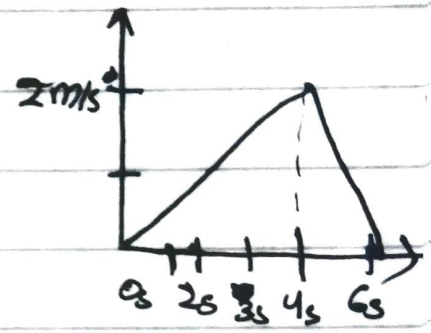
HOME ASSIGNMENT →

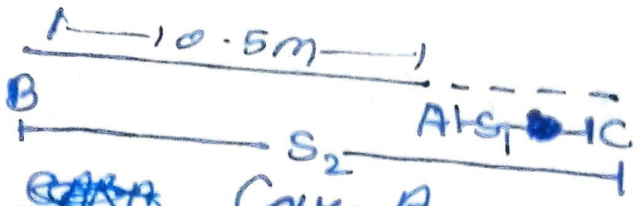
1. The velocity-time graph of a particle moving ~~with~~ along a straight line is as shown in figure. Which of the following is/are incorrect for this motion.

(1) The motion is uniform.

(3) The particle changes its direction of motion.



2. Initially car A is 10.5m ahead of car B. Both start moving at time $t = 0$ in the same direction along a straight line. The v-t graph of two cars is shown in figure. Find the time when car B will catch car A.



Case A

V = constant $\Rightarrow a = 0 ms^{-2}$

$u = 10 ms^{-1}$

$t = ?$

$$S_1 = ut + \frac{1}{2}at^2$$

$$= 10t + \frac{1}{2} \times 0 \times t^2$$

$$= 10t$$

Case B

$u = 0 ms^{-1}$

$\tan\theta = 45^\circ \Rightarrow a = 1$

$t = ?$

$$S_2 = ut + \frac{1}{2}at^2$$

$$= 0 + \frac{1}{2} \times 1 \times t^2$$

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

$\Rightarrow S_2 - S_1 = 10.5\,m$

$\Rightarrow \frac{t^2}{2} - 10t = 10.5\,m$

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

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

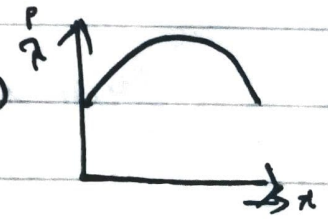
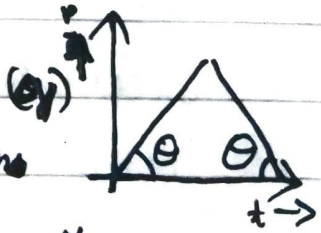
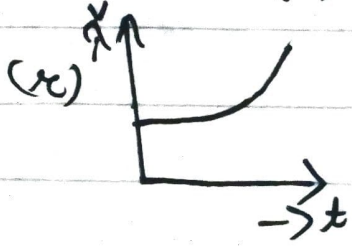
$\Rightarrow t^2 - 1t + 21t - 21 = 0$

$\Rightarrow t(t-1) + 21(t-1) = 0$

$\Rightarrow (t-1)(t+21) = 0$

So, $t = 21s$

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

Column I	Column II
(a) Particle moving with constant speed	(p) 
(b) Particle moving with ~~constant~~ increasing accelerations	(q) 
(c) Particle moving with constant -ve acceleration	(r) 

(d) Particle moving with zero acceleration.

(s) 

Ans:- a- p
b- r
c- s
d- q

4. The v-t graph of an object is shown in the figure

(a) State the kind of motion from A to B & from B to C.

From A to B = uniform motion/ constant velocity.

From B to C = Deceleration/ Retardation.

(b) Identify the part of graph where the object has zero acceleration. Give reason for your answer.

The line AB represents 0 acceleration because the velocity is constant.

(c) Identify the part of graph where the object has -ve acceleration. give reason for your answer.

The slope BC represents -ve acceleration because the direction of slope is towards -ve direction.

5. The v-t graph of a body is given:-

(i) State the kind of motion reported by OA, AB.

By OA = Uniformly accelerating motion.

By AB = Uniform motion

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

Velocity of body after 10s is $20ms^{-1}$ & after 40s is $0ms^{-1}$.

(c) Calculate the negative acceleration of the body.

$$a = \frac{v-u}{t}$$

$$= \frac{0-20}{40-30}$$

$$= \frac{-20}{10}$$

$$= -2\,ms^{-2}$$

(d) Calculate the distance covered by the body between 10^{th} & 30^{th} second.

S_{10th} :-

$u = 0\,ms^{-1}$

$a = \frac{v-u}{t} = \frac{20}{10} = 2\,ms^{-2}$

$n = 10$

$S_{10th} = 0 + \frac{2}{2}\{2(10) - 1\}$

$= 19\,m$

$S_{30}th$:-

$u = 20 ms^{-1}$

$a = 0 ms^{-2}$

$n = 30$.

$S_{30}th = u + \frac{a}{2}(2n-1)$

$= 20 + \frac{0}{2}(2(30)-1)$

$= 20 + 0$

$= 20m$

Distance covered between $S_{10}th$ & $S_{30}th$

$= S_{30}th - S_{10}th$

$= 20 - 19$

$= \underline{1m}$