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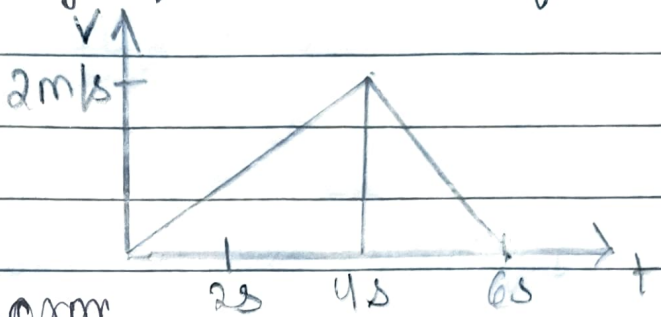
Page

# HOME ASSIGNMENT

1) The velocity-time graph of a particle moving along a straight line is as shown in fig. Which of the following is/are incorrect for this motion?



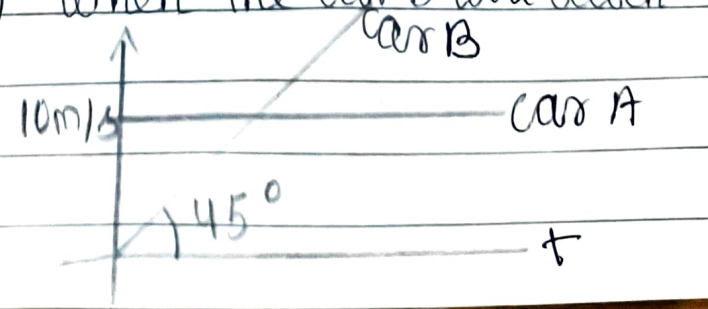

i) The motion is uniform.

ii) The acceleration is uniform

iii) The particle changes its direction of motion.

iv) The displacement during the period 0-4s is equal to the area under the velocity-time graph for this period.

2) Initially car A is 10.5 m ahead of car B. Both start moving at ~~the~~ time $t = 0$ in the same direction along a straight line. The velocity time graph of two cars is shown in fig. Find the time (in sec) when the car B will catch the car A?



As car A is 10.5m ahead of car B then in 1st case:

$\Rightarrow s = ut + \frac{1}{2}at^2 + 10.5$

$= 10t + 10.5$

In 2nd case :-

$s = ut + \frac{1}{2}at^2$

$= \frac{1}{2}t^2$

Equating both the sides :-

$\Rightarrow 10t + 10.5 = \frac{1}{2}at^2$

$\Rightarrow t^2 - 20t - 21 = 0$

$\Rightarrow t = \frac{20 + \sqrt{400 + 84}}{2}$

$\Rightarrow t = \frac{20 + 22}{2}$

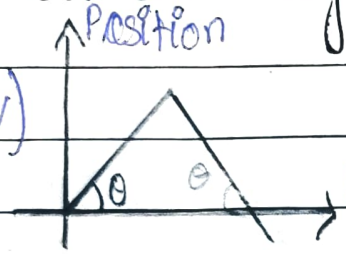
$\Rightarrow t = \frac{42}{2}$

$\Rightarrow t = 21 \text{ sec.}$

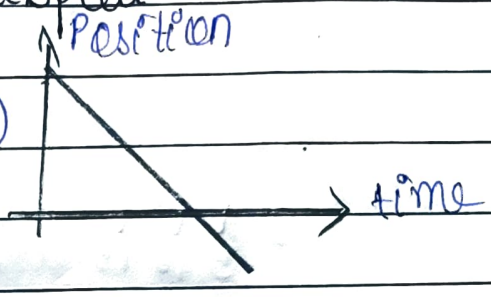
3) match the situation given in column I with the possible curves in column II.

