an object stationary over a period of time. The gradient is zero, so the object has zero velocity.

5. Question

Name the quantity which is measured by the area occupied under the velocity-time graph.

Answer

the quantity which is measured by the area occupied under the velocity-time graph is distance travelled.

6. Question

What does the slope of a speed-time graph indicate?

Answer

the slope of a speed-time graph indicate acceleration.

7. Question

What does the slope of a distance-time graph indicate?

Answer

the slope of a distance-time graph indicates speed.

8. Question

Give one example of a motion where an object does not change its speed but its direction of motion changes continuously.

Answer

The example of a motion where an object does not change its speed but its direction of motion changes continuously is the motion of moon around the earth

9. Question

Name the type of motion in which a body has a constant speed but not constant velocity.

Answer

the type of motion in which a body has a constant speed but not constant velocity is Uniform circular motion.

10. Question

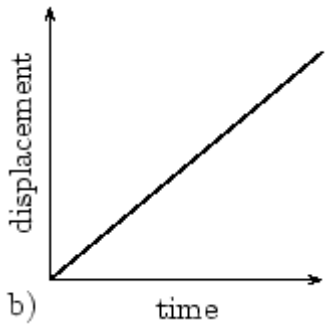
What can you say about the motion of a body if its speed-time is a straight line parallel to the time axis?

Answer

When the motion of a body if its speed-time is a straight line parallel to the time axis the speed of body is constant.

11. Question

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

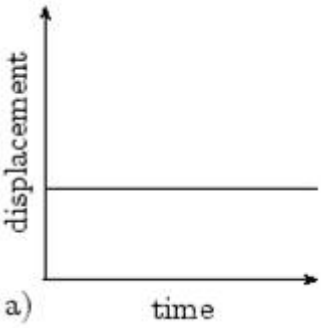


Answer

It shows the graph for an object moving at a constant velocity. You can see that the displacement is increasing as time goes on. The gradient, however, stays constant (remember: its the slope of a straight line), so the velocity is constant. Here the gradient is positive, so the object is moving in the direction defined as positive.

12. Question

What can you say about the motion of a body whose distance time graph is a straight line parallel to the time axis?

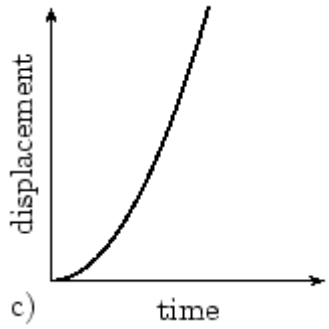


Answer

It shows the graph for an object stationary over a period of time. The gradient is zero, so the object has zero velocity.

13. Question

What conclusion can you draw about the acceleration of a body from the speed time graph shown below?



Answer

It shows the graph for an object moving at a constant acceleration. You can see that both the displacement and the velocity (gradient of the graph) increase with time. The gradient is increasing with time, thus the velocity is increasing with time and the object is accelerating.

14. Question

A satellite goes round the earth in a circular orbit with constant speed. Is the motion uniform or accelerated?

Answer

The motion is accelerated.

15. Question

What type off motion is represented by the tip of 'seconds' hand' of watch? Is it uniform or accelerated?

Answer

Accelerated motion is represented by the tip of 'seconds' hand' of watch? Is it uniform or accelerated

16. Question

Fill in the following blanks with suitable words :

(a) If a body moves with _____, its acceleration is zero

(b) The ___ of a distance time graph indicates speed of a moving body.

(c) The slope of a _____graph of a moving body gives its acceleration

(d) In a speed-time graph, the area enclosed by the speed-time curve and the time axis gives the ……by the body.

(e) It is possible for something to accelerate but not change its speed if it moves in a ……

Answer

(a) uniform velocity

(b) slope

(c) speed-time

(d) distance travelled

(e) circular path

Short Answer Type Questions-Pg-41

17. Question

Is the uniform circular motion accelerated? Give reasons for your Answer.

Answer

Yes as the velocity changes due to continuous change in the direction of motion

18. Question

Write the formula to calculate the speed of a body moving along a circular path. Give the meaning of each symbol which occurs in it.

Answer

the formula to calculate the speed of a body moving along a circular path is

$$v = \frac{2\pi r}{t}$$

⇒ speed of a body = (2 x constant x radius of the circular path) / (time taken for one round of circular path)

19. Question

Explain why, the motion of a body which is moving with constant speed in a circular speed in a circular path is said to be accelerated.

Answer

Due to the continuous change in the velocity there is a continuous change in the direction of motion because of which the motion of a body which is moving with constant speed in a circular path is said to be accelerated.

20. Question

What is the difference between uniform linear motion and uniform circular motion? Explain with examples.

Answer

Uniform linear motion	Uniform circular motion
It is uniform motion along a linear path or a straight line	is uniform motion along a circular path
The direction of motion is fixed	The direction of motion changes continuously
it is not accelerated	it is accelerated
e.g.: a car running with uniform speed of 10km/hr on a straight road.	For e.g.: motion of earth around the sun.

