

Physics JEEEnious

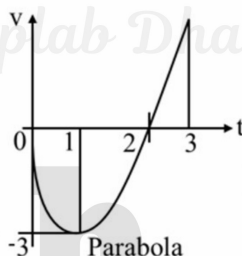
LEARN • THINK • SOLVE • EXCEL

Advanced Test on: **1D motion**

Duration: **40 min.**

Single option correct type

- 1) A particle moves along x-axis. Its velocity time graph is shown in figure. The distance travelled by particle in 0 to 3s.



- (A) zero (B) 4m (C) 8m (D) 12m
- 2) A car starts from rest from origin in a straight line with an acceleration given by the relation

$$a = \frac{25}{(x+2)^3}$$

where a is in m/s^2 and x is in meter. The maximum velocity of the car will be (x is the position of the car).

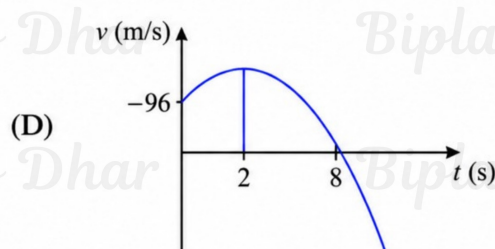
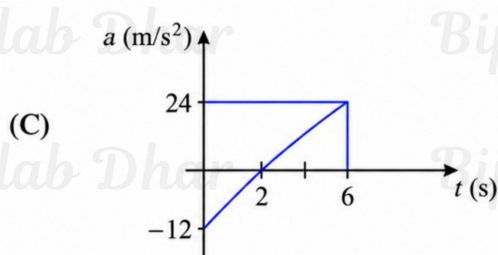
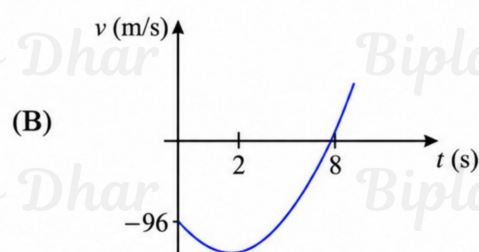
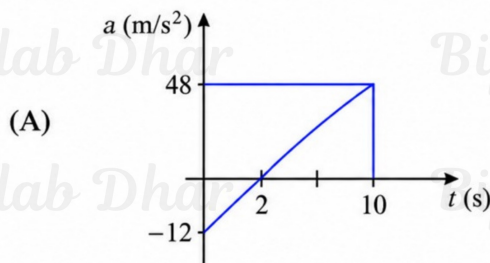
- (A) 2.5 m/s (B) 5 m/s (C) 10 m/s (D) Infinite
- 3) A particle is thrown upward with a velocity $u = 60a_0$ in a planet where acceleration due to gravity changes with time. From $t = 0$ to $t = 1$ sec it is a_0 , from $t > 1$ to $t = 2$ sec it is $2a_0$, from $t > 2$ to $t = 3$ sec it is $3a_0$ and so on. The direction of acceleration is always downward only. Find the distance travelled by the particle in between 10 to 11 sec.

[Take $a_0 = 1.21 \text{ m/s}^2$]

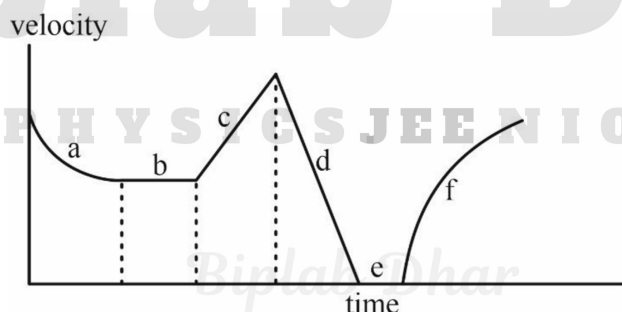
- (A) 1 m (B) 1.55 m (C) 3.38 m (D) 4.27 m

Multi Options correct type:

- 4) The position of a particle which moves along a straight line is defined by the relation
- $$x = t^3 - 6t^2 - 96t + 37$$
- where x is expressed in meters and t is in seconds. Which of the graphs represents the motion of the particle?



