INDUS RANGERS INSTITUTE PVT. LTD

MOTION IN A STRAIGHT LINE

1. A bullet loses 1/20 of its velocity in passing through a plank. The least number of planks required to stop the bullet is

(a)20 (b)21 (c)10 (d)11

2.The velocity of a body ,moving in a straight line with a constant acceleration ,is 10m/s at a certain instant t. After 5s the velocity becomes 20m/s .The velocity 3 s before t was

(a)4m/s (b)6 m/s (c)7 m/s (d)8 m/s

3.A stone, thrown upwards from the top of a tower with an initial velocity u , reaches the ground with a velocity 3u.The height of the tower is

(a)$\frac{3u^2}{g}$ (b)$\frac{4u^2}{g}$ (c)$\frac{6u^2}{g}$ (d)$\frac{9u^2}{g}$

4.A train of light 150 m is going towards north at a speed of 10m/s .A parrot flies at a speed of 5m/s towards south along the railways track. The time taken by the parrot to cross the train is equal to

(a)8s (b)10s (c)12s (d)15s

5.A body starts from rest and moves with a constant acceleration .The ratio of the distance covered in the nth second to the distance covered in n seconds is :

(a)$\frac{1}{n}-\frac{2}{n^2}$ (b)$\frac{1}{n}+\frac{2}{n^2}$

(c)$\frac{2}{n}-\frac{1}{n^2}$ (d)$\frac{2}{n}+\frac{1}{n^2}$

6.Two balls are projected simultaneously with the same passed from the top of a tower ,one vertically upwards and the other vertically downwards .They reach the ground in 9s and 4s ,respectively .The height of the tower is(g=10 m/s²)

(a)90m (b)180 m (c)270 m (d)360 m

7.A car is moving along a straight road with a uniform acceleration .It passes through two points P and Q with velocities 30km/h and 40km/h ,respectively .The velocity of the car midways between P and Q is

(a)33.3 km/h (b)$20\sqrt{3}$ km/h

(c)$25\sqrt{2}$ km/h (d)35 km/h

8.A body dropped from a tower with zero velocity, reaches the ground in 4s.The height of the tower is about

(a)80m (b)20m (c)160m (d)40m

9.A particle moves along a straight line such that its displacement s at any time t is given by s=t^3-6t^2+3t+4 meters t being in seconds .The velocity when the acceleration is zero is

(a)3m/s (b)-12m/s (c)42m/s (d)-9m/s

10.An elevator car ,whose floor to ceiling distance is 2.7 m, starts ascending with constant acceleration of 0.2 m/s².Two seconds after he start , a bolt begins to from the ceiling of the car .The free fall time of the bolt is:

(a)$\sqrt{054}$ s (b)$\sqrt{6}$ s (c)0.7s (d)1 s

11.A body moves from rest with a constant acceleration of 5m/s².Its instantaneous speed ,in m/s at the end of 10 seconds is

(a)50 (b)5 (c)2 (d)0.5

12.The acceleration a, in m/s ,of a particle is given by a=3t^2+2t+2 ,where t is the time in seconds .If the particles out with a velocity v=2m/s at t=0,then the velocity at the end of 2s is

(a)12m/s (b)14m/s (c)16m/s (d)18m/s

13.A person is sitting in a moving train and is facing the engine .He tosses up a coin and the coin falls behind him. It can be concluded that the train is moving

(a)forward and losing speed

(b)forward and gaining speed

(c)forward with uniform speed

(d)backward with uniform speed

14.A body is released from a great height and falls freely towards the earth. Another body is released from the same height one second later .The separation between the two bodies, two seconds after the release of the seconds body, is:

(a)4.9m (b)9.8m (c)19.6m (d)24.5m

15.A body starts from rest with uniform acceleration .If its velocity after n seconds is v ,then its displacement in the last two seconds is

