Implicit
Difficulty: Medium

Question Paper 2

Level	A Level only
Subject	Maths - Pure
Exam Board	Edexcel
Topic	Differentiation
Sub-Topic	Implicit
Difficulty	Medium
Booklet	Question Paper 2

Time allowed: **53 minutes**

Score: **/44**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>76%	61%	52%	42%	33%	23%	<23%

. A curve C has the equation $y^2 - 3y = x^3 + 8$.

(a) Find $\frac{dy}{dx}$ in terms of x and y. **(4)**

(b) Hence find the gradient of C at the point where $y = 3$. **(3)**

(Total 7 marks)

Question 2

The curve C has the equation $ye^{-2x} = 2x + y^2$.

(a) Find $\frac{dy}{dx}$ in terms of x and y. **(5)**

The point P on C has coordinates $(0, 1)$.

(b) Find the equation of the normal to C at P, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers. **(4)**

(Total 9 marks)

The curve C has the equation

$$\cos 2x + \cos 3y = 1, \quad -\frac{\pi}{4} \leqslant x \leqslant \frac{\pi}{4}, \quad 0 \leqslant y \leqslant \frac{\pi}{6}$$

(a) Find $\frac{\mathrm{d}y}{\mathrm{d}x}$ in terms of x and y. **(3)**

The point P lies on C where $x = \frac{\pi}{6}$.

(b) Find the value of y at P. **(3)**

(c) Find the equation of the tangent to C at P, giving your answer in the form $ax + by + c\pi = 0$, where a, b and c are integers. **(3)**

(Total 9 marks)

The curve C has equation

$$2x^2y + 2x + 4y - \cos(\pi y) = 17$$

(a) Use implicit differentiation to find $\frac{dy}{dx}$ in terms of x and y. **(5)**

The point P with coordinates $\left(3, \frac{1}{2}\right)$ lies on C

The normal to C at P meets the x-axis at the point A.

(b) Find the x coordinate of A, giving your answer in the form $\frac{a\pi + b}{c\pi + d}$, where a, b, c and d are integers to be determined. **(4)**

(Total 9 marks)

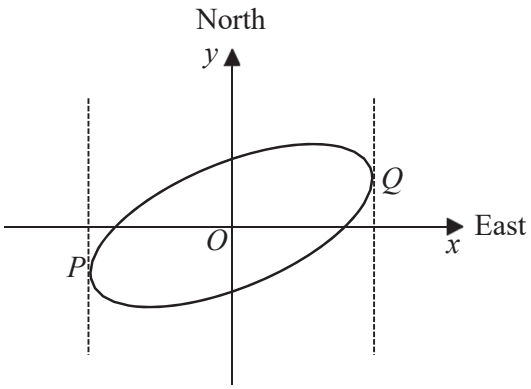

Figure 4

Figure 4 shows a sketch of the curve with equation $x^2 - 2xy + 3y^2 = 50$

(a) Show that $\frac{dy}{dx} = \frac{y - x}{3y - x}$ **(4)**

The curve is used to model the shape of a cycle track with both x and y measured in km.

The points P and Q represent points that are furthest west and furthest east of the origin O, as shown in Figure 4.

Using part (a),

(b) find the exact coordinates of the point P. **(5)**

(c) Explain briefly how to find the coordinates of the point that is furthest north of the origin O. (You **do not** need to carry out this calculation).

(1)

(Total 10 marks)