21. Question

State an important characteristic of uniform circular motion. Name the force which brings about uniform circular motion.

Answer

An important characteristic of uniform circular motion is that

a. The direction of motion in it changes continuously with time.

b. It is accelerated.

The force which brings about uniform circular motion is Centripetal force

22. Question

Find the initial velocity of a car which is stopped in 10 seconds by applying brakes. The retardation due to brakes is 2.5 m/s^2.

Answer

t = 10 sec

a = -2.5 m/ s^2

v = 0 m/s

v-u = at

On applying the formula, we get

u = 25m/s

23. Question

Describe the motion of a body which is accelerating at a constant rate of 10 ms^2. Calculate the speed of the motorcycle after 10 seconds, and the distance travelled in this time.

Answer

a = 10m/s^2

T = 10 sec

On calculating we get, that the velocity of this body is increasing at a rate of 10 metres per second.

On applying the formula, we get d = 20m

24. Question

A motorcycle moving with a speed of 5 m/s is subjected to an acceleration of 0.2 m/s^2. Calculate the speed of the motorcycle after 10 seconds, and the distance travelled in this time.

Answer

According to the Question,

u = 5m/s

a = 0.2 m/s^2

t = 10 sec

v= ?s=?

We know that **v= u+at**, Putting the values in the equation,we get:-

v= 5+(0.2)x10∴ **v= 7 m/s**

We know that $\mathbf{v^2-u^2= 2as}$, Putting the values in the equation, we get:-

$(7)^2-(5)^2$= 2x(0.2)x s

49-25= 0.4s∴ **s =** $\frac{24}{0.4} = 60m$

25. Question

A bus running at a speed of 18 km/h is stopped in 2.5 seconds by applying brakes. Calculate the retardation produced.

Answer

u (initial velocity) = 18 Km/hr

$$\Rightarrow \frac{18 \times 1000}{60 \times 60} = 5\ m/s$$

t (time)= 2.5 sec

v(final velocity) = 0 m/s

from, the first equation of motionv = u + a×t0 = 5 + a×2.5a = - 2 m/s^2

26. Question

A train starting from rest moves with a uniform acceleration of 0.2 m/s^2 for 5 minutes. Calculate the speed acquired and the distance travelled in this time.

Answer

A = 0.2 m/s^2(Given)

T = 5 mins(Given)

We know 1 Minute= 60 seconds∴ 5 Minute= 300 seconds

U = 0 m/s(As the train is starting from rest)

On applying the formula **v= u+at** we get

v= 0+ 0.2m/s^2×300 secondsv

= 60 m/s

On applying the formula $\mathbf{v^2 - u^2 = 2as}$ we get

$(60)^2$-$(0)^2$= 2×0.2×s

$$s = \frac{60 \times 60}{2 \times 0.2}$$

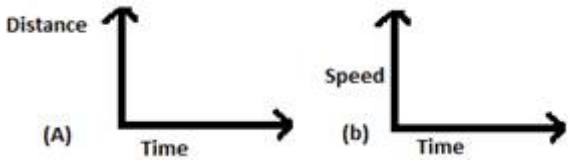
=9000ms= 9km

27. Question

Name the two quantities, the slope of whose graph gives :

(a) speed, and (b) acceleration

Answer



28. Question

A cheetah starts from rest, and accelerates at 2 m/s^2 for 10 seconds. Calculate :

(a) the final velocity

(b) the distance travelled.

Answer

Given:

a is the acceleration of the cheetah = $2m/s^2$

t is the time period for which cheetah is accelerating = 10 sec

u is the initial velocity of the cheetah = 0 m/s

Formula used:

1. Final velocity "v"= u + a × t

where

v is the final velocity of the cheetahu is the initial velocity of the cheetaha is the acceleration of the cheetaht is the time period

2. third equation of motion

$v^2 - u^2 = 2 \times a \times s$

where,v is the final velocityu is the initial velocitya is the acceleration of the bodys is the displacement

putting the value of u,a, t in the equation(1)

$v = 0 + 2 \times 10 = 20$ m/s

putting the value of v,a,s in equation(2)

$400 - 0 = 2 \times 2 \times s$

s=100 m

The final velocity after 10 s will be 20 m/s and the displacement will be 100 m

=-Using the formula, we calculate distance travelled as 100m.

29. Question

A train travelling at 20 m s^{-1} accelerates at 0.5 m s^{-2} for 30 s. How far will it travel in this time?

Answer

Given:

u = 20 m/sa = 0.5 m/s^2

t = 30 s

d= __ m

Formula:using, Second equation of motion

$$d = u \times t + \frac{a \times t^2}{2}$$

$$d = 20 \times 30 + \frac{0.5 \times 30^2}{2}$$

d = 600 + 225 = 825 m

30. Question

A cyclist is travelling at 15 m s^{-1}. She applies brakes so that she does not collide with a wall 18 m away. What deceleration must she have?

