PHYSICS

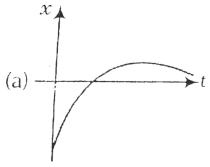
BOOKS - NCERT PHYSICS (ENGLISH)

MOTION IN A STRAIGHT LINE

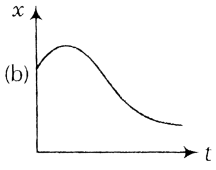
Multiple Choice Question

1. Among the four graphs shown in the figure there is only one graph for which average velocity over the time interval (0,T) can vanish for a suitably chosen T. Which one is it ?

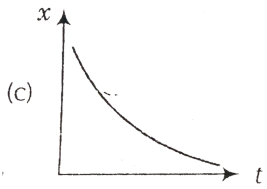
A.



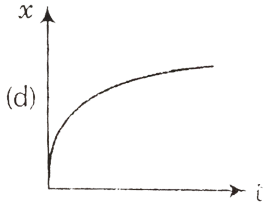
B.



C.



D.



Answer: B

Watch Video Solution

2. A lift is coming from $8th$ floor and is just about to reach $4th$ floor. Taking ground floor as origin and positive direction upwards for all quantities, which one of the following is correct ?

A. $x < 0, v < 0, a > 0$

B. $x > 0, v < 0, a < 0$

C. $x > 0, v < 0, a > 0$

D. $x > 0, v > 0, a < 0$

Answer: A

Watch Video Solution

3. The instantaneous speed is always equal to the magnitude of instantaneous velocity. Why?

A. The displacement in time T must always take non-negative values

B. The displacement x in time T satisfies $-v_0T < x < v_0T$

C. The accleration is always a non-negative number

D. The motion has no turning points

Answer: B

Watch Video Solution

4. A vehicle travels half the distance (L) with speed V_1 and the other half with speed V_2, then its average speed is .

A. $\frac{v_1 + v_2}{2}$

B. $\frac{2v_1 + v_2}{v_1 + v_2}$

C. $\frac{2v_1 v_2}{v_1 + v_2}$

D. $\frac{L(v_1 + v_2)}{v_1 v_2}$

Answer: C

Watch Video Solution

5. The displacement of a particle is given by $x = (t-2)^2$ where x is in meter and t in second. The distance covered by the particle in first 3 seconds is

A. 4 m

B. 8 m

C. 12 m

D. 16 m

Answer: D

View Text Solution

6. At a metro station, a girl walks up a stationary escalator in time t_1 If she remains stationary on the escalator, then the escalator take her up in time t_2. The time taken by her to walk up the moving escalator will be.

A. $(t_1 + t_2)/2$

B. $t_1 t_2/(t_2 - t_1)$

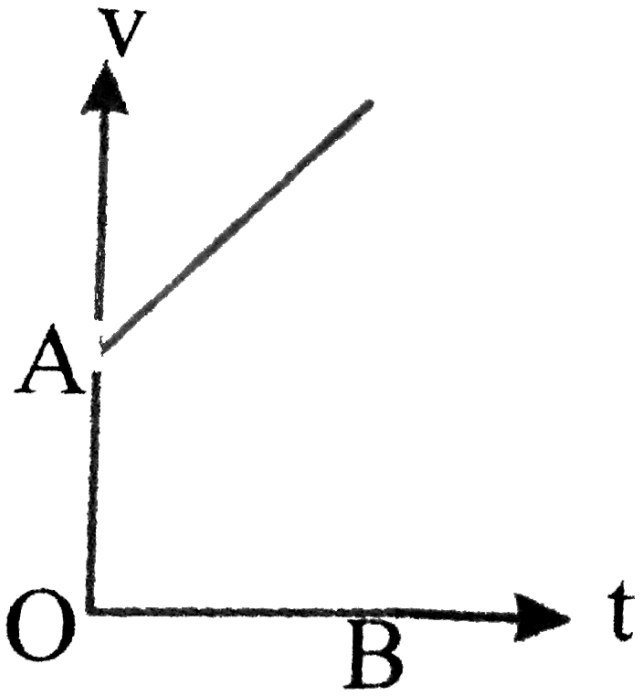
C. $t_1 t_2/(t_2 + t_1)$

D. $t_1 - t_2$

Answer: C

Watch Video Solution

Multiple Choice Question More Than One Qns



1.