A) Particle moving with constant speed:

q)

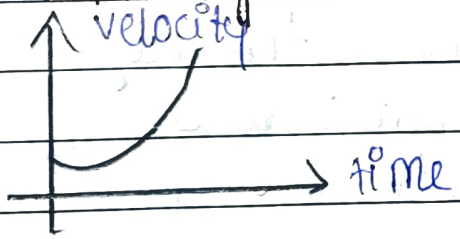



s)



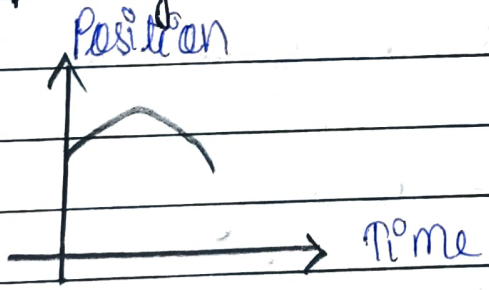

B) Particle moving with increasing acceleration:

r)



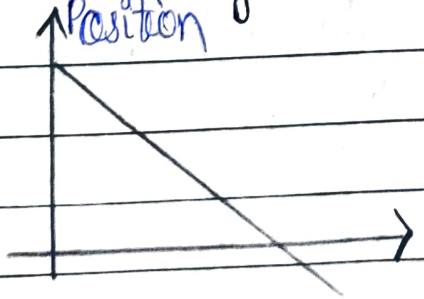

C) Particle moving with constant negative acceleration.

p)

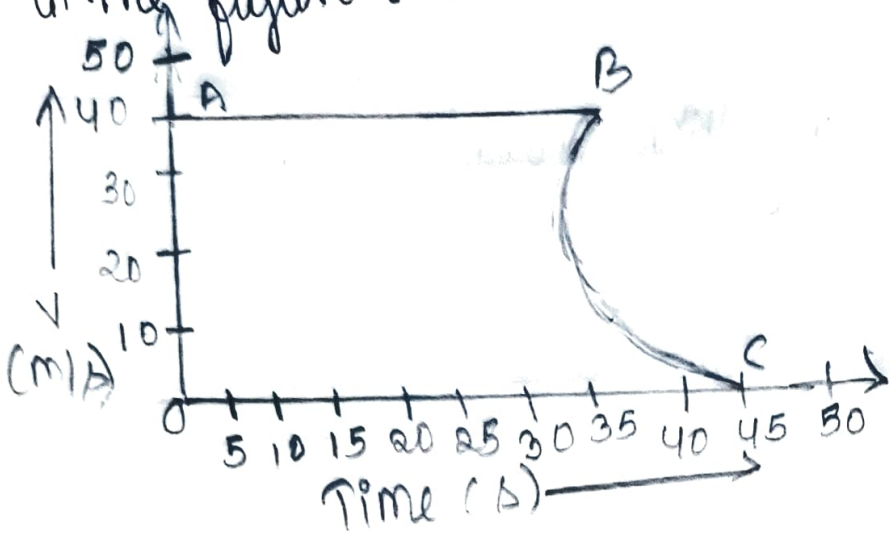



D) Particle moving with zero acceleration.

s)



4) The velocity-time graph of an object is shown in the figure:




a) State the kind of motion that object has, from A to B & from B to C.

As we know that if the slope of velocity time graph is parallel to time axis then the body is moving with a constant velocity. Hence, from A to B body has an constant velocity of 40 m/s.

From B to C, the body uniformly retards as the velocity of 40 m/s.

b) Identify the part of graph where the object has zero ~~negative~~ acceleration. Give reasons for your answer.

From A to B, the body has zero acceleration (i.e, retardation) as we know that if the body is uniform velocity acceleration automatically becomes

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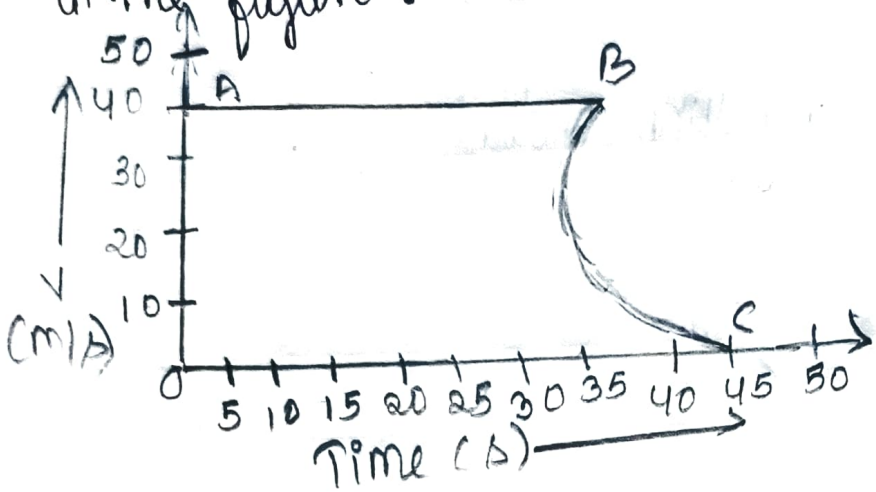