- 5) An object is moving in a straight line. The velocity time graph of the object is shown below. Choose the correct option(s):



- A) The object is having decreasing retardation in segment c
 B) The object is travelling in north with constant acceleration in south in segment d
 C) The object is travelling in north with variable acceleration in north in segment f
 D) The object is travelling in north with variable acceleration in south in segment a

- 6) Balls A and B are released from the top of a tower at $t = 0$ and $t = 2$ s, respectively. A strikes the ground elastically and rebounds back with the same speed and meets B at a height 55 m from the ground.

- (A) Height of the tower is 160 m.
 (B) Speed of the ball A just before touching the ground is 60 m/s.
 (C) Time after which ball B meets A after it (B) starts motion is 5 sec.
 (D) Speed of ball B when it meets A is 30 m/s.

Matrix match Type:

- 7) A student walks to coaching centre every evening with a constant velocity (v_0) and it takes 20 mins to reach there. One day he starts with his natural speed. On his way he realised that he forgot to carry physics copy. He calculated that if he continues to coaching centre, he will reach 8 mins before the bell. Luckily he met one friend and borrowed his cycle and decided to go back home with double his usual speed. In this way he finally reached coaching centre 6 min late. List – I gives information about few quantities. List – II gives their values.

List – I		List – II	
I	Time duration (in min.) he walked	P	24
II	Percentage of total distance from his home where he realised that he forgot to carry physics copy	Q	9
III	If he were not that lucky to meet his friend and had to complete entire journey by walk only, he would have been late by (in min.)	R	3
IV	How much times (at least) the speed of the cycle had to be such that he could reach the centre on time	S	45
		T	16
		U	80
		V	4.5

The correct match is

- (A) I → T; II → U; III → P; IV → P
(B) I → T; II → U; III → P; IV → R
(C) I → T; II → S; III → T; IV → R
(D) I → T; II → S; III → V; IV → P

- 8) A particle performing rectilinear motion on x axis, such that its x -coordinate varies with time as

$$X = \frac{t^3}{3} - 2t^2 + 3t + 5 \text{ (m)}$$

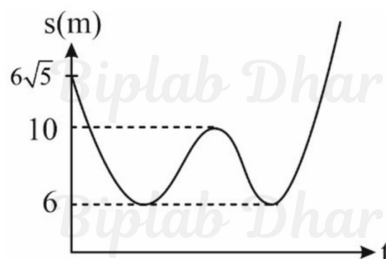
where t is in second. In List – I time instant is given and List – II sign of velocity and acceleration is given. Match the proper entry from List – I to List – II and select the correct answer using the code given below the list.

List – I		List – II	
P	$t = \frac{1}{2}$ sec	1	$V > 0, a > 0$
Q	$t = \frac{3}{2}$ sec	2	$V < 0, a > 0$
R	$t = \frac{5}{2}$ sec	3	$V < 0, a < 0$
S	$t = 4$ sec	4	$V > 0, a < 0$

- (A) P → 4; Q → 3; R → 2; S → 1
(B) P → 4; Q → 3; R → 1; S → 2
(C) P → 2; Q → 3; R → 1; S → 4
(D) P → 2; Q → 3; R → 4; S → 1

Comprehension Type:

A ball is projected vertically upwards with a velocity u . Distance (s) of the ball from a fixed point (P) changes with time according to the given graph.



9) Value of u can be

(A) 10 ms^{-1}

(B) 15 ms^{-1}

(C) 12 ms^{-1}

(D) 20 ms^{-1}

10) Which of the following is true?

(A) The ball was projected from the ground

(B) The point P lies on the line of motion of the ball.

(C) The ball was projected from a point above the ground.

(D) The ball was projected from a point above the point P.

Biplab Dhar

WWW.PHYSICSJEEGENIOUS.COM