Kinematics worksheet 1

1. Under what condition is the relation $s = vt$ correct? 1

Ans. When the particle moves with uniform velocity and along a straight line

2. Two balls of different masses are thrown vertically upward with same initial speed. Which one will rise to a greater height? 1

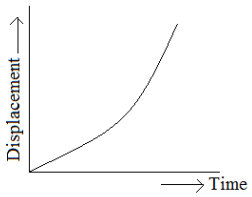
Ans. Same height

3. What is the relative velocity of two bodies having equal velocities? 1

Ans. zero

4. Draw displacement time graph for uniformly accelerated motion. What is its shape? 2

Ans. parabolic



5. Sameer went on his bike from Delhi to Gurgaon at a speed of 60km/hr and came back at a speed of 40km/hr. what is his average speed for entire journey. 2

Ans. $v_{av} = 2v_1v_2/v_1 + v_2 = 2x60x40/60 + 40 = 48$ km/hr

6. Derive $v = u + at$ from calculus method. 2

Ans.

7. A particle is moving along a straight line and its position is given by the relation 3

$x = (t^3 - 6t^2 - 15t + 40)m$

Find (a) The time at which velocity is zero.

(b) Position and displacement of the particle at that point.

(c) Acceleration for the particle at that line.

Ans. $X = t^3 - 6t^2 - 15t + 40$,

$V = \frac{dx}{dt} = (3t^2 - 12t - 15)$m/s

$A = \frac{dv}{dx} = (6t - 12)$m/s^2

(a) $3t^2 - 12t - 15 = 0$

$t = -1$ or $t = 5$

$t = 5$ sec

(b) position at $t = 0$ s, $x = 40$m

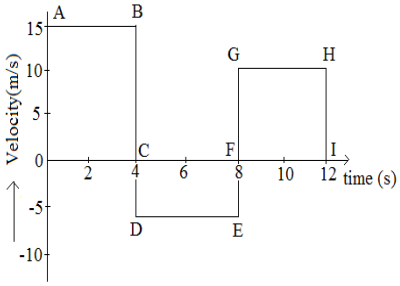
position at $t = 5$s, $x = (5)^3 - 6(5)^2 - 15(5) + 40 = -60$m

Displacement at t = 5s and t = 0s

S = x5 – x0 = -60 – 40 = -100m

(c) Acceleration at t = 5s, A = 6(5) – 12 = 18 m/s^2

8 Velocity time graph of a moving particle is shown. 3



Find the displacement

(1) 0 – 4 s

(2) 0 – 8

(3) 0- 12 s from the graph.

Ans. (1) S_1 = area of OABS = 15 x 4 = 60m

(2) $S_2 = S_1$ + area of CDEF = 60 + (-5) x 4 = 40m

(3) $S_3 = S_1$ + area CDEF + area of FGHI = 60 – 20 + 40 = 80m