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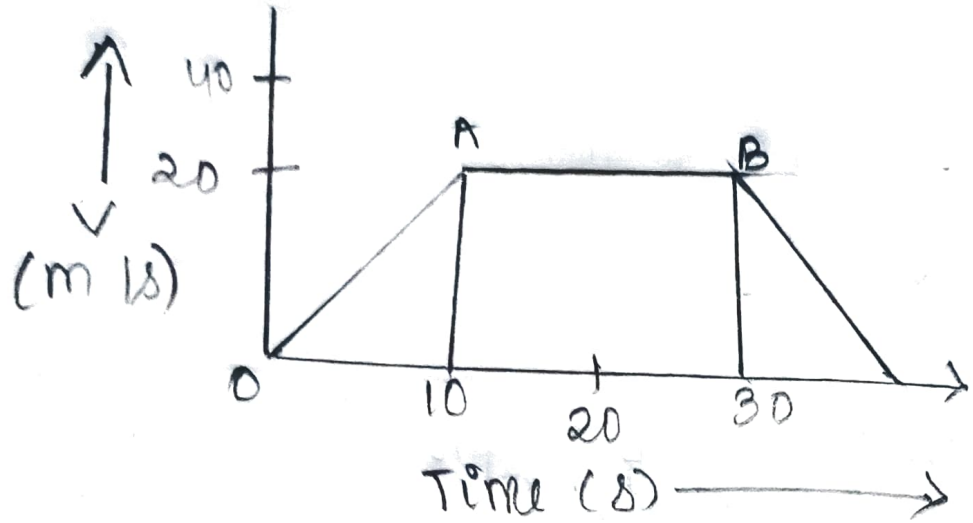
zero here in the graph as we know the body started from 40 metre per second & from A to B, when body reaches at B its velocity remains 40 metre/sec. Hence there is no change in velocity & we can say that acceleration is zero in this part of the graph.

c) Identify the part of graph where the object has negative acceleration. Give reason for your answer.

From B to C, the body has negative acceleration (i.e, retardation) as we know that if the body has some initial velocity 'u' & after some time 't' if it gains some velocity 'v' we can say the body has an acceleration 'a'. If the initial velocity is greater than the final velocity the acceleration becomes negative that is retardation of the body is seen. Similarly here at point B if we considered the initial velocity to be 40 metre/sec. it uniformly retards to 0 m/s by the time it crosses 45 secs.

5) The velocity-time graph of a body is given:




i) State the kind of motion reported by OA, OB

OA represents uniform acceleration since the slope of OA in the velocity-time graph is having a uniform positive slope.

AB represents the uniform velocity of $20ms^{-1}$. Since the slope of AB is zero.

Hence the acceleration is zero.

ii) What is the velocity of the body after 10s & after 40s?

After 10s, the velocity is $20ms^{-1}$ upto 30s & After 30s, the velocity is uniformly restarted to zero after 40s.

(iii) Calculate negative acceleration of the body.

Retardation is uniform & it is equal ~~hence~~ to ~~acceleration~~ the slop of BC, i.e.

$$\text{slope of BC} = \frac{BD}{DC} = \frac{20}{40-30} = 2ms^{-2}$$

And acceleration $= -2ms^{-2}$.

(iv) Calculate the distance covered by the body between 10th & 30th second.

Distance covered by the body b/w the 10th & 30th second $= 20 \times 20 = 400$ metres.