Answer

According to the Question we have :-

u = 15m/s (Given)

s = 18m (Given)

v = 0 (As she is applying brakes and coming to stop)

Using the Formula $v^2 - u^2 = 2as$

Putting the values we get:-$(0)^2-(15)^2 = 2xax18$

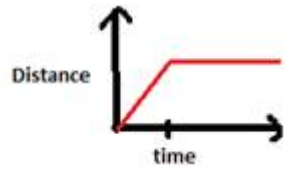
-225= 36xa∴ a= $\frac{-225}{36} = (-6.25)\ m/s^2 (as\ its\ deceleration)$

31. Question

Draw a velocity-time graph to show the following motion :

A car accelerates uniformly from rest for 5 s; then it travels at a steady velocity for 5 s.

Answer



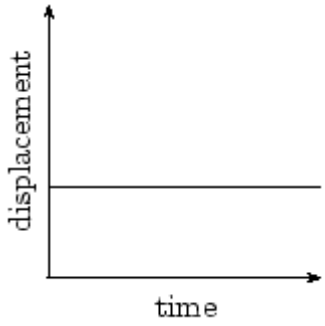
32. Question

The velocity-time graph for part of a train journey is a horizontal straight line. What does this tell you about

(a) the train's velocity, and

(b) about its acceleration?

Answer



a. it has uniform velocity

b. it has no acceleration. As v/t = 0

Long Answer Type Questions-Pg-41

33 A. Question

Explain the meaning of the following equation of motion :

$v = u + at$

where symbols have their usual meanings.

Answer

final velocity is equal to sum of the initial velocity and product of acceleration and time.

33 B. Question

A body starting from rest travels with uniform acceleration. If it travels 100 m in 5 s, what is the value of acceleration?

Answer

According to Question we have :-

s=100m(Given)

t = 5 sec

u=0 (As the body is starting from rest)

We know that :- $s = ut + \frac{1at^2}{2}$

Putting the values in the above equation we get:

$$100 = 0 \times 5 + \frac{1 \times a \times 5^2}{2}$$

$$100 = \frac{25a}{2}(Cross\ Multiplying)$$

$$\frac{200}{25} = a$$

$$\therefore\ a = 8\ m/s^2$$

34 A. Question

Derive the formula : *v* = *u* + *at*; where

the symbols have usual meanings.

Answer

Consider a body of mass “m” having initial velocity “u”.Let after time “t” its final velocity becomes “v” due to uniform acceleration “a”.

Now we know that:

Acceleration = change in velocity/Time taken

=> Acceleration = Final velocity-Initial velocity / time taken

=> a = v-u /t

=>at = v-u

or v = u + atThis is the first equation of motion.

34 B. Question

A bus was moving with a speed of 54 km/h. On applying brakes it stopped in 8 seconds. Calculate the acceleration.

Answer

According to the Question we know:-

u = 54 Km/hr

(Given)

(We know that 1km=1000m and 1hr= 60x60 seconds)u= $\frac{54 \times 1000}{60 \times 60} = 15m/s$

t = 8 sec(Given)

v = 0 m/s(As the bus is coming to rest)

We know that v= u+at,Putting the values in the equation we get:-

0= 15+8a

⇒ (-15)= 8a

∴ a= (-1.875 ms^{-2})

35 A. Question

Derive the formula: $s = ut + \frac{1}{2}at^2$,where the symbols have usual meanings.

Answer

Let the distance traveled by the body be “s”.

We know that, Distance = Average velocity × Time

Also, Average velocity = $\frac{u+v}{2}$

.: Distance (s) = $\frac{u+v}{2} \times t$ …….eq.(1)

Again we know that:

v = u + at substituting this value of “v” in eq.(1),

we get

s = $\frac{u+u+at}{2} \times t$

s = $\frac{2u+at}{2} \times t$

s = $\frac{2ut+at^2}{2}$

s = $ut + \frac{at^2}{2}$

or $s = ut + \frac{1}{2}at^2$

This is the 2nd equation of motion.

35 B. Question

A train starting from stationary position and moving with uniform acceleration attains a speed of 36 km per hour in 10 minutes. Find its acceleration.

Answer

u= 0m/s

V = 36 km per hour = 36 x (1000/3600) m/s

T = 10 minutes = 10 x 60 sec

On applying the formula,

Acceleration = 0.016 m/s^2

36 A. Question

Write the three equations of uniformly accelerated motion. Give the meaning of each symbol which occurs in them.

Answer

v – u = at

s = ut +1/2 at^2

$v^2 = u^2 + 2as$

where,

u = initial velocity

v = final velocity

a = acceleration

t – time taken

s = distance travelled

36 B. Question

A car acquires a velocity of 36 km per hour in 10 minutes starting from rest. Find (i) the acceleration, (ii) the average velocity, and (iii) the distance travelled in this time.

