

Functions

Question Paper 8

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Functions
Sub Topic	
Booklet	Question Paper 8

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** Determine the set of values of the constant k for which the line $y = 4x + k$ does not intersect the curve $y = x^2$. [3]

- 2** The function f is defined by $f : x \mapsto 2x^2 - 8x + 11$ for $x \in \mathbb{R}$.

(i) Express $f(x)$ in the form $a(x + b)^2 + c$, where a , b and c are constants. [3]

(ii) State the range of f . [1]

(iii) Explain why f does not have an inverse. [1]

The function g is defined by $g : x \mapsto 2x^2 - 8x + 11$ for $x \leq A$, where A is a constant.

(iv) State the largest value of A for which g has an inverse. [1]

(v) When A has this value, obtain an expression, in terms of x , for $g^{-1}(x)$ and state the range of g^{-1} . [4]

- 3** The function f is defined by $f(x) = a + b \cos 2x$, for $0 \leq x \leq \pi$. It is given that $f(0) = -1$ and $f(\frac{1}{2}\pi) = 7$.

(i) Find the values of a and b . [3]

(ii) Find the x -coordinates of the points where the curve $y = f(x)$ intersects the x -axis. [3]

(iii) Sketch the graph of $y = f(x)$. [2]

- 4** The function f is defined by $f : x \mapsto x^2 - 3x$ for $x \in \mathbb{R}$.

(i) Find the set of values of x for which $f(x) > 4$. [3]

(ii) Express $f(x)$ in the form $(x - a)^2 - b$, stating the values of a and b . [2]

(iii) Write down the range of f . [1]

(iv) State, with a reason, whether f has an inverse. [1]

The function g is defined by $g : x \mapsto x - 3\sqrt{x}$ for $x \geq 0$.

(v) Solve the equation $g(x) = 10$. [3]

5 A function f is defined by $f : x \mapsto 3 - 2 \sin x$, for $0^\circ \leq x \leq 360^\circ$.

(i) Find the range of f . [2]

(ii) Sketch the graph of $y = f(x)$. [2]

A function g is defined by $g : x \mapsto 3 - 2 \sin x$, for $0^\circ \leq x \leq A^\circ$, where A is a constant.

(iii) State the largest value of A for which g has an inverse. [1]

(iv) When A has this value, obtain an expression, in terms of x , for $g^{-1}(x)$. [2]

6 The function $f : x \mapsto 5 \sin^2 x + 3 \cos^2 x$ is defined for the domain $0 \leq x \leq \pi$.

(i) Express $f(x)$ in the form $a + b \sin^2 x$, stating the values of a and b . [2]

(ii) Hence find the values of x for which $f(x) = 7 \sin x$. [3]

(iii) State the range of f . [2]