YAKEEN NEET 2.0

2026

Motion in a Straight Line

Physics | Assignment Solution 06

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1. A bullet fired into a fixed target loses half of its velocity after penetrating 1 cm. How much further it will penetrate before coming to rest, assuming that it faces constant resistance to motion **[AIEEE 2005]**

(1) 1.5 cm (2) 1.0 cm

(3) ~~3.0 cm~~ 1/3 cm (4) 2.0 cm

2. A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 m/s to 20 m/s while passing through a distance of 135 m in t second. The value of t is **[CBSE PMT 2008]**

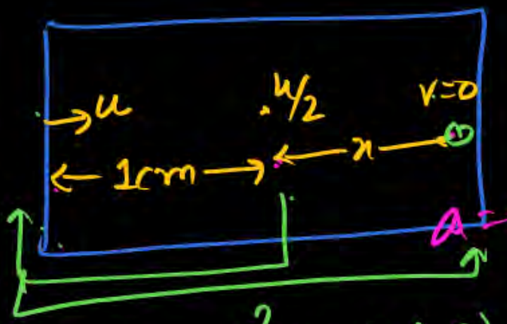
(1) 12 (2) 9

(3) 10 (4) 1.8

3. Speed of two identical cars are u and $4u$ at a specific instant. The ratio of the respective distances in which the two cars are stopped from that instant is **[AIEEE 2002]**

(1) 1 : 1 (2) 1 : 4

(3) 1 : 8 (4) 1 : 16



4. A car, starting from rest, accelerates at the rate α through a distance d, then continues at a constant speed for time t and then decelerates at the rate of $\alpha/2$ to come to rest. If the total distance traveled is $15d$, then **[AIEEE 2008]**