The variation of quantity A with quantity B is plotted in the fig. Describes the motion of a particle in a straight line.

(a) Quantity B may represent time.

(b) Quantity A is velocity if motion is uniform.

(c) Quantity A is displacement if motion is uniform

(d) Quantity A is velocity if motion is uniformly accelerated.

A. Quantive B may represent time

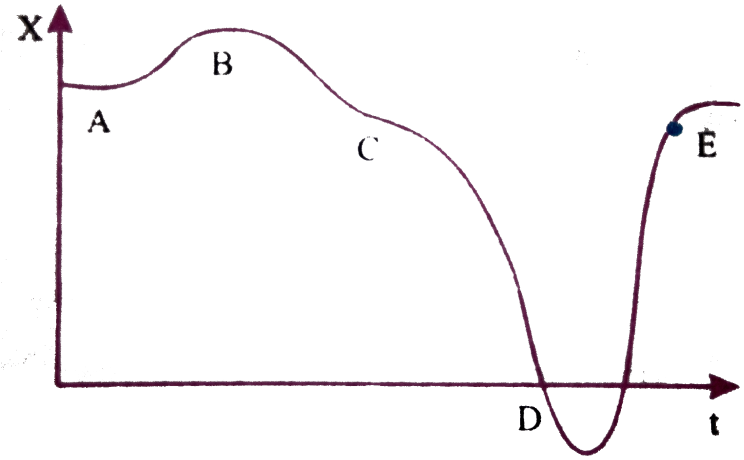
B. Quantity A is velocity if motion is uniform

C. Quantity A is displacement if motion is uniform

D. Quantify A is velocity if motion is uniformly acclerated

Answer: A::C::D

Watch Video Solution



2.

A graph of x versus t is shown in figure. Choose correct alternative from below.

A. The particle was released from rest at $t = 0$

B. At B, the acceleration $a > 0$

C. Average velocity $V > 0$

D. The speed at D exceeds that at E

Answer: A::C::D

Watch Video Solution

3. If (2, 3, 5) is one end of a diameter of the sphere $x^2 + y^2 + z^2 - 6x - 12y - 2z + 20 = 0$, then the coordinates of the other end of the diameter are (1) $(4, 9, -3)$ (2) $(4, -3, 3)$ (3) $(4, 3, 5)$ (4) $(4, 3, -3)$

A. $x(t) > 0$ for all $t > 0$

B. $v(t) > 0$ for all $t > 0$

C. $a(t) > 0$ for all $t > 0$

D. $v(t)$ lies between 0 and 2

Answer: A::D

Watch Video Solution

4. A spring with one end attached to a mass and the other to a right support is stretched and released

A. Magnitude of acceleration, when just released is maximum

B. Magnitude of acceleration, when at equilibrium position, is maximum

C. Speed is maximum when is at equilibrium position

D. Magnitude of displacement is always maximum whenever speed is minimum

Answer: A::C

Watch Video Solution

5. A ball is bouncing elastically with a speed $1m/s$ between walls of a railway compartment of size $10m$ in a direction perpendicular to walls.

