TYPE A : VERY SHORT ANSWER QUESTIONS (1 mark each)

1. Are rest and motion absolute or relative terms ?
2. Can an object be at rest as well as in motion at the same time ?
3. Is it true that a body is at rest in a frame within which it has been fixed ?
4. Under what condition can an object in motion be considered a point object ?
5. Give an example of a physical phenomenon in which earth cannot be regarded as a point mass.
6. Under what condition will the distance and displacement of moving object have the same magnitude ? [Chandigarh 08]
7. A bullet fired vertically upwards falls at the same place after some time. What is the displacement of the bullet ?
8. A particle is moving along a circular track of radius r. What is the distance traversed by particle in half revolution ? What is its displacement ?
9. Will the displacement of an object change on shifting the position of origin of the coordinate system ? [Himachal 06C]
10. What does the speedometer of a car measure-average speed or instantaneous speed ?
11. What is the numerical ratio of velocity to speed of an object ?
12. A ball hits a wall with a velocity of $30\ ms^{-1}$ and rebounces with the same velocity. What is the change in its velocity ?
13. Why does time occur twice in the unit of acceleration ?
14. Give an example which shows that a positive acceleration can be associated with a slowing down object.
15. Give an example which shows that a negative acceleration can be associated with a speeding up object.
16. Is the acceleration of a car greater than when the accelerator is pushed to the floor or when brake pedal is pushed hard ?
17. The v-t graphs of two objects make angles of $30°$ and $60°$ with the time-axis. Find the ratio of their accelerations.
18. Is it possible that your cycle has a northward velocity but southward acceleration ? If yes, how ?
19. If the instantaneous velocity of a particle is zero, will its instantaneous acceleration be necessarily zero ?
20. A woman standing on the edge of a cliff throws a ball straight up with a speed of $8\ kmh^{-1}$ and then throws another ball straight down with a speed of $8\ kmh^{-1}$ from the same position. What is the ratio of the speeds with which the balls hit the ground ?
21. A body travels, with uniform acceleration a_1 for time t_1 and with uniform acceleration a_2 for time t_2. What is the average acceleration ?
22. What is the nature of position-time graph for a uniform motion ? [Chandigarh 03]
23. What does the slope of position-time graph indicate ? [Himachal 07]
24. What is the nature of velocity-time graph for uniform motion ?
25. If the displacement-time graph for a particle is parallel to displacement axis, what should be the velocity of the particle ?
26. If the displacement-time graph for a particle is parallel to time-axis, how much is the velocity of the particle ?
27. How can the distance travelled be calculated from the velocity-time graph in a uniform one-dimensional motion ?
28. Suppose the acceleration of a body varies with time. Then what does the area under its acceleration-time graph for any time interval represent ?
29. What is the area under the velocity-time curve in the case of a body projected vertically upwards from the ground after reaching the ground ?
30. Can a particle with zero acceleration speed up ?
31. Is the formula : $s = vt - \frac{1}{2}at^2$ correct, when the body is moving with uniform acceleration ?
32. A body projected up reaches a point P of its path at the end of 4 seconds and the highest point at the end of 12 seconds. After how many seconds from the start will it reach P again ?
33. Can a body subjected to a uniform acceleration always move in a straight line ?

1. A bullet fired into a fixed target loses half of its velocity after penetrating 3 cm. How much further will it penetrate before coming to rest assuming that it faces constant resistance in motion ?

(a) 1.5 cm (b) 1.0 cm
(c) 3.0 cm (d) 2.0 cm [AIEEE 05]

2. A car moving with the speed of 50 kmh^{-1} can be stopped by brakes after atleast 6 m. If the same car is moving at a speed of 100 kmh^{-1}, the minimum stopping distance is

(a) 12 m (b) 18 m
(c) 24 m (d) 6 m [AIEEE 03]

3. An automobile travelling with a speed of 60 kmh^{-1} can brake to stop within a distance of 20 m. If the car is going twice as fast *i.e.*, 120 kmh^{-1}, the stopping distance will be

(a) 20 m (b) 40 m
(c) 60 m (d) 80 m [AIEEE 04]

4. Speeds of two identical cars are u and $4u$ at a specific instant. The ratio of the respective distances at which the two cars are stopped from that instant is

(a) 1 : 1 (b) 1 : 4
(c) 1 : 8 (d) 1 : 16 [AIEEE 02]

5. If a body loses half of its velocity on penetrating 3 cm in a wooden block, then how much will it penetrate more before coming to rest ?