Answer

Given:u is the initial velocity = 0 m/s

v is the final velocity = 36 Km/hr = 36 x (1000/3600)=10 m/s

t is the time period = 10 ×60 =600 s

a = 2 m/s^2

avg. velocity= $\frac{Initial\ velocity + \ final\ velocity}{2} = \frac{0+10}{2} = \ 5\ m/s$

formula used:1. final velocity " V "= u + a × twhere ,v is the final velocityu is the initial velocitya is the acceleration of the bodyt is the time period2. Using third equation of motionv^2 - u^2 =2 × a × swhere,v is the

final velocityu is the initial velocitya is the accelerations is the displacementputting the value of v,u,t in equation 110 =0 +a × 600a = 0.0167 ms^{-2}putting the value of v,u,a,t in equation 2100-0=2×0.0167×ss =3000 m= 3 km

The average velocity is 5 m/s , acceleration is 0.0167 ms^{-2}, displacement is 3 km

37 A. Question

What is meant by uniform circular motion? Give two examples of uniform circular motion.

Answer

When an object is experiencing uniform circular motion, it is traveling in a circular path at a constant speed. If r is the radius of the path, and we define the period, T, as the time it takes to make a complete circle, then the speed is given by the circumference over the period.

1. Twirling an object tied to a rope in a horizontal circle.

2. Revolution of earth

3. Hands of clock

37 B. Question

The tip of seconds' hand of a clock takes 60 seconds to move once on the circular dial of the clock. If the radius of the dial of the clock be 10.5 cm, calculate the speed of the tip of the seconds' hand of the clock (given p=$\frac{22}{7}$)

Answer

t = 60 sec

r = 10.5 cm

v = 2π r/T

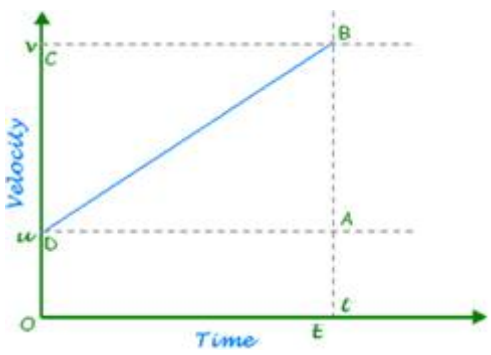
= 0.011 m/s

38. Question

Show by means of graphical method that :

v = *u* + *at* where the symbols have their usual meanings.

Answer



The body has an initial velocity u at point A and then its velocity changes at a uniform rate from A to B in time t. In other words, there is a uniform acceleration 'a' from A to B, and after time t its final velocity becomes 'v' which is equal to BC in the graph. The time t is represented by OC. To complete the figure, we draw the perpendicular CB from point C, and draw AD parallel to OC. BE is the perpendicular from point B to OE.

Now, Initial velocity of the body, $u = OA$..... (1)

And, Final velocity of the body, $v = BC$..... (2)

But from the graph $BC = BD + DC$

Therefore, $v = BD + DC$ ..... (3)

Again $DC = OA$

So, $v = BD + OA$

Now, From equation (1), $OA = U$

So, $v = BD + u$ ..... (4)

We should find out the value of BD now. We know that the slope of a velocity – time graph is equal to acceleration, a.

Thus, Acceleration, a = slope of line AB

or $a = BD/AD$

But $AD = OC = t$,

so putting t in place of AD in the above relation, we get:

$a = BD/t$

or $BD = at$

Now, putting this value of BD in equation (4) we get :

$v = at + u$

This equation can be rearranged to give:

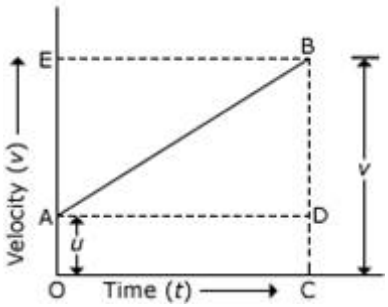
$v = u + at$

And this is the first equation of motion. It has been derived here by the graphical method.

39. Question

Show by using the graphical method that : $s = ut + \frac{1}{2}at^2$, where the symbols have usual meanings.

Answer



Velocity–Time graph to derive the equations of motion.

Suppose the body travels a distance *s* in time *t*. In the above Figure, the distance travelled by the body is given by the area of the space between the velocity – time graph *AB* and the time axis *OC*,which is equal to the area of the figure *OABC*. Thus:

Distance travelled = Area of figure *OABC*

= Area of rectangle *OADC* + Area of triangle *ABD*

We will now find out the area of the rectangle *OADC* and the area of the triangle *ABD*.

