

Stationary Points

Question Paper 5

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Differentiation
Sub Topic	Stationary Points
Booklet	Question Paper 5

Time Allowed: 54 minutes

Score: /45

Percentage: /100

Grade Boundaries:

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

- 1 A curve has equation $y = \frac{1}{x-3} + x$.
- (i) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. [2]
- (ii) Find the coordinates of the maximum point A and the minimum point B on the curve. [5]

- 2 A curve is such that $\frac{dy}{dx} = 3x^{\frac{1}{2}} - 6$ and the point $(9, 2)$ lies on the curve.
- (i) Find the equation of the curve. [4]
- (ii) Find the x -coordinate of the stationary point on the curve and determine the nature of the stationary point. [3]

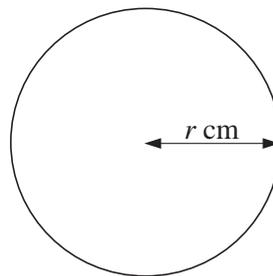
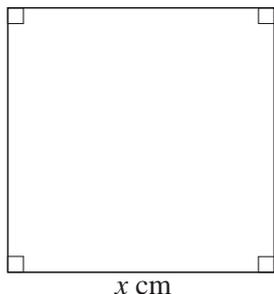
- 3 A solid rectangular block has a square base of side x cm. The height of the block is h cm and the total surface area of the block is 96 cm^2 .
- (i) Express h in terms of x and show that the volume, $V \text{ cm}^3$, of the block is given by

$$V = 24x - \frac{1}{2}x^3. \quad [3]$$

Given that x can vary,

- (ii) find the stationary value of V , [3]
- (iii) determine whether this stationary value is a maximum or a minimum. [2]

4



A wire, 80 cm long, is cut into two pieces. One piece is bent to form a square of side x cm and the other piece is bent to form a circle of radius r cm (see diagram). The total area of the square and the circle is A cm².

(i) Show that $A = \frac{(\pi + 4)x^2 - 160x + 1600}{\pi}$. [4]

(ii) Given that x and r can vary, find the value of x for which A has a stationary value. [4]

5 The equation of a curve C is $y = 2x^2 - 8x + 9$ and the equation of a line L is $x + y = 3$.

(i) Find the x -coordinates of the points of intersection of L and C . [4]

(ii) Show that one of these points is also the stationary point of C . [3]

6 The equation of a curve is $y = (2x - 3)^3 - 6x$.

(i) Express $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ in terms of x . [3]

(ii) Find the x -coordinates of the two stationary points and determine the nature of each stationary point. [5]