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Surname					Other names							
Pearson					Centre Number				Candidate Number			
Edexcel GCE					<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>				<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>			
A level Mathematics												
Practice Paper												
Pure Mathematics - Implicit differentiation												
You must have: Mathematical Formulae and Statistical Tables (Pink)										Total Marks		

Instructions

- Use black ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all the questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided – there may be more space than you need.
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Inexact answers should be given to three significant figures unless otherwise stated.

Information

- A booklet ‘Mathematical Formulae and Statistical Tables’ is provided.
- There are 7 questions in this question paper. The total mark for this paper is 66.
- The marks for each question are shown in brackets – use this as a guide as to how much time to spend on each question.
- Calculators must not be used for questions marked with a * sign.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

1. A curve C has the equation

$$x^3 + 2xy - x - y^3 - 20 = 0$$

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

(5)

- (b) Find an equation of the tangent to C at the point $(3, -2)$, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers.

(2)

(Total 7 marks)

2. The curve C has the equation $2x + 3y^2 + 3x^2y = 4x^2$.

The point P on the curve has coordinates $(-1, 1)$.

- (a) Find the gradient of the curve at P .

(5)

- (b) Hence 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.

(3)

(Total 8 marks)

3. The curve C has equation

$$x^2 - 3xy - 4y^2 + 64 = 0.$$

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

(5)

- (b) Find the coordinates of the points on C where $\frac{dy}{dx} = 0$.

(Solutions based entirely on graphical or numerical methods are not acceptable.)

(6)

(Total 11 marks)

4.

$$x^2 + y^2 + 10x + 2y - 4xy = 10$$

(a) Find $\frac{dy}{dx}$ in terms of x and y , fully simplifying your answer.

(5)

(b) Find the values of y for which $\frac{dy}{dx} = 0$.

(5)

(Total 10 marks)

5. 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)

6. The curve C has equation

$$4x^2 - y^3 - 4xy + 2^y = 0$$

The point P with coordinates $(-2, 4)$ lies on C .

- (a) Find the exact value of $\frac{dy}{dx}$ at the point P .

(6)

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

- (b) Find the y coordinate of A , giving your answer in the form $p + q\ln 2$, where p and q are constants to be determined.

(3)

(Total 9 marks)

7. The curve C has equation

$$16y^3 + 9x^2y - 54x = 0.$$

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

(5)

- (b) Find the coordinates of the points on C where $\frac{dy}{dx} = 0$.

(7)

(Total 12 marks)

TOTAL FOR PAPER: 66 MARKS