(i) Area of rectangle *OADC* = *OA* × *OC*

= *u* × *t*

= *ut* ..... (5)

(ii) Area of triangle *ABD* = (1/2) × Area of rectangle *AEBD*

= (1/2) × *AD* × *BD*

= (1/2) × *t* × *at* (because *AD* = *t* and *BD* = *at*)

= (1/2) at^2..... (6)

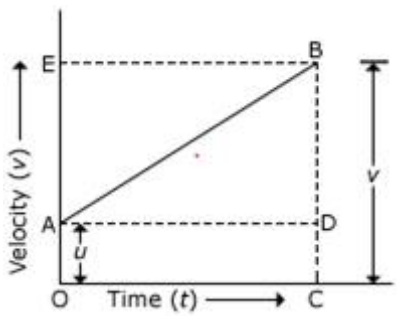
So, Distance travelled, *s* = Area of rectangle *OADC* + Area of triangle *ABD*

or $s = ut + (1/2)\ at^2$This is the second equation of motion. It has been derived here by the graphical method.

40. Question

Derive the following equation of motion by the graphical method : $v^2 = u^2 + 2as$, where the symbols have their usual meanings.

Answer



Velocity–Time graph to derive the equations of motion.

We have just seen that the distance travelled *s* by a body in time *t* is given by the area of the figure

OABC which is a trapezium. In other words,

Distance travelled, *s* = Area of trapezium *OABC*

$$s = \frac{\text{(Sum of parallel sides)} \times \text{Height}}{2}$$

$$s = \frac{(OA + CB) \times OC}{2}$$

Now, $OA + CB = u + v$ and $OC = t$. Putting these values in the above relation, we get:

$$s = \frac{(u + v) \times t}{2} \quad \text{..... (7)}$$

We now want to eliminate *t* from the above equation. This can be done by obtaining the value of *t* from the first equation of motion. Thus, $v = u + at$ (First equation of motion)And, $at = v - u$ or $t = \frac{(v - u)}{a}$

Now, putting this value of *t* in equation (7) above, we get:

$$s = \frac{(u + v) \times (v - u)}{2a}$$

or $2as = v^2 - u^2$[because $(v + u) \times (v - u) = v^2 - u^2$]

or $v^2 = u^2 + 2as$

This is the third equation of motion.

Multiple Choice Questions (MCQs)-Pg-42

41. Question

A bus increases its speed from 36 km/h to 72 km/h in 10 seconds. Its acceleration is :

A. 5 m/s^2

B. 2 m/s^2

C. 3.6 m/s^2

D. 1 m/s^2

Answer

Given:The initial velocity u =36 km/h=10 m/sthe Final velocity v =72 Km/h = 20 m/sThe time period t = 10 s using first equation of motionv – u = atwherev is the final velocityu is the initial velocitya is the accelerationt is the time period putting the value of v,u,t in the equation, we get20 -10 =a ×10a = 1 m/s^2

42. Question

A bus moving along a straight line at 20 m/s undergoes an acceleration of 4 m/s^2. After 2 seconds, its speed wil be :

A. 8 m/s B. 12 m/s

C. 16 m/s D. 28 m/s

Answer

V – u = at

43. Question

The slope of a speed-time graph gives :

A. distance travelled

B. velocity

C. acceleration

D. displacement

Answer

a = v/t

44. Question

The area under a speed-time graph represents a physical quantity which has the unit of :

A. m

B. m^2

C. $m\ s^{-1}$

D. $m\ s^{-2}$

Answer

a = v/t

45. Question

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

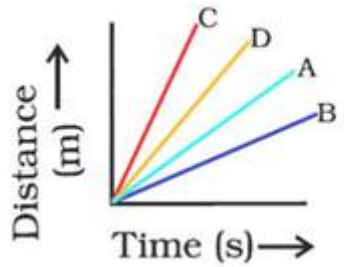
Answer||B

Answer

when displacement is proportional to the square of time then object moves with uniform acceleration.

46. Question

Four cars A, B, C and D are moving on a levelled, straight road. Their distance-time graphs are shown in the given figure. Which of the following is the correct statement regarding the motion of these cars?



A. car A is faster than car D

B. car B is the slowest

C. car D is faster than the car C

D. car C is the slowest

Answer

Speed is directly proportional to the slope of distance time graph

47. Question

A car of mass 1000 kg is moving with a velocity of 10 m s^{-1}. If the velocity-time graph for this car is a horizontal line parallel to the time axis, then the velocity of car at the end of 25 s will be :

A. 25 m/s^{-1} B. 40 m/s^{-1}

C. 10 m/s^{-1} D. 250 m/s^{-1}

Answer

Since the velocity time graph for this car is a horizontal line parallal to the time axis then the velocity of the car will be constant. So, velocity of car at the end of 25 s will be 10m/s.

1. Question

A car moving with an initial velocity of 10 m/s slows down at a constant deceleration and stops after traveling 400 m. What is the time (in seconds) taken by the car to come to a stop?

A. 80 sec B. 60 secC. 25 sec D. 40 sec

Answer

Let's put kinematics to play, shall we?

