

6665/01

Wednesday 20 January 2010 – Afternoon
Time: 1 hour 30 minutes

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Mathematical Formulae (Pink or Green)

Nil

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions.

You must write your answer to each question in the space following the question.

When a calculator is used, the answer should be given to an appropriate degree of accuracy.

A booklet 'Mathematical Formulae and Statistical Tables' is provided.

Full marks may be obtained for answers to ALL questions.

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 9 questions in this question paper. The total mark for this paper is 75.

There are 28 pages in this question paper. Any blank pages are indicated.

You must ensure that your answers to parts of questions are clearly labelled.

You should show sufficient working to make your methods clear to the Examiner.

Answers without working may not gain full credit.

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1. Express

$$\frac{x+1}{3x^2-3} - \frac{1}{3x+1}$$

as a single fraction in its simplest form.

(4)



(a) Show that $f(x) = 0$ can be rearranged as

(2)

The equation $f(x) = 0$ has one positive root α .

(b) Taking $x_1 = 0$, find, to 3 decimal places, the values of x_2 , x_3 and x_4 .

(3)

(c) Show that $\alpha = 2.057$ correct to 3 decimal places.

(3)

This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across its entire width, providing a template for handwriting practice or general note-taking. The margins are consistent on all sides.

for $0 \leq x < 2\pi$, giving your answers to 2 decimal places. (5)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(ii) Given that $x = \tan y$, show that $\frac{dy}{dx} = \frac{1}{1+x^2}$.

This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across its entire width, providing a guide for handwriting or typing. The background is a clean, solid white color.

5. Sketch the graph of $y = \ln|x|$, stating the coordinates of any points of intersection with the axes.

(3)



6.

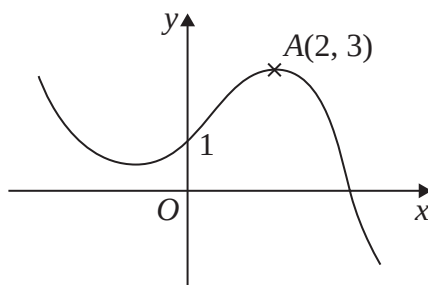
**Figure 1**

Figure 1 shows a sketch of the graph of $y = f(x)$.

The graph intersects the y-axis at the point $(0, 1)$ and the point $A(2, 3)$ is the maximum turning point.

Sketch, on separate axes, the graphs of

- (i) $y = f(-x) + 1$,
- (ii) $y = f(x + 2) + 3$,
- (iii) $y = 2f(2x)$.

On each sketch, show the coordinates of the point at which your graph intersects the y-axis and the coordinates of the point to which A is transformed.

(9)

Leave
blank**Question 6 continued**

N 3 5 3 8 1 A 0 1 5 2 8

Given that $y = e^{2x} \sec 3x$,

(b) find $\frac{dy}{dx}$.

The curve with equation $y = e^{2x} \sec 3x$, $-\frac{\pi}{6} < x < \frac{\pi}{6}$, has a minimum turning point at (a, b) .

(c) Find the values of the constants a and b , giving your answers to 3 significant figures.

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Question 7 continued

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for $0 \leq x \leq 180^\circ$.

(7)

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blank**Question 9 continued****Q9****(Total 15 marks)****TOTAL FOR PAPER: 75 MARKS****END**