(a) 1 cm (b) 2 cm
(c) 3 cm (d) 4 cm [AIEEE 02]

6. A car, starting from rest, accelerates at the rate f through a distance s, then continues at constant speed for time t and then decelerates at the rate $f/2$ to come to rest. If the total distance traversed is $5s$, then

(a) $s = ft$ (b) $s = \frac{1}{6} ft^2$
(c) $s = \frac{1}{2} ft^2$ (d) $s = \frac{1}{4} ft^2$ [AIEEE 05]

7. The relation between time t and distance x is $t = ax^2 + bx$, where a and b are constants. The acceleration is

(a) $-2abv^2$ (b) $-2bv^3$
(c) $-2av^3$ (d) $-2av^2$ [AIEEE 05]

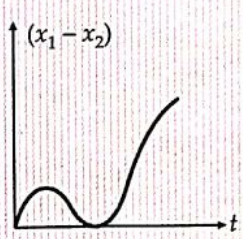
8. A particle located at $x = 0$ at time $t = 0$, starts moving along the positive x-direction with a velocity v that varies as $v = \alpha\sqrt{x}$. The displacement of the particle varies with time as

(a) $t^{1/2}$ (b) t^3
(c) t^2 (d) t [AIEEE 06]

9. The velocity of a particle is $v = v_0 + gt + ft^2$. If its position is $x = 0$ at $t = 0$, then its displacement after time $(t = 1)$ is

(a) $v_0 + \frac{g}{2} + f$ (b) $v_0 + 2g + 3f$
(c) $v_0 + \frac{g}{2} + \frac{f}{3}$ (d) $v_0 + g + f$ [AIEEE 07]

10. A body is at rest at $x = 0$. At $t = 0$, it starts moving in the positive x-direction with a constant acceleration. At the same instant another body passes through $x = 0$ moving in the positive x-direction with a constant speed. The position of the first body is given by $x_1(t)$ after time t and that of second body by $x_2(t)$ after the same time interval. Which of the following graphs correctly describes $(x_1 - x_2)$ as a function of time t ?

(a)


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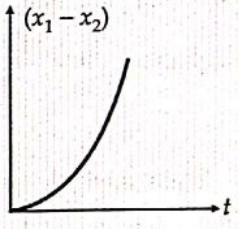

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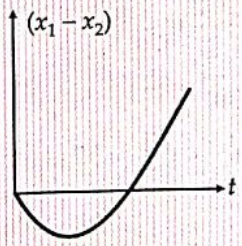
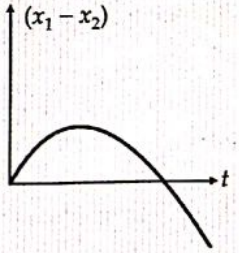


(d)


[AIEEE 08]

11. From a building two balls A and B are thrown such that A is thrown upwards and B downwards (both vertically). If v_A and v_B are their respective velocities on reaching the ground, then

(a) $v_B > v_A$ (b) $v_A = v_B$
(c) $v_A > v_B$
(d) their velocities depend on their masses. [AIEEE 02]

3. A particle moves in one dimension. The velocity is given by $v(t) = c_2t^2 + c_1t + c_0$, where c_1 and c_2 are constants. What is the acceleration of the particle at time $t = 1$s ?

(a) $c_1 + 2c_2$ (b) zero

(c) $c_1 + c_2$ (d) c_1 [IPUEE 15]

4. What are the units of the constant c_1 in the equation for $v(t)$ in the above question ?

(a) length/time (b) length/time^3

(c) length (d) length/time^2 [IPUEE 15]

5. With the usual notations, the following equations

$$s_{th} = u + \frac{1}{2}a(2t - 1) \text{ is}$$

(a) only numerically correct

(b) only dimensionally correct

(c) both numerically and dimensionally correct

(d) neither numerically nor dimensionally correct [IPUEE 10]

6. What is the relation among displacement, time and acceleration in case of a body having uniform acceleration f ?

(a) $s = ut + \frac{1}{2}ft^2$ (b) $s = (u + f)t$

(c) $s = v^2 - 2fs$ (d) none of these [DCE 99]