(1) $d = \frac{1}{2}\alpha t^2$

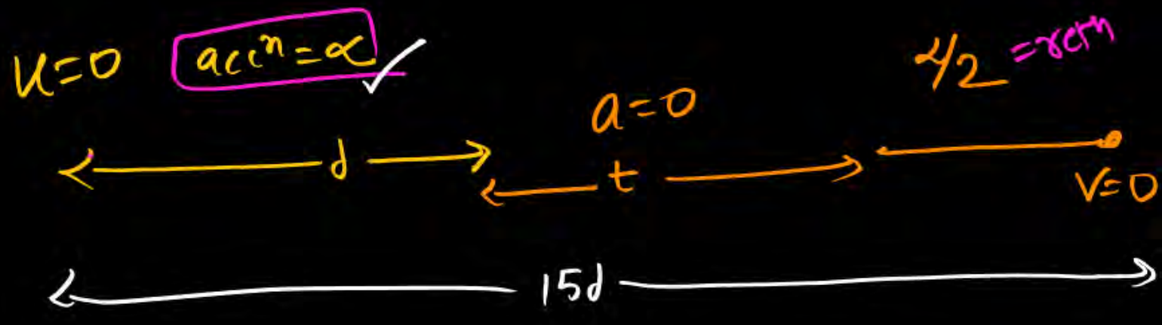
(2) $d = \frac{1}{4}\alpha t^2$

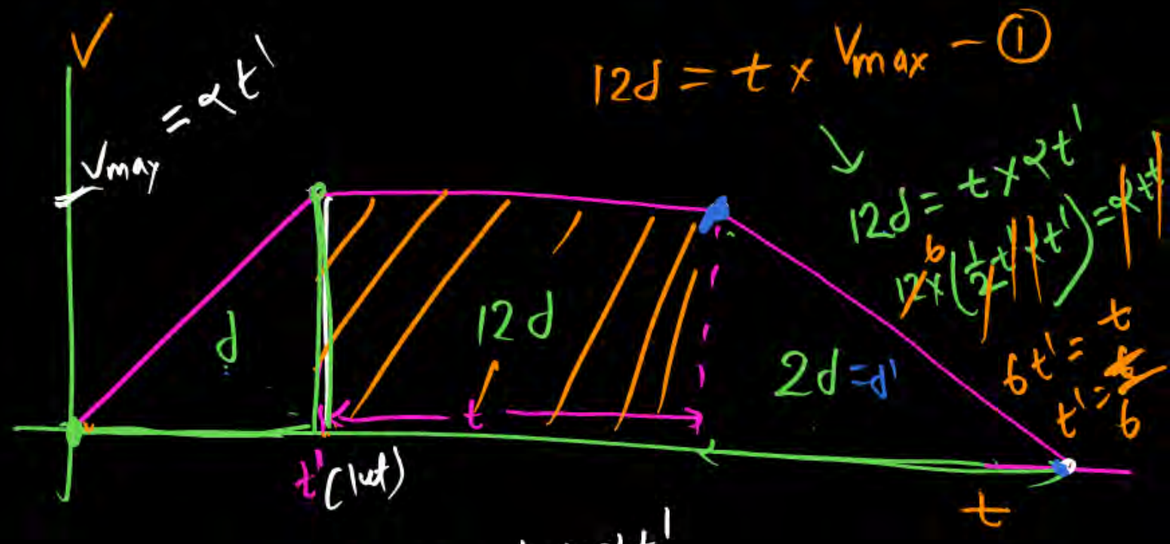
(3) $d = \frac{1}{72}\alpha t^2$

(4) $d = \frac{1}{6}\alpha t^2$

$\alpha t_1 = \beta t_2$

$\alpha s_1 = \beta s_2$





$12d = t \times V_{max}$ — ①

$12d = t \times \alpha t'$

$12 \times \left(\frac{1}{2} t t'\right) = \alpha t t'$

$6t' = t$

$t' = \frac{t}{6}$

$d = \frac{1}{12} t V_{max} = \frac{1}{12} t \alpha t'$

$d = \frac{1}{12} t \alpha \frac{t}{6} = \frac{1}{72} \alpha t^2$

5. A body travels for 15 s starting from rest with a constant acceleration. If it travels distances x, y and z in the first 5 s, second 5 s and the next 5 s, respectively, the relation between x, y and z is

(1) $x = y = z$ (2) $5x = 3y = z$

(3) $x = \frac{y}{3} = \frac{z}{5}$ (4) $x = \frac{y}{5} = \frac{z}{3}$

6. A body moving with a uniform acceleration crosses a distance of 15 m in the 3rd second and 23 m in the 5th second. The displacement in 10 s will be

(1) 150 m (2) 200 m

(3) 250 m (4) 300 m

7. A ball is released from the top of a tower of height h meters. It takes T seconds to reach the ground. What is the position of the ball at $T/3$ second?

[AIEEE 2004]

