Gradients, Tangents & Normals
Question Paper 5

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Differentiation
Sub Topic	Gradients, Tangents & Normals
Booklet	Question Paper 5

Time Allowed: **34 minutes**

Score: /28

Percentage: /100

Grade Boundaries:

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

1 A function f is defined by $f : x \mapsto (2x - 3)^3 - 8$, for $2 \leqslant x \leqslant 4$.

    (i) Find an expression, in terms of x, for $f'(x)$ and show that f is an increasing function.   [4]

    (ii) Find an expression, in terms of x, for $f^{-1}(x)$ and find the domain of f^{-1}.   [4]

2 Find the gradient of the curve $y = \dfrac{12}{x^2 - 4x}$ at the point where $x = 3$.   [4]

3 The equation of a curve is $y = x^2 - 3x + 4$.

    (i) Show that the whole of the curve lies above the x-axis.   [3]

    (ii) Find the set of values of x for which $x^2 - 3x + 4$ is a decreasing function of x.   [1]

    The equation of a line is $y + 2x = k$, where k is a constant.

    (iii) In the case where $k = 6$, find the coordinates of the points of intersection of the line and the curve.   [3]

    (iv) Find the value of k for which the line is a tangent to the curve.   [3]

4 A curve is such that $\dfrac{dy}{dx} = 3x^2 - 4x + 1$. The curve passes through the point $(1, 5)$.

    (i) Find the equation of the curve.   [3]

    (ii) Find the set of values of x for which the gradient of the curve is positive.   [3]