7. The motion of a particle is described by the equation $u = at$. The distance travelled by particle in first 4 s is

(a) $4a$ (b) $12a$

(c) $6a$ (d) $8a$ [DCE 2K]

8. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$

where a, b, α and β are positive constants. The velocity of the particle will

(a) go on decreasing with time

(b) be independent of α and β

(c) drop to zero when $\alpha = \beta$

(d) go on increasing with time [DCE 01]

9. A ball rolls up a slope. At the end of three seconds its velocity is 20 cm/s, at the end of eight seconds its velocity is 0. What is the average acceleration from the third to eighth second ?

(a) -2.5 cm/s^2 (b) -4.0 cm/s^2

(c) -5.0 cm/s^2 (d) -6.0 cm/s^2 [IPUEE 15]

10. The acceleration 'a' of a particle starting from rest varies with time according to relation $a = \alpha t + \beta$. The velocity of the particle after a time 't' will be

(a) $\frac{\alpha t^2}{2} + \beta$ (b) $\frac{\alpha t^2}{2} + \beta t$

(c) $\alpha t^2 + \frac{1}{2}\beta t$ (d) $\frac{\alpha t^2 + \beta}{2}$ [DCE 09]

11. A body sliding down on a smooth inclined plane slides down 1/4th distance in 2s. It will slide down the complete plane in

(a) 4 s (b) 5 s

(c) 2 s (d) 3 s [IPUEE 10]

12. A particle moving in one dimension with a constant acceleration of 2 m/s^2 is observed to cover a distance of 5 m during a particular interval of 1 s. The distance covered by the particle in the next 1 s interval (in metre) is

(a) 5 (b) 6

(c) 7 (d) 10 [IPUEE 12]

13. A train started from rest from a station and accelerated at 2 ms^{-2} for 10 s. Then, it ran at constant speed for 30 s and thereafter it decelerated at 4 ms^{-2} until it stopped at the next station. The distance between two stations is

(a) 650 m (b) 700 m

(c) 750 m (d) 800 m [DCE 03]

14. A ball falls from 20 m height on floor and rebounds to 5 m. Time of contact is 0.02 sec. Find acceleration during impact.

(a) 1200 m / s^2 (b) 1000 m / s^2

(c) 2000 m / s^2 (d) 1500 m / s^2 [DCE 06]

15. A ball is dropped from top of a tower of 100 m height. Simultaneously another ball was thrown upward from bottom of the tower with a speed of 50 m / s. They will cross each other ($g = 10$ m / s^2) after

(a) 1 sec (b) 2 sec

(c) 3 sec (d) 4 sec [IPUEE 04]

16. A body dropped from a height h with an initial speed zero reaches the ground with a velocity of 3 km/h. Another body of the same mass dropped from the same height h with an initial speed 4 km/h will reach the ground with a velocity of

(a) 3 km/h (b) 4 km/h

(c) 5 km/h (d) 12 km/h [IPUEE 10]

17. A ball thrown upward from the top of a tower with speed v reaches the ground in t_1 second. If this ball is thrown downward from the top of the same tower with speed v, it reaches the ground in t_2 seconds.

1. A car covers the first half of the distance between two places at 40 km/h and another half at 60 km/h. The average speed of the car is

(a) 40 km/h (b) 48 km/h

(c) 50 km/h (d) 60 km/h [CBSE PMT 90]

2. A car moves a distance of 200 m. It covers the first half of the distance at speed 40 km/h and the second half of distance at speed v. The average speed is 48 km/h. The value of v is

(a) 56 km/h (b) 60 km/h

(c) 50 km/h (d) 48 km/h [CBSE PMT 91]

3. A bus travelling the first one-third distance at a speed of 10 km/h, the next one-third at 20 km/h and the last one-third at 60 km/h.

