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Motion in a Straight Line

1. A target is made of two plates,one of wood and the other of iron. The thickness of the wooden plate is 4cm and that of the iron plate is 2 cm .A bullet fired goes through iron first and then penetrates 2 cm into wood .A similar bullet fired with the same velocity from the opposite direction goes through wood first and then penetrates 1 cm into iron .The ratio of the average retardations offered by the iron and the wooden plates is

(a)1/2 (b)1 (c)2 (d)4

2.A body is allowed to slide from the top of a smooth inclined plane of inclination θ.Another identical body is allowed to fall vertically from the top point of the same plane. The ratio of the time taken by them to reach the ground is

(a)sin θ (b)1/sinθ (c)sin²θ (d)1/sin²θ

3.The displacement time graphs for two particles A and B are straight lines inclined at 30° and 60° to the time axis. The ratio of their speeds is

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

4.A stone is dropped from a height h, simultaneously ,another stone is thrown up from the ground which reaches a height 4h.The two stone cross each other after time

(a)$\sqrt{\frac{h}{2g}}$ (b)$\sqrt{\frac{h}{8g}}$ (c)$\sqrt{8hg}$ (d)$\sqrt{2hg}$

5. The initial velocity of a particle is *u* and the acceleration at time t is at ,a being a constant .Then the velocity v at time t is given by:

(a)v=u (b)v=u + at (c)v=u+at² (d)v=u+$\frac{1}{2}at^2$

6.A bullet fired into a fixed wooden block loses half its velocity after penetrating 60 cm .It comes to rest after penetrating a further distance of

(a)10cm (b)20cm (c)40cm (d)60cm

7.A particle moves along the x-axis in such a way that is coordinates (x)varies with time (t) as x=2-5t+6r² metres, t being in seconds .The initial velocity of the particle is

(a)-5m/s (b)-3m/s (c)3m/s (d)6m/s

8.A balloon rises from rest with a constant acceleration g/8 .A stone is released from it when it has risen to a height h. The time taken by the stone to reach the ground is

(a)$\sqrt{\frac{h}{g}}$ (b)$\sqrt{\frac{2h}{g}}$ (c)2$\sqrt{\frac{h}{g}}$ (d)4$\sqrt{\frac{h}{g}}$

9.A man standing on the edge of a cliff throws a stone vertically upwards with a certain speed .He then throws another stone downwards with the same speed .Find the ratio of the speed of the two stones when they hit the ground

(a)1:1 (b)1:2 (c)1:4 (d)cannot be fond from the given information .

10.A body slides down from the given information .when released from rest. Another body falls freely from the same height .Then

(a)both reach the ground together

(b)body sliding down the plane will strike ground first

(c)both reach the ground with the same acceleration

(d)both reach the ground with the same acceleration.

11.A car moves with a speed of 40km/h for the first half time and with a speed of 60 km/h for the second half time .The average speed during the whole journey is

(a)45km/h (b)48km/h (c)50km/h (d)none of these

12.A car goes straight from a point A to a point B with a velocity of 40km/h and returns back with a velocity of 60km/h .The average velocity during the whole journey is

(a) 0 (b)48km/h (c)50km/h (d)none of these

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13.A particle ,initially ,at rest moving in a straight line with an acceleration a=(6t+4)m/s².The distance covered by it in 3 s is

(a)15 m (b)30m (c)45 m (d)60m

14.A body, starting from rest from the top of a smooth inclined plane ,reaches the bottom in 4s.The time taken by the body to cover one –fourth the distance starting from rest at the top ,is

(a)1 s (b)1.5s (c)2s (d)3s

15.The displacement x of a body varies with time t as

$X=-\frac{1}{3}t^2+16t+3$

Where x is in metres and t is in seconds .The time taken by the body to come to rest is

(a)12s (b)24s (c)30s (d)36s

16. An elevator is moving upwards with a constant speed of 10m/s .A man standing in the elevator drops a coin from a height of 2.5m.The coin reaches the floor of the elevator after a time (g=10m/s²)