(a)$\frac{2v(n-1)}{n}$ (b)$\frac{v(n-1)}{n}$

(c)$\frac{v(n+1)}{n}$ (d)$\frac{2v(2n+1)}{n}$

16.The relation between time t and distance x for a moving particles is t=ax²+βx,where $\alpha, and\ \beta$ are constant .If v is the velocity at distance x, then the retardation of the particles is

(a)2av^3 (b)2βv^3 (c)2$\alpha\beta v^3$ (d)2$\beta^2 v^3$

17.A body ,released from the top of a tower of height h, takes time t to reach the ground .At time t/2 its height from the ground was

(a)h/4 (b)h/3 (c)h/2 (d)3h/4

18.The initial velocity of a particle moving in a straight line is 10m/s and its retardation is 2m/s².The distance moved by the particle in the fifth second of its motion is

(a)1m (b)19m (c)50m (d)75m

19.A man in a balloon, rising vertically with an acceleration of 4.9 m/s²,released a ball 2 s after the balloon is let go from the ground the greatest height above the ground reached by the ball is (g=9.8m/s²)

(a)14.7m (b)19.6 m (c) 9.8m (d)24.5m

20.The initial velocity of a body moving along a straight line is 7m/s .It has a uniform acceleration of 4m/s².The distance covered by the body in the fifth second of its motion is

(a)25m (b)35m (c)50m (d)85m

21.A balloon is at a height of 81m and its ascending upwards with velocity of 12m/s. A body of 2kg weight is dropped from it .If g=10m/s² ,the body will reach the surface of the earth in

(a)1.5 s (b)4.025s (c)5.4 s (d)6.75s

22.A ball dropped from a tower covers half the total distance in the last seconds of its motion .The total time of falls is (g=10m/s²)

(a)$\sqrt{2}$ s (b)2 s (c)(2+$\sqrt{2}$)s (d)2$\sqrt{2}$s

23.A train accelerates from rests at a constant rate a for distance x_1 and time $t_1.After$ that it decelerates to rest at a constant rate β in distance $x_2\ and\ time\ t_2$ Then .

(a)$\frac{x_1}{x_2}$=$\frac{\alpha}{\beta} = \frac{t^1}{2}$ (b)$\frac{x_1}{x_2} = \frac{\beta}{\alpha} = \frac{t_1}{t_2}$

(c)$\frac{x_1}{x_2} = \frac{\alpha}{\beta} = \frac{t_2}{t_1}$ (d)$\frac{x_1}{x_2} = \frac{\beta}{a} = \frac{t_2}{t_1}$

24.A person throws ball upwards one after the other with the same speed at an interval of 1 seconds .The next ball is thrown when the velocity of the previous ball is zero. The balls rise to a height ($g=10m/s^2$)

(a)5m (b)10m (c)15m (d)20m

25.A body falls freely under gravity. The distance travelled by it in the last second of its journey equals the distance travelled by it in first three seconds .The total time of fall is

(a)5s (b)8s (c)12s (d)15s

26. A food packets is released from a helicopter which is rising steadily at 2m/s. The velocity of the packet after 2s is

(a)8.8m/s downwards (b)8.8m/s upwards

(c)17.6 m/s upwards (d)17.6 m/s downwards

27.A body is moving in a straight line such that the distance covered by it in time t is proportional to the square of the time t. The acceleration of the body is

(a)constant (b)zero (c)increasing (d)decreasing

28.The distance covered by a particle varies with time as $x=(k/b)(1-e^{-bt})$.The speed of particle at a time t is

(a)ke^{-bt} (b)kbe^{-bt} (c)$(k/b^2)e^{-bt}$ (d)$(k/b)e -^{bt}$

29.The displacement x(in meters)of a body varies with time t (in seconds) as $x=-\frac{2}{3}t^2+16t+2$.The velocity of the body will be zero at time

(a)8s (b)10s (c)12s (d)14s

30. Two bodies are thrown vertically upwards with their initial speeds in the ratio 2:3 .The ratio of the maximum height attained by them is

(a)$\sqrt{2}:\sqrt{3}$ (b)4:9 (c)2:3 (d)None