The average speed of bus is

(a) 9 km/h (b) 16 km/h

(c) 18 km/h (d) 48 km/h [CBSE PMT 91]

4. A car moves from X to Y with a uniform speed v_u and returns to Y with a uniform speed v_d. The average speed of this round trip is

(a) $\sqrt{v_u v_d}$ (b) $\frac{v_d v_u}{v_d + v_u}$

(c) $\frac{v_u + v_d}{2}$ (d) $\frac{2 v_d v_u}{v_d + v_u}$ [CBSE PMT 07]

5. A particle covers half of its total distance with speed v_1 and the rest half distance with speed v_2. Its average speed during the complete journey is

(a) $\frac{v_1^2 v_2^2}{v_1^2 + v_2^2}$ (b) $\frac{v_1 + v_2}{2}$

(c) $\frac{v_1 v_2}{v_1 + v_2}$ (d) $\frac{2 v_1 v_2}{v_1 + v_2}$ [CBSE Final 2011]

6. A car moves along a straight line, whose equation of motion is given by

$$s = 12t + 3t^2 - 2t^3$$

where s is in metres and t in seconds. The velocity of the car at the start will be

(a) $7\,ms^{-1}$ (b) $9\,ms^{-1}$

(c) $12\,ms^{-1}$ (d) $16\,ms^{-1}$ [CBSE PMT 98]

7. A particle moves along a straight line OX. At a time t (in seconds) the distance x (in metres) of the particle from O is given by $x = 40 + 12t - t^3$. How long would the particle travel before coming to rest ?

(a) 16 m (b) 24 m

(c) 40 m (d) 56 m [CBSE PMT 06]

8. The position x of a particle varies with time t as $x = at^2 - bt^3$. The acceleration will be zero at time t equal to

(a) $\frac{a}{3b}$ (b) zero

(c) $\frac{2a}{3b}$ (d) $\frac{a}{b}$ [CBSE PMT 97]

9. Motion of a particle is given by equation $s = (3t^3 + 7t^2 + 14t + 8)$ m. The value of acceleration of the particle at $t = 1$ sec is

(a) $10\ m/s^2$ (b) $32\ m/s^2$

(c) $23\ m/s^2$ (d) $16\ m/s^2$ [CBSE PMT 2K]

10. A particle moves along a straight line such that its displacement at any time t is given by $s = (t^3 - 6t^2 + 3t + 4)$ metres. The velocity when the acceleration is zero, is

(a) 3 m/s (b) 42 m/s

(c) –9 m/s (d) –15 m/s [CBSE PMT 94]

11. The motion of a particle along a straight line is described by equation : $x = 8 + 12t - t^3$, where x is in metre and t in second. The retardation of the particle when its velocity becomes zero, is

(a) $24\,ms^{-2}$ (b) zero

(c) $6\,ms^{-2}$ (d) $12\ ms^{-2}$ [AIPMT Pre 12]

12. A particle moves a distance x in time t according to equation : $x = (t + 5)^{-1}$. The acceleration of particle is proportional to

(a) $(\text{velocity})^{3/2}$ (b) $(\text{distance})^2$

(c) $(\text{distance})^{-2}$ (d) $(\text{velocity})^{2/3}$ [CBSE Pre 2010]

13. A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to

$$v(x) = \beta x^{-2n}$$

where β and n are constants and x is the position of the particle. The acceleration of the particle as a function of x, is given by

(a) $-2n\beta^2 x^{-4n-1}$ (b) $-2\beta^2 x^{-2n+1}$

(c) $-2n\beta^2 x^{-4n+1}$ (d) $-2n\beta^2 x^{-2n-1}$ [AIPMT 15]

19. A body falling from rest describes distances s_1, s_2 and s_3 in the first, second and third seconds of its fall, then the ratio $s_1 : s_2 : s_3$ is

(a) 1 : 1 : 1 (b) 1 : 3 : 5

(c) 1 : 2 : 3 (d) 1 : 4 : 9 [DPMT 90]

20. When a ball is thrown vertically upwards, at the maximum height [DPMT 06]

(a) the velocity is zero and therefore there is no acceleration acting on the particle

(b) the acceleration is present and therefore velocity is not zero

(c) the acceleration depends on the velocity as $a = \frac{dv}{dt}$.