The train is moving at a constant velocity of $10m/s$ parallel to the direction of motion of the ball. As seen from the ground, choose the correct option

A. The direction of motion of the ball changes every 10.

B. Speed of ball changes every 10

C. Average speed of ball over any 20 interval is fixed.

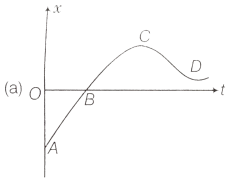
D. The acceleration of ball is the same as from the train

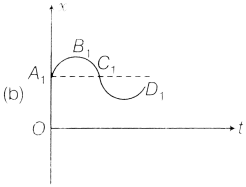
Answer: B::C::D

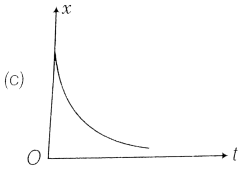
View Text Solution

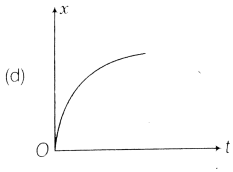
6. Refer to the graph in figure. Match the following

Graph	Characteristics	
(a)	(i)	has $v > 0$ and $a < 0$ throughout
(b)	(ii)	has $x > 0$ throughout and has a point with $v = 0$ and a point with $a = 0$
(c)	(iii)	has a point with zero displacement for $t > 0$
(d)	(iv)	has $v < 0$ and $a > 0$

A. 

B. 

C. 

D. 

Answer:

View Text Solution

Very Short Answer Type Qns

1. A uniform moving cricket ball is turned back by hitting it with a bat for a very short time interval. Show the variation of its acceleration with time. (Take acceleration in the back ward direction as positive).

Watch Video Solution

2. Give examples of a one-dimensional motion where

(a) the particle moving along positive x-direction comes to rest periodically and forward.

(b) the particle moving along positive x-direction comes to rest periodically and moves backward..

Watch Video Solution

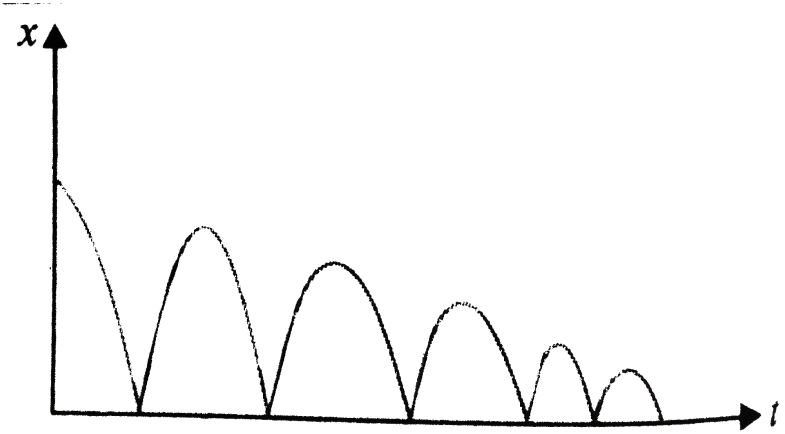
3. Give example of a motion where $x > 0, v < 0, a > 0$ at a particular instant.

Watch Video Solution

4. An object falling through a fluid is observed to have acceleration given by $a = g - bv$ where ` g= gravitational acceleration and (b) is constant. After a long time of rlease. It is observed to fall with constant speed. What must be the value of constant speed ?

Watch Video Solution

5. A ball is dropped and its displacement vs time graph is as shown in Fig. 2 (EP) .7 displacement (x) is from ground and all quantities are +ve upwards. (a) Plot qualitatively velocity vs time graph. (b) plot qualitatively acceleration vs time graph .



Watch Video Solution

6. A particle executes the motion described by $x(t) = x_0\left(1 - e^{-\gamma t}\right), t > = 0, x_0 > 0.$

(a) Where does the particle start and with what velocity ?

(b) Find maximum and minimum values of $x(t), a(t)$. Show that $x(t)$ and $a(t)$ increase with time and $v(t)$ decreases with time.

Watch Video Solution

7. A bird is tossing (flying to and from) between two cars moving towards each other on a straight road. One car has speed of $27kmh^{-1}$ while the other has the speed of $18kmh^{-1}$. The bird starts moving from first car towards the other and is moving with the speed of $36kmh^{-1}$ when the two cars were separated by 36 km. The total distance covered by the bird is

Watch Video Solution

8. A man runs across the roof-top of a tall building and jumps horizontally with hope of landing on the roof of the next building which is at a lower height than the first. If his speed is $9m/s$,the horizontal distance between the two buildings is $10m$ and height difference is $9m$, will he be able to land on the next building ? (take $g = 10m/s^2$).