Consider the third equation of motion,

$v^2-u^2 = 2\times a\times s$ ------- (1)

Here , 'v' is the final velocity of the body in question

' u ' is the initial velocity.

' a ' is the acceleration experienced.

' s ' is the distance traveled.

Taking only S.I. units, for the case mentioned in the question,

it can be calculated that a = -1/8 ms^{-2} (v = 0, u = 10, s = 400).

The negative sign indicates that the body (the car) is decelerating. Applying this result to first equation of motion,

$v=u + a\times t$ -------- (2)

You can calculate the time taken (t) as t = -10/(-1/8).

Which is:t = 80 seconds.

49. Question

A sprinter is running along the circumstance of a big sports stadium with constant speed. Which of the following do you think is changing in this case?

A. magnitude in which the sprinter being produced

B. distance covered by the sprinter per second

C. direction in which the sprinter is running

D. centripetal force acting on the sprinter.

Answer

Velocity is directional.

50. Question

A student draws a distance-time graph for a moving object shown here, the part which indicates uniform deceleration of the object is :

A. ST B. QR

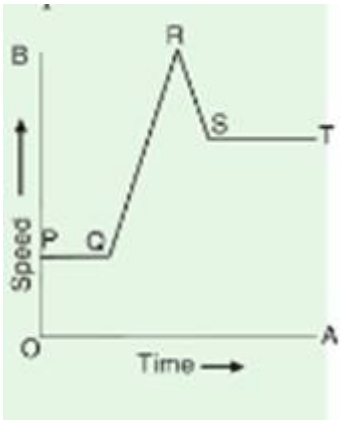
C. RS D. PQ

Answer

.

51. Question

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 the scooter is the minimum in this section

D. the distance travelled by the scooter is zero in this section

Answer

Speed = constant

So distance = 0

1. Question

Which one of the following is most likely not a case of uniform circular motion?

A. motion of the earth around the sun

B. motion of a toy train on a circular track

C. motion of a racing car on a circular track

D. motion of hours' hand on the dial of a clock

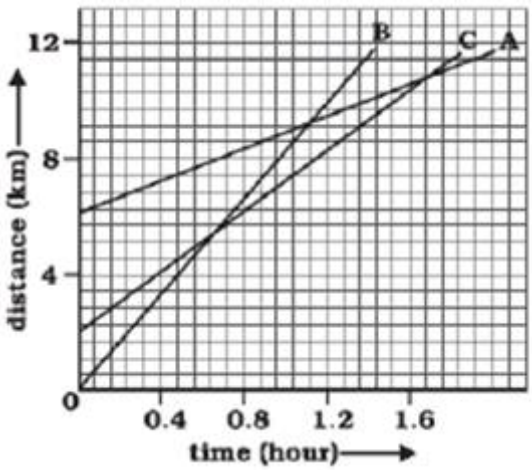
Answer

Speed of a car is not constant.

Questions Based on High Order Thinking Skills (HOTS)-Pg-43

53. Question

Fig 8.11 shows the distance-time graph of three objects A,B and C. Study the graph and answer the following questions:



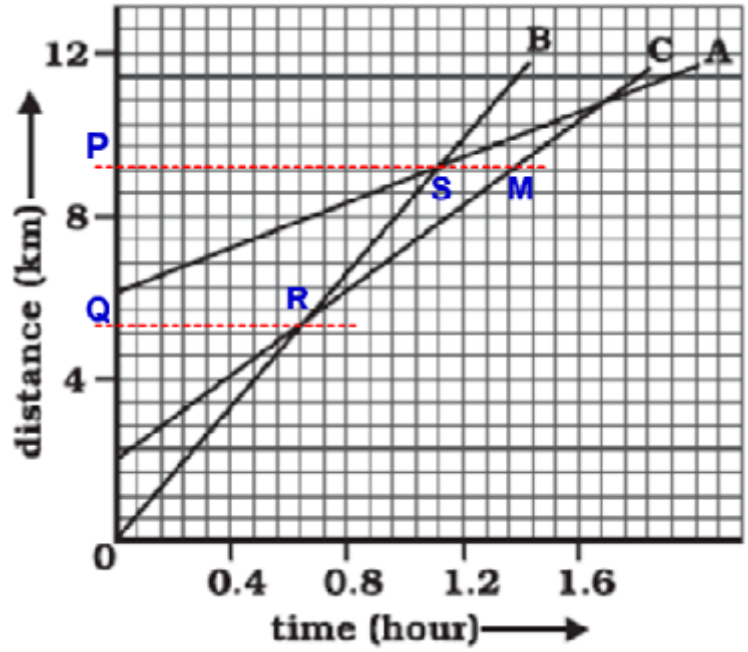
(a) Which of the three is travelling the fastest?

(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?

Answer



(a) It is clear from graph that B covers more distance in less time. Therefore, B is the fastest.

(b) All of them never come at the same point at the same time.

(c) According to graph; each small division shows about 0.57 km.

