

(14) Kinematics

- 1) The velocity, v m/s, of a particle moving in a straight line, t seconds after leaving a fixed point O is given by $v = t^2 + kt + 12$, where k is a constant. At $t = 3$ s The particle rests momentarily at point M .
 - a) Find the other value of t where the particle is momentarily at rest.
 - b) Calculate the average speed of the particle for the first 6 seconds.
 - c) Calculate the time at which the particle passes point M again.

- 2) A particle moves in a straight line. After time t seconds, the velocity of the particle (in m/s) is $v = 16 + 4t - kt^2$, where k is a constant.
 - a) If the maximum velocity is 20 m/s, find the value of k .
 - b) Find the time when the particle is moving at its initial velocity again.

- 3) Two cyclists, Alvin and Bryan, are moving in the same direction on the same straight track. At a certain point O , Alvin is travelling at a speed of 20 m/s and decelerate uniformly at $4m/s^2$, overtakes Bryan who is travelling at 4 m/s and accelerating uniformly at $2 m/s^2$.
 - a) Find the distance between Alvin and Bryan three seconds after passing O .
 - b) Calculate the velocity of Bryan when he overtakes Alvin.