Acceleration worksheet

Solutions of selected problems are given at the link
https://physicscatalyst.com/mech/acceleration-worksheet-with-answers.php

Numerical type questions

Question 1:- The displacement (in meter) of a particle moving along x-axis is given by $x = 18t + st^2$.

Calculate
(i) Instantaneous velocity at $t = 2s$
(ii) average velocity between $t = 2s$ and $t = 3s$,
(iii) Instantaneous acceleration.

Question 2 : The displacement x of a particle at time t along a straight line is given by $x = \alpha - \beta t + \gamma t^2$. Find the acceleration of the particle. (Ans = 2γ)
Hint: - procedure same as above question.

Question 3 : A car accelerates from rest at constant role α for some time, after which it decelerates at a constant rate β and come to rest. If the total time elapsed is t second, then calculate

(i) maximum velocity attained by the car

(ii) total distance travelled by the car in terms of ∝, β and t.

Question 4 : A race car accelerates on a straight road from rest to a speed of $180 kmh^{-1}$ in $25s$. Assuming uniform acceleration of the car throughout find the distance covered in this time.
Question 5 : A ball rolls down an inclined track 2 m long in us. Find (i) acceleration, (ii) time taken to cover the second meter of the track and speed of the ball at the bottom of the track.

Long answer type Questions :-

Question 1- What do you understand by term acceleration and retardation distinguish between average acceleration and instantaneous acceleration.

Question 2- Represent graphically and explain the motion of an object when the object is under the following conditions

(i) object is at rest

(ii) object with uniform motion along straight line

(iii) object with accelerated motion along straight line

(iv) object with decelerated motion moving along a straight line.

Single choice type question :-

Choose correct option to answer following questions.

Question 1 :- A body is covering distance in proportion to square of time. The acceleration of the body is

(a) increasing

(b) decreasing

(c) zero

(d) constant

Question 2: The relation between t and distance x is

$t = \alpha x^2 + \beta x$

Where α and β are constants. The retardation is

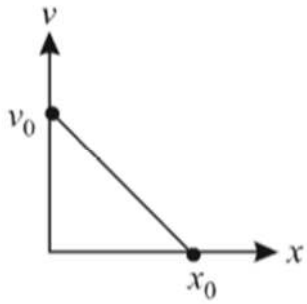
(a) $2\alpha v^3$

(b) $2\alpha\beta v^3$

(c) $2\beta v^3$

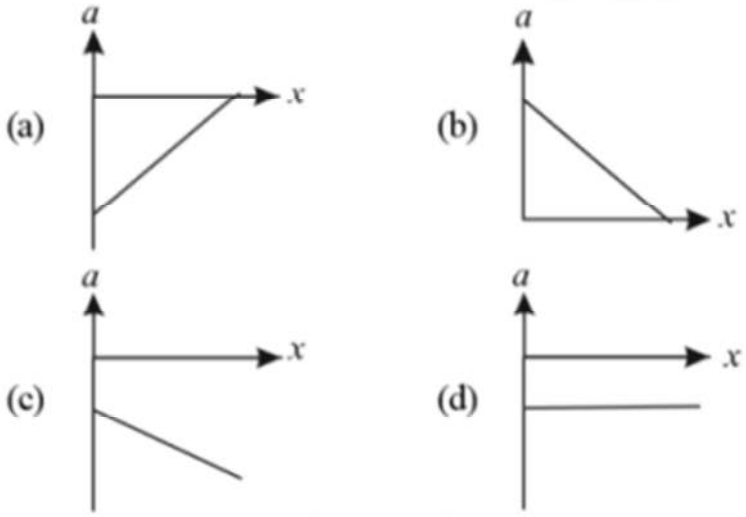
(d) $2\beta^2 v^3$

Question 3 : The velocity displacement graph of a particle moving along a



straight line is shown.

The most suitable acceleration – displacement graph will be. [IIT 05]



Question 4 : A car, starting from rest accelerates at the rate *f* through a distance s, then continues at constant speed for time t and then decelerates at the rate *f*/2 to come to rest. If the total distance traversed is 5 S, then [A1EE 05]

(a) $s = ft$

(b) $s = \frac{1}{6} ft^2$

(c) $s = \frac{1}{2} ft^2$

(d) $s = \frac{1}{4} ft^2$

Question 5 : The acceleration of a particle is increasing linearly with time t as bt. The particle starts from origin with an initial velocity v_0 .The distance travelled by the particle in time t will be

(a) $v_0 t + \frac{1}{3} bt^2$

(b) $v_0 t + \frac{1}{2} bt^2$

(c) $v_0 t + \frac{1}{6} bt^3$

(d) $v_0 t + \frac{1}{3} bt^3$

Very short answer type questions :-

Question 1 : Give an example which shows that a positive acceleration can be associated with a slowing down object.

Question 2 : is the acceleration of a car greater than when accelerator is pushed to the floor or when break pedal is pushed hard.

Question 3 : suppose the acceleration of a body varies with time. Then what does area under its acceleration – time graph for any time interval represent.

Question 4 : The v –t graphs of two objects make angle of 30^0 and 60^0 with the time axis. Find the ratio of their acceleration.

Question 5 : is it possible that your cycle has northward velocity but southward acceleration? If yes, how?