

Power

Question Paper 2

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Energy, Work and Power
Sub Topic	Power
Booklet	Question Paper 2

Time Allowed: 58 minutes

Score: /48

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 1 A particle P starts to move from a point O and travels in a straight line. The velocity of P is $k(60t^2 - t^3) \text{ m s}^{-1}$ at time t s after leaving O , where k is a constant. The maximum velocity of P is 6.4 m s^{-1} .

(i) Show that $k = 0.0002$. [3]

P comes to instantaneous rest at a point A on the line. Find

(ii) the distance OA , [5]

(iii) the magnitude of the acceleration of P at A , [2]

(iv) the speed of P when it subsequently passes through O . [2]

- 2 A particle moves in a straight line. Its velocity t seconds after leaving a fixed point O on the line is $v \text{ m s}^{-1}$, where $v = 0.2t + 0.006t^2$. For the instant when the acceleration of the particle is 2.5 times its initial acceleration,

(i) show that $t = 25$, [3]

(ii) find the displacement of the particle from O . [3]

- 3 A particle P starts from a point O and moves along a straight line. P 's velocity t s after leaving O is $v \text{ m s}^{-1}$, where

$$v = 0.16t^{\frac{3}{2}} - 0.016t^2.$$

P comes to rest instantaneously at the point A .

(i) Verify that the value of t when P is at A is 100. [1]

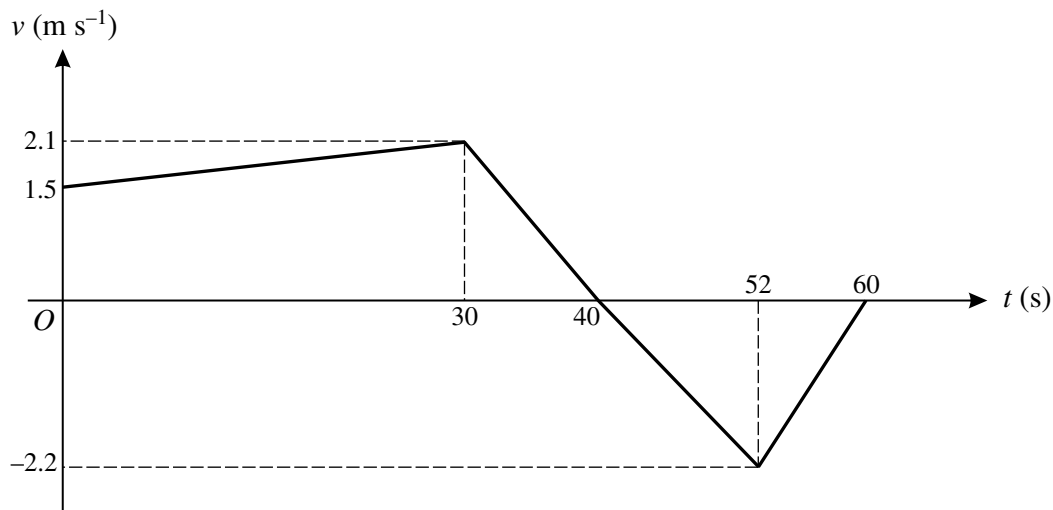
(ii) Find the maximum speed of P in the interval $0 < t < 100$. [4]

(iii) Find the distance OA . [3]

(iv) Find the value of t when P passes through O on returning from A . [2]

- 4 A particle P moves in a straight line. It starts from a point O on the line with velocity 1.8 m s^{-1} . The acceleration of P at time t s after leaving O is $0.8t^{-0.75} \text{ m s}^{-2}$. Find the displacement of P from O when $t = 16$. [6]

5



A woman walks in a straight line. The woman's velocity t seconds after passing through a fixed point A on the line is $v \text{ m s}^{-1}$. The graph of v against t consists of 4 straight line segments (see diagram). The woman is at the point B when $t = 60$. Find

- (i) the woman's acceleration for $0 < t < 30$ and for $30 < t < 40$, [3]
- (ii) the distance AB , [2]
- (iii) the total distance walked by the woman. [1]

6 A particle P moves in a straight line. It starts from rest at A and comes to rest instantaneously at B . The velocity of P at time t seconds after leaving A is $v \text{ m s}^{-1}$, where $v = 6t^2 - kt^3$ and k is a constant.

- (i) Find an expression for the displacement of P from A in terms of t and k . [2]
- (ii) Find an expression for t in terms of k when P is at B . [1]

Given that the distance AB is 108 m, find

- (iii) the value of k , [2]
- (iv) the maximum value of v when the particle is moving from A towards B . [3]