A is passing B at point S which is in line with point P (on the distance axis) and shows about 9.14 km

Thus, at this point C travels about

9.14 – (0.57 x 3.75) km = 9.14 km – 2.1375 km = 7.0025 km ≈ 7 km

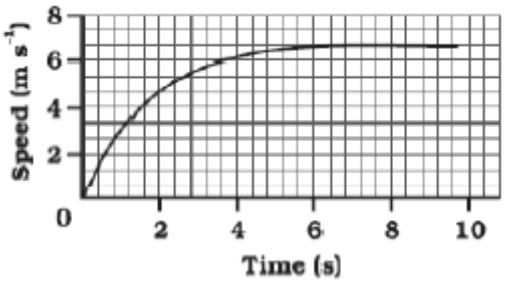
Thus, when A passes B, C travels about 7 km.

(d) B passes C at point Q at the distance axis which is ≈ 4km + 0.57km x 2.25 = 5.28 km

Therefore, B travelled about 5.28 km when passes to C

54. Question

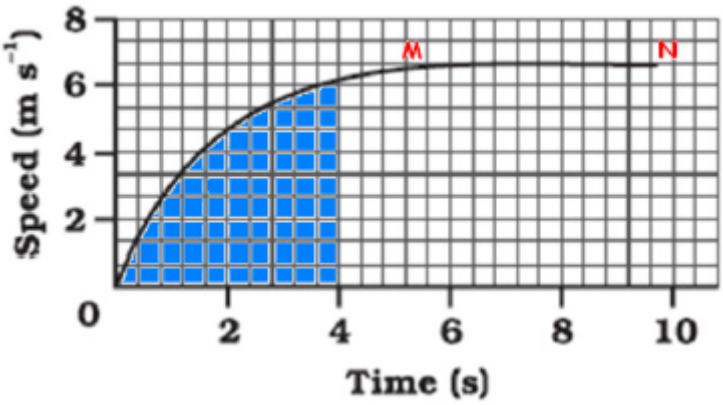
The speed-time graph for a car is shown is Fig. 8.12.



(a) 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.

(b) Which part of the graph represents uniform motion of the car?

Answer



(a) Distance travelled by car in the 4 seconds

The area under the slope of the speed – time graph gives the distance travelled by an object.

In the given graph

56 full squares and 12 half squares come under the area slope for the time of 4 second.

Total number of squares = 56 + 12/2 = 62 squares

The total area of the squares will give the distance travelled by the car in 4 second.

On the time axis, 5 squares = 2s

∴ 1 square =25s=25s

On the speed asix 3 squares = 2 m/s

∴ 1 square =23m/s=23m/s

∴ area of 1 square =25s×23m/s=415m=25s×23m/s=415m

∴ area of 62 squares =415m×62=415m×62

24815m=16.53m24815m=16.53m

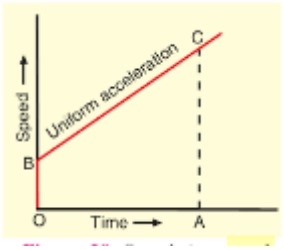
Therefore, car travels 16.53 m in first 4 second.

(b) Part MN of the slope of the graph is straight line parallel to the time axis, thus this potion of graph represents uniform motion of car.

55. Question

A body with an initial velocity *x* moves with a uniform acceleration *y*. Plot its velocity-time graph is a straight line?

Answer



56. Question

Given alongside is the velocity-time graph for a moving body :

Find (i) Velocity of the body at point C.

(ii) Acceleration acting on the body between A and B.

(iii) Acceleration acting on the body beyween B and C.