Watch Video Solution

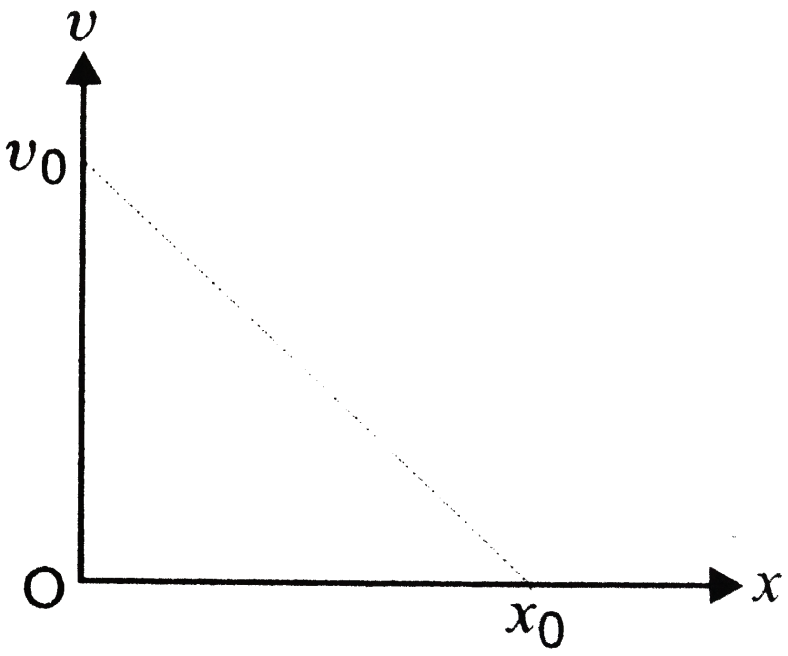
9. A ball A is dropped from a building of height $45m$. Simultaneously another ball B is thrown up with a speed $40m/s$. Calculate the relative speed of the balls as a function of time.