(a)$\frac{1}{2}$s (b)$\frac{1}{\sqrt{2}}s$ (c)$\sqrt{2s}$ (d)2s

17.The speed with a ball should be thrown down ,so that it bounces 10m higher than its original level. assuming no energy loss in striking the ground ,is

(a)10m/s (b)14m/s (c)20m/s (d)none of the above

18.Two bodies start falling freely from rest from the same height at an interval of 1s.How long after the first body begins to fall will the two bodies be 10m apart?(g=10m/s²)

(a)0.5 s (b)1.0s (c)1.5s (d)2.0s

19.Starting from rest and moving with a constant acceleration ,a body covers a certain distance in time t. It covers the second half of the distance in time

(a)$\frac{1}{\sqrt{2}}$ (b)$\frac{1}{\sqrt{3}}$ (c)t$\left(1-\frac{1}{\sqrt{2}}\right)$ (d)t$\left(1-\frac{1}{\sqrt{3}}\right)$

20.A car takes 12 hours to go from place A to place B .Every hour one car starts from place to reach the other place .How many cars does each car meet on the road (excluding the places A and B)?

(a)12 (b)13 (c)23 (d)24

21.Two trains A and B ,100 km apart are travelling towards each other with starting speeds of 50km/h for \both ,train A accelerating at 18km/h and B decelerating at 18Km/h².The distance from the initial position of A where the engines cross each other is

(a)50km (b)68km (c)32km (d)59km

22.A particle ,dropped from a height h, travels a distance 9h/25 in the last second .If g= m/s².then h is

(a)100m (b)122.5m (c)145 m (b)167.5 m

23.A stone dropped from a certain height can reach the ground in 5s.If it is topped after 3 seconds of its fall and then allowed to fall again ,the time taken by the stone to reach the ground for the remaining distance is :

(a)2s (b)3s (c)4s (d)none of these

24.A particle moving with constant acceleration from A to B along a straight line AB has velocities u and v at A and B ,respectively .Its velocity at the middle point of AB is

(a)$\frac{u+v}{2}$ (b)$\sqrt{\frac{u^2+v^2}{2}}$ (c)$\frac{u^2+v^2}{u+v}$ (d)$\sqrt{uv}$

25.The displacement x of a particle moving in one dimension under constant acceleration is related to the time t as =$\sqrt{x+3}$.The displacement of the particle when its velocity is zero is

(a)zero (b)3 units (c)$\sqrt{3}$ units (d)9 units

26.A particle starts with a velocity of 200 cm/s and moves in a straight line with a retardation of 10cm/s².Its displacement will be 1500 cm.

(a)only once, after 30 s from start

(b)only once ,after 10 s from start

(c)twice ,after 10s and 30s from start

(d)never

27.A particle thrown down from the top of a tower takes time t_1,to reach the ground .It takes time t_2 if thrown from the same point with the same speed in the upward direction .The time it will take to fall freely to the ground from the top of the tower is:

(a)$\frac{t_1+t_2}{2}$ (b)$\sqrt{t_1 t_2}$ (c)$\sqrt{\frac{t_1^2+t_2^2}{2}}$ (d) $\sqrt{\frac{t_1^1+t_2^2}{2}}$

28.A car travels the first on e-third of a certain distance with a speed of 10km/h ,the next one-third distance with a speed of 20km/h and the last one – third distance with a speed of 60 km/h. The average speed of the car for the whole journey is:
(a)18km/h (b)24km/h (c)30km/h (d)36km/h

29.A bus starts from rest and moves with an acceleration of 1 m/s².A boy ,who is 48 m behind the bus, runs after it with a constant speed of 10m/s .The boy can catch the bus
(a)only once, after 8 s from start
(b)only once, after 12 s from start
(c)twice ,after 12 s from start
(d)never

30.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