
Variable Acceleration - Edexcel Past Exam Questions

1. A particle P moves on the x -axis. At time t seconds, its acceleration is $(5 - 2t) \text{ m s}^{-2}$, measured in the direction of x increasing. When $t = 0$, its velocity is 6 m s^{-1} measured in the direction of x increasing. Find the time when P is instantaneously at rest in the subsequent motion.

(6)

June 06 Q1

2. A particle P moves on the x -axis. At time t seconds the velocity of P is $v \text{ m s}^{-1}$ in the direction of x increasing, where v is given by

$$v = \begin{cases} 8t - \frac{3}{2}t^2, & 0 \leq t \leq 4 \\ 16 - 2t, & t > 4. \end{cases}$$

When $t = 0$, P is at the origin O .

Find

- (a) the greatest speed of P in the interval $0 \leq t \leq 4$, (4)
- (b) the distance of P from O when $t = 4$, (3)
- (c) the time at which P is instantaneously at rest for $t > 4$, (1)
- (d) the total distance travelled by P in the first 10 s of its motion. (8)

June 07 Q8

3. A particle P moves along the x -axis in a straight line so that, at time t seconds, the velocity of P is $v \text{ m s}^{-1}$, where

$$v = \begin{cases} 10t - 2t^2, & 0 \leq t \leq 6, \\ \frac{-432}{t^2}, & t > 6. \end{cases}$$

At $t = 0$, P is at the origin O . Find the displacement of P from O when

- (a) $t = 6$, (3)
- (b) $t = 10$. (5)

Jan 09 Q4



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4. At time $t = 0$ a particle P leaves the origin O and moves along the x -axis. At time t seconds the velocity of P is v m s⁻¹, where

$$v = 8t - t^2.$$

- (a) Find the maximum value of v . (4)
- (b) Find the time taken for P to return to O . (5)

June 09 Q2

5. A particle P moves along the x -axis. At time t seconds the velocity of P is v m s⁻¹ in the positive x -direction, where $v = 3t^2 - 4t + 3$. When $t = 0$, P is at the origin O . Find the distance of P from O when P is moving with minimum velocity.

(8)

Jan 10 Q1

6. A particle P moves on the x -axis. The acceleration of P at time t seconds, $t \geq 0$, is $(3t + 5)$ m s⁻² in the positive x -direction. When $t = 0$, the velocity of P is 2 m s⁻¹ in the positive x -direction. When $t = T$, the velocity of P is 6 m s⁻¹ in the positive x -direction.

Find the value of T . (6)

June 10 Q1

7. A particle moves along the x -axis. At time $t = 0$ the particle passes through the origin with speed 8 m s⁻¹ in the positive x -direction. The acceleration of the particle at time t seconds, $t \geq 0$, is $(4t^3 - 12t)$ m s⁻² in the positive x -direction.

Find

- (a) the velocity of the particle at time t seconds, (3)
- (b) the displacement of the particle from the origin at time t seconds, (2)
- (c) the values of t at which the particle is instantaneously at rest. (3)

Jan 11 Q3



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8. A particle P moves on the x -axis. The acceleration of P at time t seconds is $(t - 4) \text{ m s}^{-2}$ in the positive x -direction. The velocity of P at time t seconds is $v \text{ m s}^{-1}$. When $t = 0$, $v = 6$.

Find

- (a) v in terms of t , (4)
- (b) the values of t when P is instantaneously at rest, (3)
- (c) the distance between the two points at which P is instantaneously at rest. (4)

June 11 Q6
