

317 - (9709-S 2018-Paper 4/1-Q4) - GENERAL MOTION IN STRAIGHT LINE

A particle P moves in a straight line starting from a point O . At time t s after leaving O , the displacement s m from O is given by $s = t^3 - 4t^2 + 4t$ and the velocity is v m s⁻¹.

(i) Find an expression for v in terms of t . [2]

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(ii) Find the two values of t for which P is at instantaneous rest. [2]

(iii) Find the minimum velocity of P . [3]

318 - (9709-S 2018-Paper 4/2-Q6) - GENERAL MOTION IN STRAIGHT LINE

A particle P moves in a straight line passing through a point O . At time t s, the acceleration, a m s⁻², of P is given by $a = 6 - 0.24t$. The particle comes to instantaneous rest at time $t = 20$.

(i) Find the value of t at which the particle is again at instantaneous rest. [5]

(ii) Find the distance the particle travels between the times of instantaneous rest. [3]

321 - (9709-W 2018-Paper 4/1-Q7) - GENERAL MOTION IN STRAIGHT LINE

A particle moves in a straight line starting from rest from a point O . The acceleration of the particle at time t s after leaving O is $a \text{ m s}^{-2}$, where

$$a = 5.4 - 1.62t.$$

- (i) Find the positive value of t at which the velocity of the particle is zero, giving your answer as an exact fraction. [4]

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- (ii) Find the velocity of the particle at $t = 10$ and sketch the velocity-time graph for the first ten seconds of the motion. [3]

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- (iii) Find the total distance travelled during the first ten seconds of the motion. [5]

The acceleration of the particle for $t > 9$ is given by $a = -3t^{-\frac{1}{2}}$.

(iii) Find the velocity of the particle when $t = 25$.

[4]

323 - (9709-S 2019-Paper 4/1-Q5) - GENERAL MOTION IN STRAIGHT LINE

A particle P moves in a straight line from a fixed point O . The velocity $v \text{ m s}^{-1}$ of P at time $t \text{ s}$ is given by

$$v = t^2 - 8t + 12 \quad \text{for } 0 \leq t \leq 8.$$

(i) Find the minimum velocity of P . [3]

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(ii) Find the total distance travelled by P in the interval $0 \leq t \leq 8$. [7]

324 - (9709-S 2019-Paper 4/3-Q6) - GENERAL MOTION IN STRAIGHT LINE

A particle P moves in a straight line. The acceleration $a \text{ m s}^{-2}$ of P at time $t \text{ s}$ is given by $a = 6t - 12$. The displacement of P from a fixed point O on the line is $s \text{ m}$. It is given that $s = 5$ when $t = 1$ and $s = 1$ when $t = 3$.

- (i) Show that $s = t^3 - 6t^2 + pt + q$, where p and q are constants to be found. [4]

325 - (9709-S 2019-Paper 4/2-Q7) - GENERAL MOTION IN STRAIGHT LINE

Particles P and Q leave a fixed point A at the same time and travel in the same straight line. The velocity of P after t seconds is $6t(t-3) \text{ m s}^{-1}$ and the velocity of Q after t seconds is $(10-2t) \text{ m s}^{-1}$.

(i) Sketch, on the same axes, velocity-time graphs for P and Q for $0 \leq t \leq 5$. [3]

(ii) Verify that P and Q meet after 5 seconds. [4]

(iii) Find the greatest distance between P and Q for $0 \leq t \leq 5$. [4]

326 - (9709-W 2019-Paper 4/2-Q1) - GENERAL MOTION IN STRAIGHT LINE

A particle moves in a straight line. The displacement of the particle at time t s is s m, where

$$s = t^3 - 6t^2 + 4t.$$

Find the velocity of the particle at the instant when its acceleration is zero.

[4]

327 - (9709-W 2019-Paper 4/3-Q6) - GENERAL MOTION IN STRAIGHT LINE

Particle P travels in a straight line from A to B . The velocity of P at time t s after leaving A is denoted by v m s⁻¹, where

$$v = 0.04t^3 + ct^2 + kt.$$

P takes 5 s to travel from A to B and it reaches B with speed 10 m s⁻¹. The distance AB is 25 m.

- (i) Find the values of the constants c and k . [6]
- (ii) Show that the acceleration of P is a minimum when $t = 2.5$. [3]

328 - (9709-W 2019-Paper 4/1-Q7) - GENERAL MOTION IN STRAIGHT LINE

A particle moves in a straight line, starting from rest at a point O , and comes to instantaneous rest at a point P . The velocity of the particle at time t s after leaving O is v m s⁻¹, where

$$v = 0.6t^2 - 0.12t^3.$$

(i) Show that the distance OP is 6.25 m.

[5]