(d) the acceleration is independent of the velocity

21. A ball is dropped from a high rise platform at $t = 0$ starting from rest. After 6 s another ball is thrown downwards from the same platform with a speed v. The two balls meet at $t = 18$ s. What is the value of v ? (Take $g = 10\,ms^{-2}$)

(a) 74 ms^{-1} (b) 64 ms^{-1}

(b) 84 ms^{-1} (d) 94 ms^{-1} [VMMC 12]

22. A body A is thrown up vertically from the ground with a velocity v_0 and another body B is simultaneously dropped from a height H. They meet at a height $H/2$, if v_0 is equal to [VMMC 14]

(a) $\sqrt{2gH}$ (b) $\sqrt{gH}$ (c) $\frac{1}{2}\sqrt{gH}$ (d) $\sqrt{\frac{2g}{H}}$

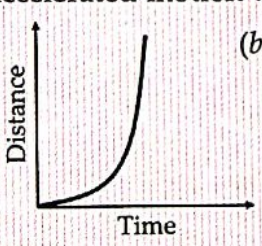
23. Velocity-time curve for a body projected vertically upwards is

(a) ellipse (b) hyperbola

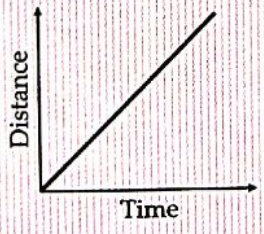
(c) parabola (d) straight line [DPMT 95]

24. Which of the following distance-time graph shows accelerated motion ? [DPMT 2K]

(a)



(b)



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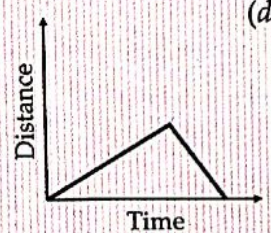
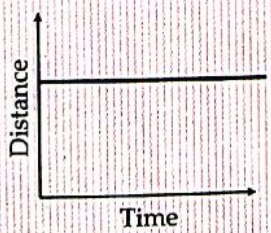
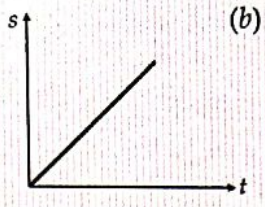


(d)



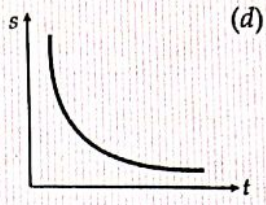
25. Which of the following graph represents uniformly accelerated motion ?

(a)

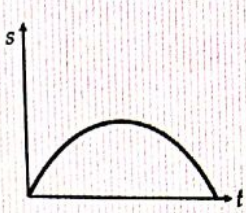


(b)

(c)

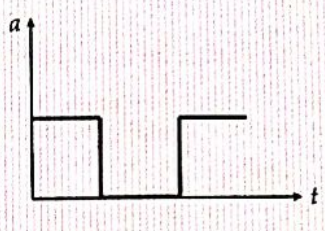


(d)



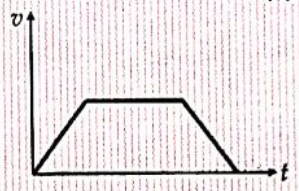
[DPMT 01]

26. Acceleration-time graph of a body is shown.

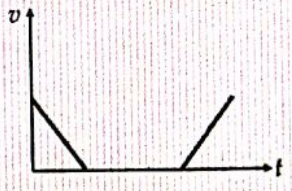


The corresponding velocity-time graph of the same body is

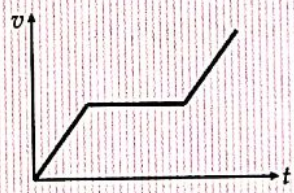
(a)



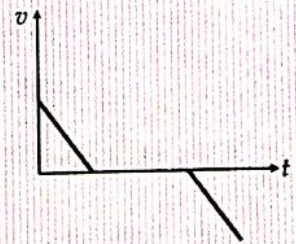
(b)



(c)

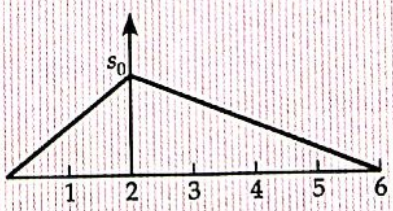


(d)



[DPMT 04]

27. What will be ratio of speed in first two seconds to the speed in next 4 seconds ?



(a) $\sqrt{2} : 1$ (b) 3 : 1

(c) 2 : 1 (d) 1 : 2 [VMMC 02 ; AIIMS 14]