Parametrics Difficulty: Easy

Question Paper 2

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

Time allowed: **41 minutes**

Score: **/34**

Percentage: **/100**

Grade Boundaries:

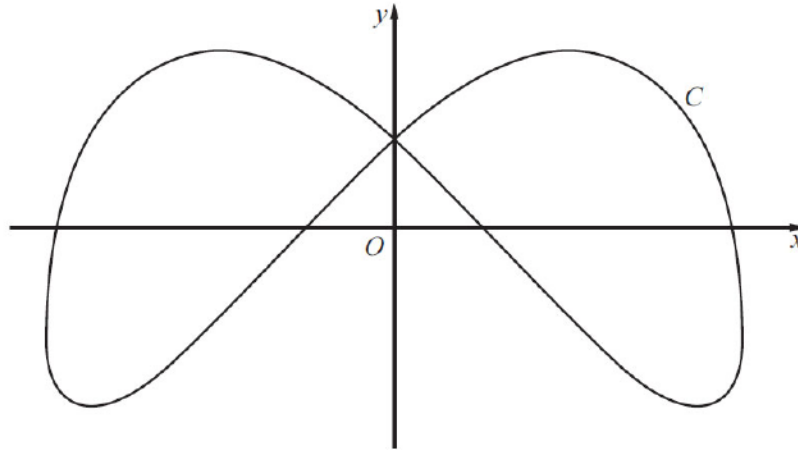| A*	A	B	C	D	E	U
>76%	61%	52%	42%	33%	23%	<23%

Figure 2

Figure 2 shows a sketch of the curve C with parametric equations

$$x = 4\sin\left(t + \frac{\pi}{6}\right), \qquad y = 3\cos 2t, \qquad 0 \leqslant t < 2\pi$$

(a) Find an expression for $\dfrac{dy}{dx}$ in terms of t.

(3)

(b) Find the coordinates of all the points on C where $\dfrac{dy}{dx} = 0$

(5)

(Total 8 marks)

A curve has parametric equations

$$x = 2\cot t, \quad y = 2\sin^2 t, \quad 0 < t \leq \frac{\pi}{2}.$$

(a) Find an expression for $\dfrac{dy}{dx}$ in terms of the parameter t. **(4)**

(b) Find an equation of the tangent to the curve at the point where $t = \dfrac{\pi}{4}$ **(4)**

(c) Find a cartesian equation of the curve in the form $y = f(x)$. State the domain on which the curve is defined. **(4)**

(Total 12 marks)

3

A curve C has parametric equations

$$x = 4t + 3, \quad y = 4t + 8 + \frac{5}{2t}, \quad t \neq 0$$

(a) Find the value of $\dfrac{dy}{dx}$ at the point on C where $t = 2$, giving your answer as a fraction in its simplest form.

(3)

(b) Show that the cartesian equation of the curve C can be written in the form

$$y = \frac{x^2 + ax + b}{x - 3} \qquad x \neq 3$$

where a and b are integers to be determined.

(3)

(Total 6 marks)

The curve C has parametric equations

$$x = 3t - 4, \quad y = 5 - \frac{6}{t}, \quad t > 0$$

(a) Find $\dfrac{dy}{dx}$ in terms of t (2)

The point P lies on C where $t = \dfrac{1}{2}$

(b) Find the equation of the tangent to C at the point P. Give your answer in the form $y = px + q$, where p and q are integers to be determined.

(3)

(c) Show that the cartesian equation for C can be written in the form

$$y = \frac{ax + b}{x + 4}, \quad x > -4$$

where a and b are integers to be determined. (3)

(Total 8 marks)