Answer

(i) Velocity of the body at point C is 40 km/h

(ii) Acceleration acting on the body between A and B is 6.6 km/h^2

(iii) Acceleration acting on the body between B and C is zero

57. Question

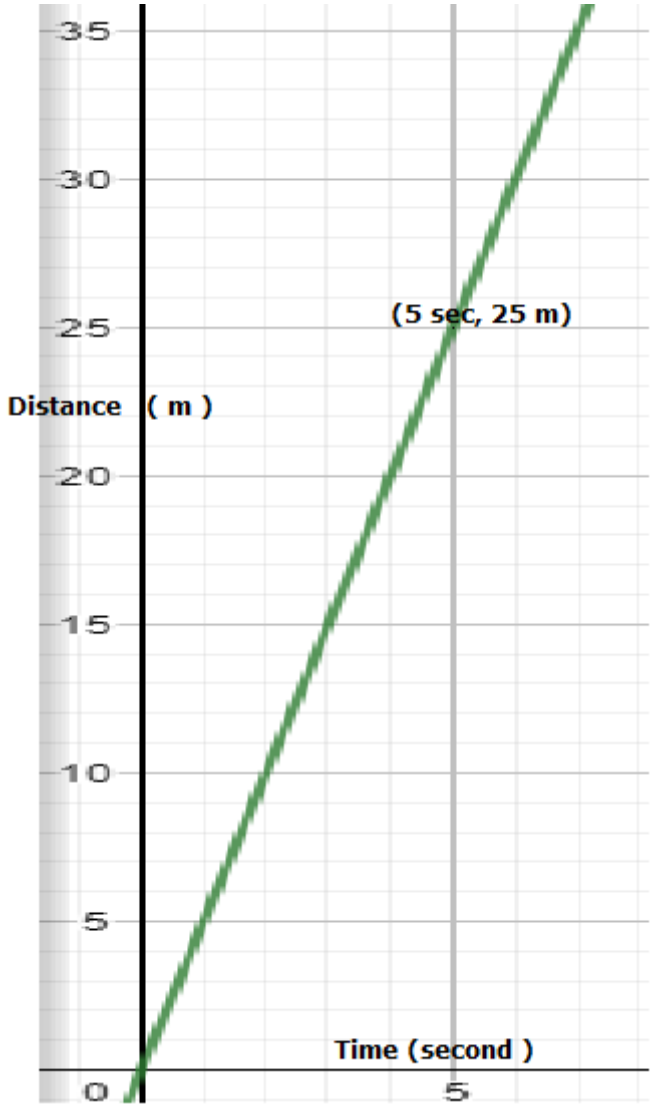
A body is moving uniformly in a straight line with a velocity of 5 m/s. Find graphically the distance covered by it in 5 seconds.

Answer

V = 5 m/s

T = 5 sec

On applying formula, we getvelocity= displacement / TimeDistance covered = 25 m



58. Question

The speed-time graph of an ascending passenger lift is given alongside.

What is the acceleration of the lift :

(i) During the first two seconds?

(ii) between second and tenth second?

(iii) during the last two seconds?

Answer

(i) the acceleration of the lift during the first two seconds is2.3 m/s^2

(ii) the acceleration of the lift between second and tenth second is Zero

(iii) the acceleration of the lift during the last two seconds is2.3 m/s^2

59. Question

A car is moving on a straight road with uniform acceleration. The speed of the car varies with time as follows :

Time (s)	Speed (m/s)
0	4
2	8
4	12
6	16
8	20
10	24

Draw the speed-time graph by chooding a convenient scale. From this graph :

(i) Calculate the acceleration of the car.

(ii) Calculate the distance travelled by the car in 10 seconds.

Answer

(i) the acceleration of the car is2 m/s^2

(ii) the distance travelled by the car in 10 seconds is 140 m

60. Question

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.

Answer

(i) the initial speed of the car is10 km/h

(ii) the maximum speed attained by the car is 35 km/h

(iii) BC shows zero acceleration.

(iv) CD shows varying retardation.

(v) the distance travelled in first 8 hours is 242.5 km

61. Question

Three speed-time graphs are given below :

Which graph represents the case of :

(i) a cricket ball thrown vertically upwards and returning to the hands of the thrower?

(ii) a trolley decelerating to a constant speed and then accelerating uniformly?

Answer

(i) Graph c represents the case of a cricket ball thrown vertically upwards and returning to the hands of the thrower?

(ii) Graph a represents the case of a trolley decelerating to a constant speed and then accelerating uniformly?

62. Question

Study the speed-time graph of a car given alongside and answer the following questions :

(i) What type of motion is represented by OA?

(ii) What type of motion is represented by AB?

(iii) Wht type of motion is represented by BC?

(iv) What is the acceleration of car from O to A?

(v) What is the acceleration of car A to B?

(vi) What is the retardation of car from B to C?

Answer

(i) Uniform acceleration is represented by OA.

(ii) Constant speed is represented by AB.

(iii) Uniform retardation is represented by BC.

(iv) the acceleration of car from O to A is 4 m/s^2

(v) the acceleration of car A to B is Zero

(vi) the retardation of car from B to C is 2 m/s^2.

63. Question

What type of motion is represented by each one of the following graphs?

Answer

a. The motion represented by first graph is Uniform acceleration

b. The motion represented by first graph is Constant speed

c. The motion represented by first graph is Uniform retardation

d. The motion represented by first graph is Non-uniform retardation

64. Question

A car is travelling along the road at 8 m s^{-1}. It accelerates at 1 m s^{-2}. For a distance of 18 m. How fast is it then travelling?

Answer

U = 8 m s^{-1}

a= 1 m s^{-2}

d = 18 m

On using the formua we get

V = 10 m/s^{-1}

65. Question

A car is travelling at 20 m/s along a road. A child runs out into the road 50 m ahead and the car driver steps on the brake pedal. What must the car's deceleration be if the car is to stop just before it reaches the child?

Answer

Given:U = 20m/s

s = 50 m

V = o m/s

formula used:

using, Third equation of motion$v^2 - u^2=2\times a\times s$

On applying the formula, we get

$0-(20)^2=2 \times a \times 50-400 =100\times$ aa= -4 m/s^2

Conlusion:The car has to decelerate at a rate of 4 m/s^2