(1) $h/9$ meters from the ground

(2) $7h/9$ meters from the ground

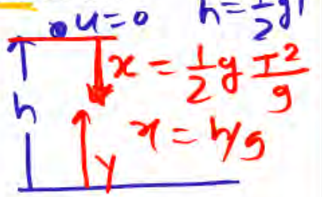
(3) $8h/9$ meters from the ground

(4) $17h/18$ meters from the ground

$x : y : z = 1 : 3 : 5$

$\frac{x}{y} = \frac{1}{3}$

$3x = y$



$h = \frac{1}{2} g T^2$

$x = \frac{1}{2} g \frac{T^2}{9}$

$x = h/9$

$a = (a+n)$

$t=0 \rightarrow u$

15m → ← 23

$z = 3^{rd}$

5^{th} sec

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$S = u + \frac{a}{2}(2n-1)$

$15 = u + \frac{a}{2}[5]$ — ①

$23 = u + \frac{a}{2}[9]$ — ②

② − ①

$8 = 2 \times \frac{a}{2}$

$a = 4 m/s^2$

Put in ①

$15 = u + \frac{4}{2} \times 5$

$15 - 10 = u$

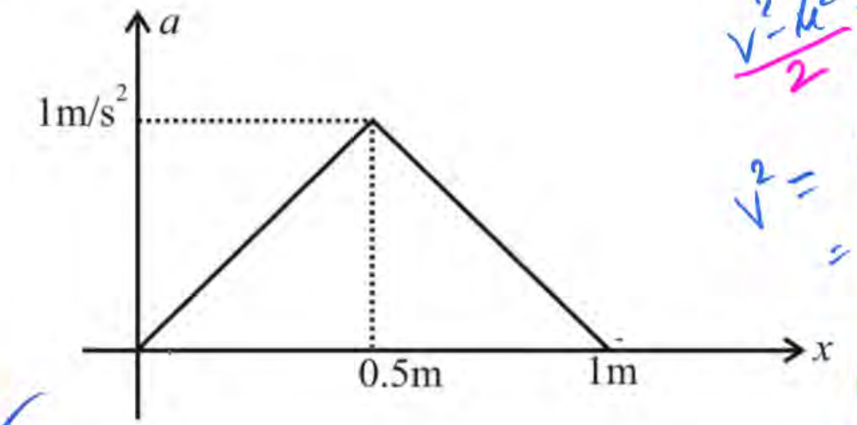
$u = 5 m/s$

$S = ut + \frac{1}{2} a t^2$

$= 5 \times 10 + \frac{1}{2} \times 4 \times (10)^2$

$= 50 + 200 = 250 m$

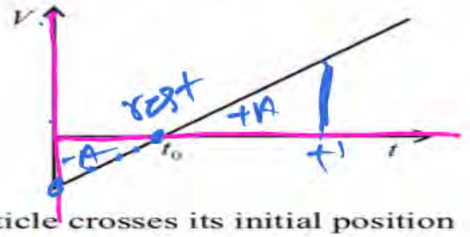
8. A body initially at rest, starts moving along x-axis in such a way so that its acceleration vs displacement plot is as shown in figure. The maximum velocity of particle is:



(1) 1 m/s (2) 6 m/s

(3) 2 m/s (4) none

9. Figure shows velocity time graph of a particle moving in straight line. Which of the following statement(s) is/are correct:



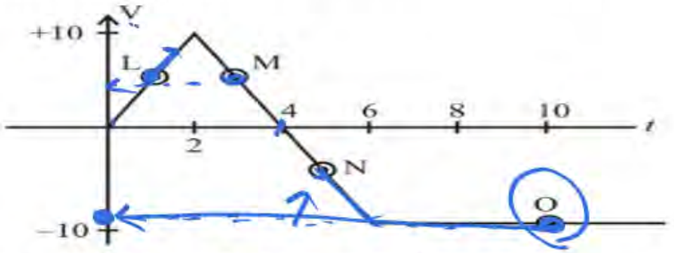
(1) Particle crosses its initial position

(2) Speed of the particle increases continuously

(3) Acceleration of particle is zero

(4) At t_0, $\frac{d|\vec{V}|}{dt}$ of particle is zero

10. A particle starts from origin and moving along x-axis, whose v-t graph is as shown. Choose the incorrect statement:



(1) At point L particle is speeding up.

(2) At point M particle is moving in positive x-direction.

(3) At point N particle is speeding up.

(4) At point O particle is rest.

11. A body starts accelerating uniformly from rest. If t_1, t_2 and t_3 are the time taken by the body to cover successive equal distances, then $t_1 : t_2 : t_3$ is

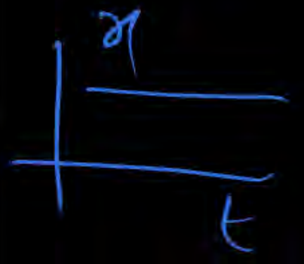
(1) $1 : \sqrt{2} : \sqrt{3}$ (2) $1 : \sqrt{2}-1 : \sqrt{3}-\sqrt{2} : \sqrt{4}-\sqrt{3}$

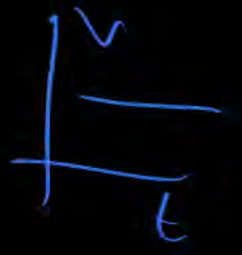
(3) $1 : 2 : 3$ (4) None of these

12.

at $t = t_0$ V is zero but a is not

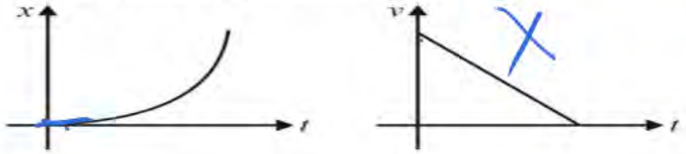
13.