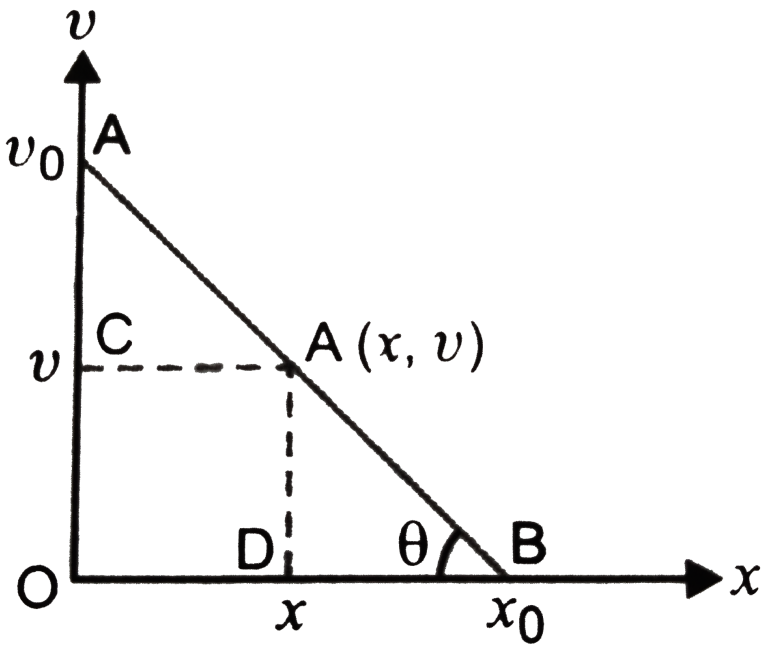
Watch Video Solution

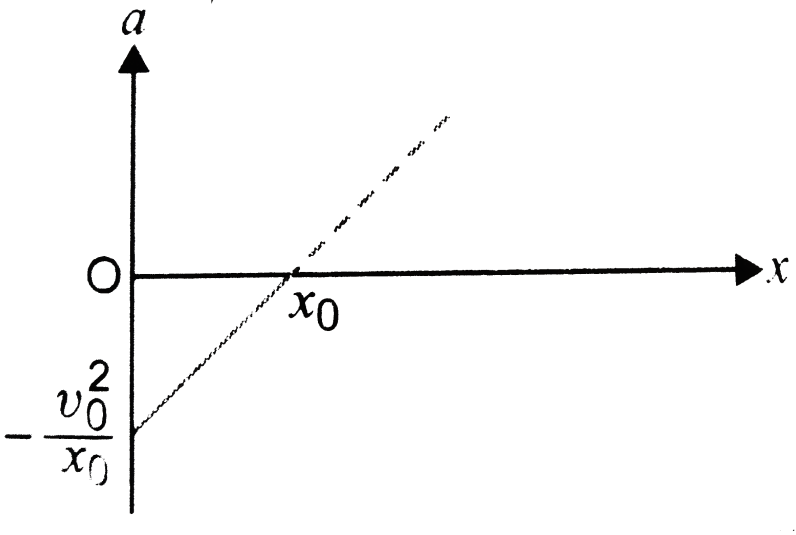
10. The velocity-displacement graph of a particle is shown in Fig . (a) Write the relation between (v) and (x).

(b) Obtain the relation between acceleration and displacement and plot it

.


v
v_0
O
x_0
x


v
v_0
A
v
C
A (x, v)
D
θ
B
O
x
x_0
x



Watch Video Solution

11. It is a common observation that rain clouds can be at about a kilometer altitude above the ground .

(a) If a rain drop falls from such a height freely under gravity, what will be its speed ? Also calcualte in $km/h\left(g = 10m/s^2\right)$.

(b) A typical rain drop is about 4 mm diameter. Momentum is mass $\times$ speed in magnitude. Estiamate its momentum when its hits ground.

(c) Estimate the time required to flatten the drop.

(d) Rate of change of momentum is force. Estiamate how much force such a drop would exert on you.

(e) Estimate the order of magnitude force on umbrella. Typical lateral separation between two rain drop is 5 cm.

(Assume that umbrealla is circular and has a diameter of 1 m and cloth is not peicreced through.)

View Text Solution

12. A motor car moving at a speed of $72km/h$ can not come to a stop in less than $3.0s$ while for a truch this time interval is $5.0s$ On a highway the car is behind the truck both moving at $72km/h$ The truck geives a signal that it is going to stop at emergency. At what distance the car should be from the truck so that it does not bump onto (collide with) the truck. Human responde time is$0.5s$.

View Text Solution

13. A monkey climbs up a slippery pole for $3\sec onds$ and subsequently slips for $3\sec onda$. Its velocity at time (t) is given by $v(t) = 2t(3-t), 0 < t > 3s$ and $v(t) = -(t-30(6-t)f$ or $3 < t < 6s$

. It repeats thei cycle till it reaches the height of $20s$.

(a) AT wht time is its v elocity maximum ? (b) At what time is its average velocity maximum ? (c) At what time is its accelration maximum in magnitude ? (d) How many cycles (counting fractions) are required to reach the top ?

View Text Solution

14. A man is standing on top of a building 100 m high. He throws two balls vertically, one at t = 0 and other after a time interval (less than 2 s). The later ball is thrown at a velocity of half the first. The vertical gap between first and second ball is 15 m at t = 2 s. The gap is found to remain constant. The velocities with which the balls were thrown are (Take g = 10 m s −2).

A. 20 m/s, 10m/s

B. 10m/s, 5m/s

C. 16m/s, 8m/s

D. 15m/s, 30m/s

Answer: A

View Text Solution