Quiz 3

Grade	**AS**
Subject	**Pure Mathematics**
Paper Name	**Paper 3**
Duration	**40 minutes**

Student's Information

Name (Pinyin)	English Name	Class	Group

Instructions

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Do **not** use an erasable pen or correction fluid.
- Write your answer to each question in the space provided.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- **You are reminded of the need for clear representation in your answers.**

Information:

- The total mark for this paper is 26.
- The number of marks for each question or part question is shown in brackets [ ].

1. The parametric equations of a curve are

$$x = 2t + \sin 2t, \quad y = \ln(1 - \cos 2t).$$

Show that $\dfrac{\mathrm{d}y}{\mathrm{d}x} = \operatorname{cosec} 2t.$ [5]

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2. A curve has equation $y = \dfrac{e^{3x}}{\tan \frac{1}{2}x}$. Find the $x-$ coordinates of the stationary points of the curve in the interval $0 < x < \pi$. Give your answers correct to 3 decimal places. [6]

3. The diagram shows the curve $(x^2 + y^2)^2 = 2(x^2 - y^2)$ and one of its maximum points M. Find the coordinates of M. [7]

Figure 1: Curve
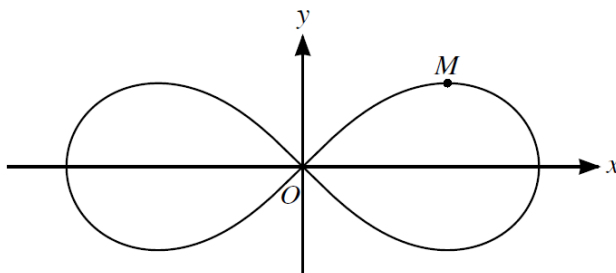
4. The equation of a curve is $2x^4 + xy^3 + y^4 = 10$.

(i) Show that $\dfrac{\mathrm{d}y}{\mathrm{d}x} = -\dfrac{8x^3 + y^3}{3xy^2 + 4y^3}$. [4]

(ii) Hence show that there are two points on the curve at which the tangent is parallel to the $x-$axis and find the coordinates of these points. [4]