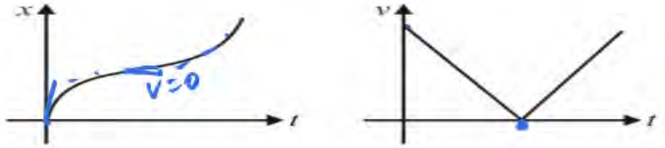


12. Which of the following pairs of graphs does not represent the motion of the same particle in the same interval (curves are parabolic):

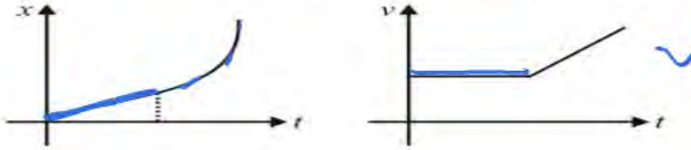
(1)



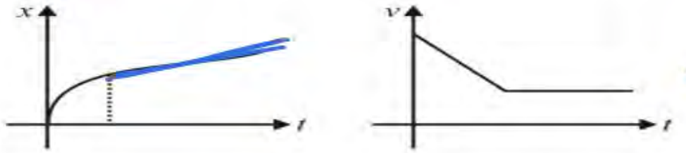
(2)



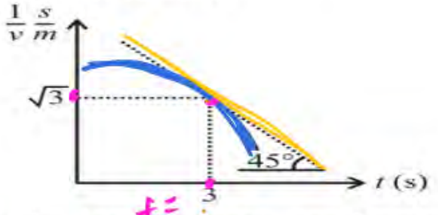
(3)



(4)



13. the diagram shows variation of $\frac{1}{v}$ with respect to time (where v is in m/s).



What is the instantaneous acceleration of body at $t = 3$ sec. $\left(\text{in } \frac{\text{m}}{\text{s}^2}\right)$?

(1) $\frac{1}{3}$ (2) 1

(3) $\frac{2}{3}$ (4) 3

Wrong

Ans → 1

$$\text{Slope} = \frac{d\frac{1}{v}}{dt} = \frac{dv^{-1}}{dt} \times \left(\frac{dv}{dv}\right)$$

$$\text{Slope} = -1\,v^{-2} \times \frac{dv}{dt}$$

$$\text{Slope} = \frac{-1}{v^2}\,a$$

$$a = -\text{slope}\,v^2$$

$$= -(-1) \times \frac{1}{3}$$

$$= +\frac{1}{3}$$

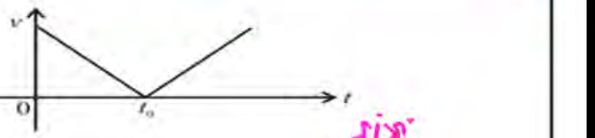
Slope = $\tan 135^\circ$

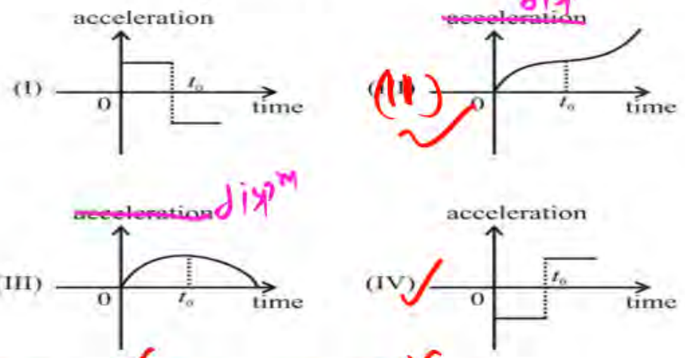
$= -1$

$\frac{1}{v} = \sqrt{3}$

$v^2 = \left(\frac{1}{\sqrt{3}}\right)^2 = \frac{1}{3}$

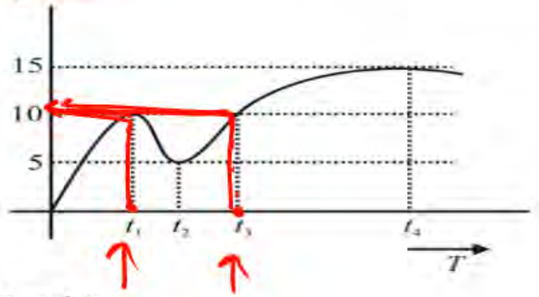
14. Velocity time graph of a particle starting from origin is given below. Choose the correct option for corresponding acceleration and displacement graphs:





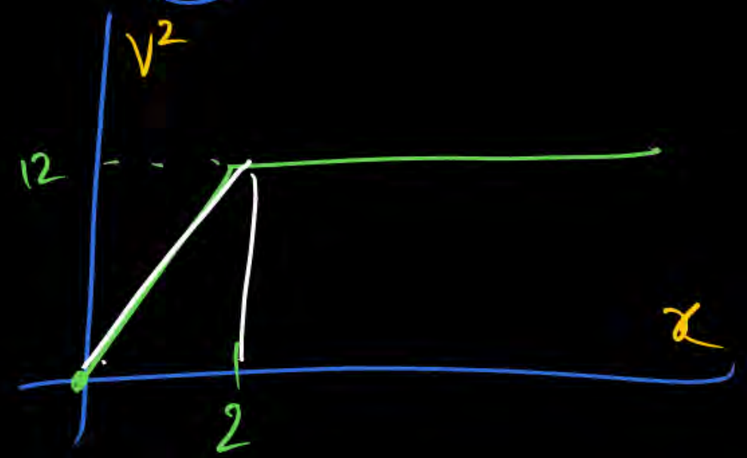
(1) II, I
(2) III, I
(3) II, IV
(4) III, IV

15. velocity time graph of a particle undergoing rectilinear motion is plotted as shown in the figure. Average acceleration of the particle is zero between time intervals:



(1) 0 and t_1
(2) t_1 and t_2
(3) t_1 and t_3
(4) t_2 and t_4

16



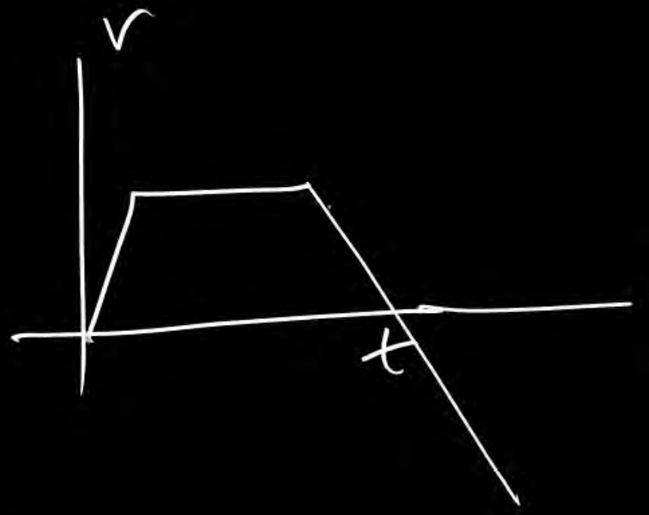
$$\text{slope} = \frac{dv^2}{dx}$$

$$\text{slop} = 2v\frac{dv}{dx}$$

$$a = \frac{\text{slope}}{2}$$

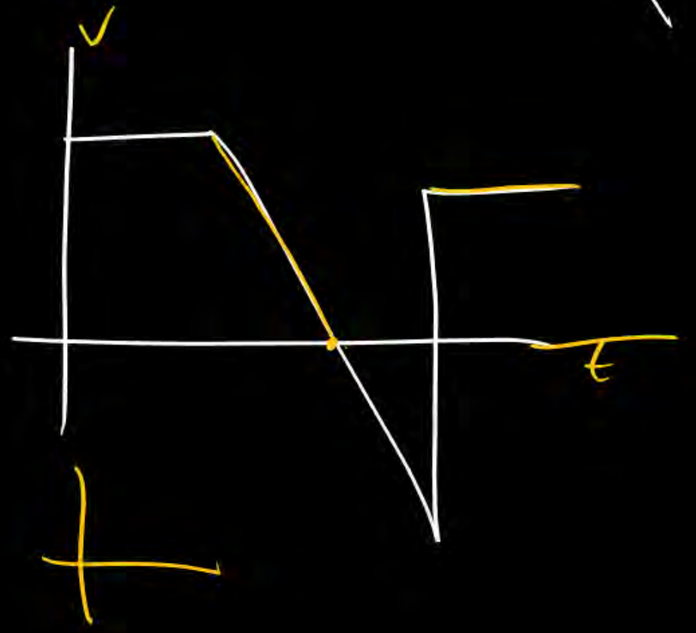
$$= \frac{6}{2} = 3 \text{ m/s}^2$$

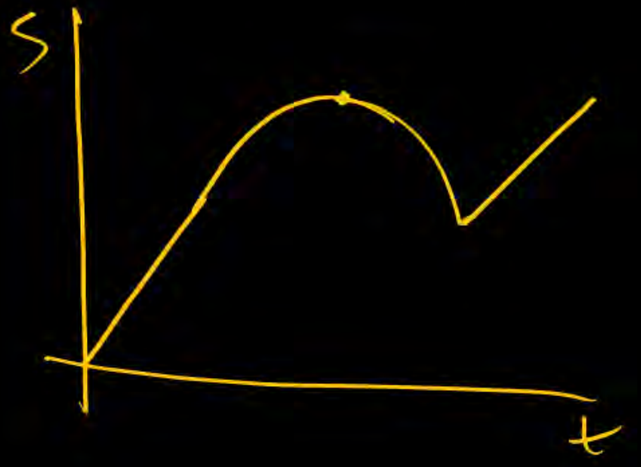
17



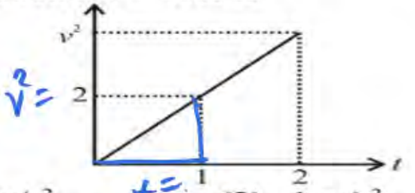
P → B

Q - D



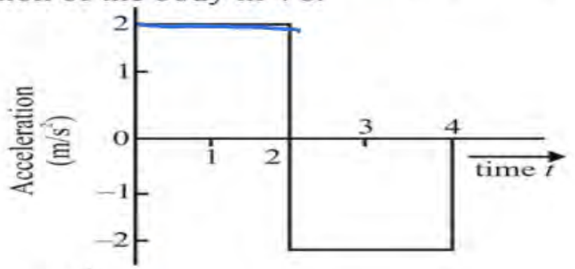


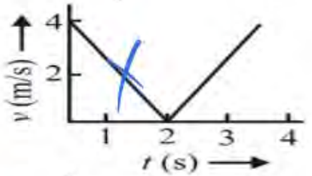
18. A particle moving along x-axis, its velocity at time t is 'v' then its "v^2-t" graph is shown below. Its acceleration at $t = 1$sec is

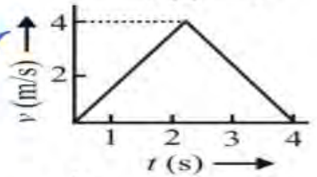


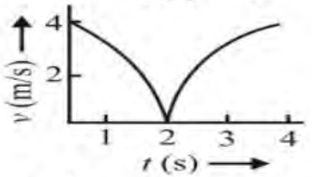
(1) 2 m/s^2 (2) 1 m/s^2
(3) 0.5 m/s^2 (4) 0.7 m/s^2

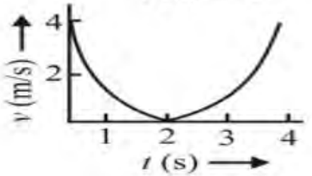
19. A body starts from rest at time $t = 0$ and undergoes and an acceleration as shown in the graph which one of the following velocity time graphs represents the motion of the body in 4 s:



(1)


(2)


(3)


(4)


$\text{Slope} = \frac{dv^2}{dt}$

$\text{Slo} = 2v\frac{dv}{dt}$

$\text{Slo} = 2v\,a$

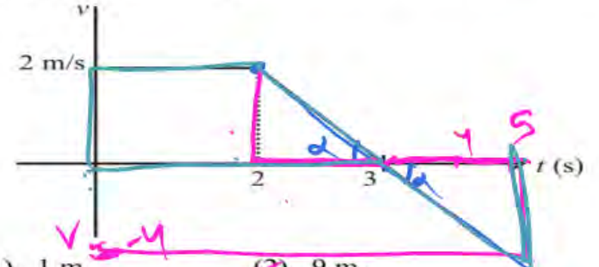
$a = \frac{\text{slope}}{2v} =$

$= \frac{2}{1.7 \times \sqrt{2}} = \frac{1}{\sqrt{2}}$

$= \frac{1}{1.41}$

$v^2 = 2$
$v = \sqrt{2}$

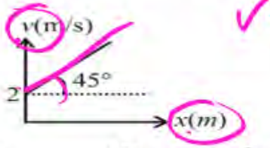
20. A particle is moving on x-axis. Its velocity-time graph is given in the figure. Find distance travelled by the particle in 5 sec.



(1) 1 m (2) 9 m

(3) 3 m (4) 7 m

21. The velocity (v) of a particle moving along x-axis, varies with its position x as shown in figure. The acceleration 'a' of the particle varies with position as



(1) $a = x + 2$ (2) $a = 2x^2 + 4$

(3) $a = x^2 + 2$ (4) $a = x - 4$

22. The velocity of a particle is given by $v = \sqrt{180 - 16x}$, where x is position in m and v in m/s. Its acceleration will be

(1) -8 m/s^{-2} (2) 5 m/s^{-2}

(3) -8 m/s^{-2} (4) 10 m/s^{-2}

23. A bullet from a gun is fired on a rectangular wooden block with velocity u. When bullet travels 24 cm through the block along its length horizontally, velocity of bullet becomes $u/3$. Then it further penetrates into the block in the same direction before coming to rest exactly at the other end of the block. The total length of the block is **[NEET 2023]**

(1) 24 cm (2) 28 cm

(3) 30 cm (4) 27 cm

24. A particle travels 10m in first 5 sec and 10m in next 3 sec. Assuming constant acceleration what is the distance travelled in next 2 sec

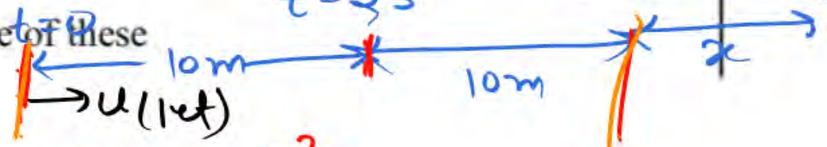
(1) 8.3 m

(2) 9.3 m

(3) 10.3 m

(4) None of these

MR Scam



$10 = u\times5 + \frac{1}{2}a(5)^2$

$10 = 5u + \frac{25}{2}a$ — (1)

$20 = u8 + \frac{1}{2}a(64)$ — (2) $\times 5$

$10 = 5u + \frac{25}{2}a$ — (1) $\times 8$

$100 = 40u + \frac{5\times64}{2}\times a$

$80 = 40u + 160a$

$20 = 40a$

$a = \frac{1}{3}\,m/s^2$

Put value of a in (1)

$20 = 8u + 32\times\frac{1}{3}$

$8u = 20 - \frac{32}{3} = \frac{28}{3}$

$u = \frac{14}{12}$

25. A bike starts from rest and accelerates at 4 m/s^2 for 5s. Then it moves at constant velocity for 25 s, and then decelerates at 2 m/s^2 until it stops, then the total distance that the bike has moved is

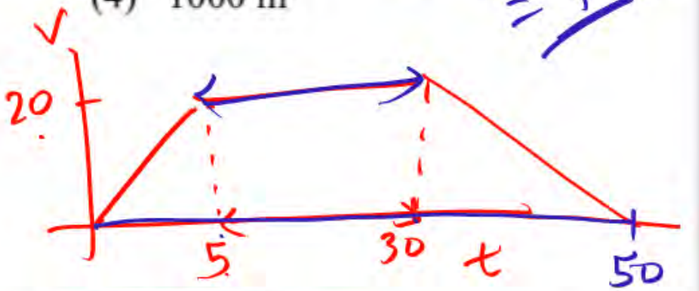
(1) 650 m

(2) 700 m

(3) 750 m

(4) 1000 m

$s = \frac{1}{2}(75)\times10 = 750$



$20 + x = u\times10 + \frac{1}{2}a(10)^2$ — (1)

$20 + x = \frac{14}{12}\times10 + \frac{1}{2}\times\frac{1}{3}\times100$

$20 + x = \frac{35}{3} + \frac{50}{3} = \frac{85}{3}$

$x = \frac{85}{3} - 20$

$= 28.33 - 20$

$= 8.33$ m

THANK YOU