

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	



General Certificate of Education
Advanced Level Examination
June 2012

Mathematics

MPC3

Unit Pure Core 3

Thursday 31 May 2012 9.00 am to 10.30 am

For this paper you must have:

- the blue AQA booklet of formulae and statistical tables.

You may use a graphics calculator.

Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Write the question part reference (eg (a), (b)(i) etc) in the left-hand margin.
- You must answer each question in the space provided for that question. If you require extra space, use an AQA supplementary answer book; do **not** use the space provided for a different question.
- Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.

Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- You do not necessarily need to use all the space provided.



J U N 1 2 M P C 3 0 1

Answer **all** questions.

Answer each question in the space provided for that question.

- 1** Use the mid-ordinate rule with four strips to find an estimate for $\int_{0.4}^{1.2} \cot(x^2) dx$,
giving your answer to three decimal places. (4 marks)

QUESTION
PART
REFERENCE

Answer space for question 1



QUESTION
PART
REFERENCE

Answer space for question 1

A large rectangular area containing horizontal dotted lines for writing an answer.

Turn over ►



QUESTION
PART
REFERENCE

Answer space for question 2

.....

.....

.....

.....

.....

.....

.....

.....

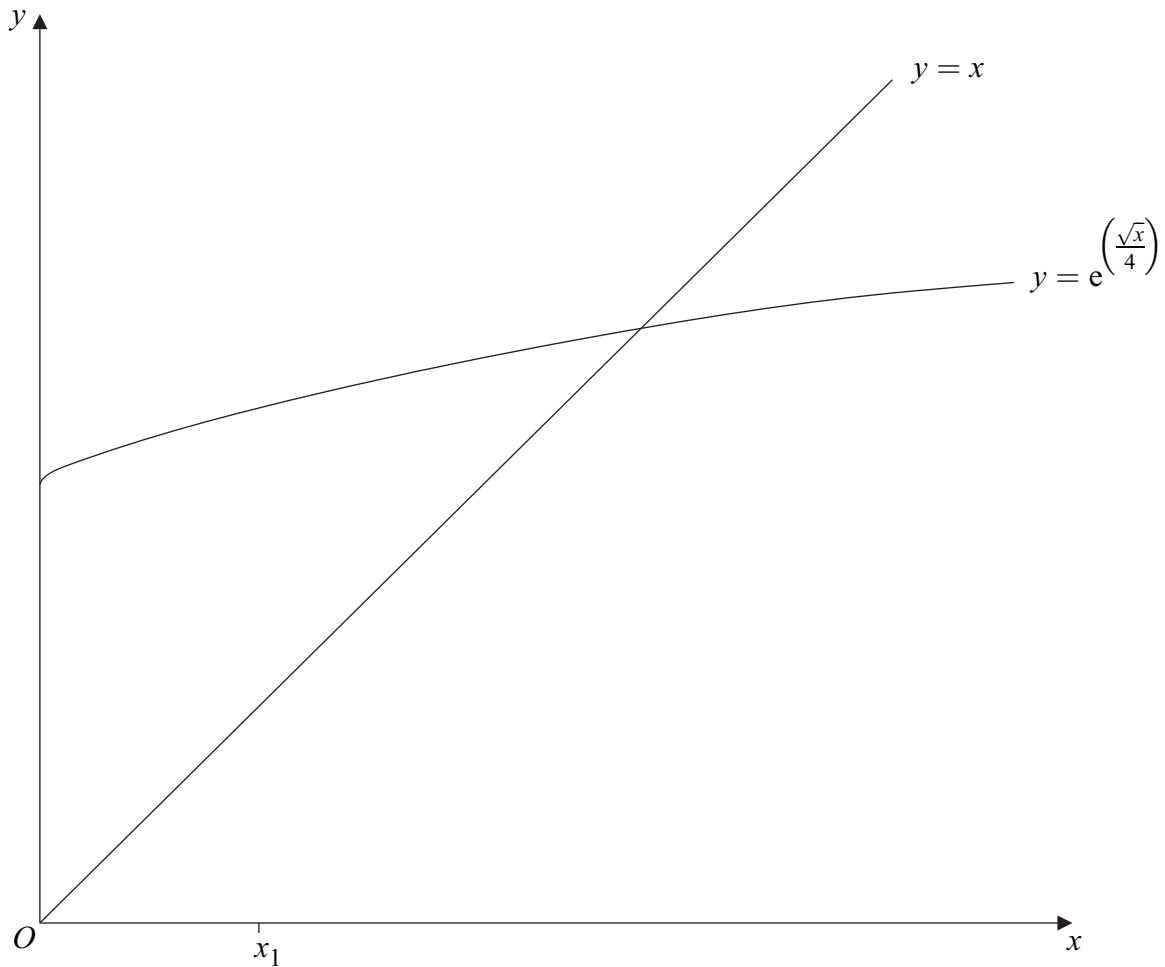
.....

.....

.....

(d)

Figure 1



Turn over ►



QUESTION
PART
REFERENCE

Answer space for question 4

A large rectangular area containing horizontal dotted lines for writing an answer.

Turn over ►



QUESTION
PART
REFERENCE

Answer space for question 5

A large rectangular area with horizontal dotted lines for writing an answer.

Turn over ►



- 6 Use the substitution $u = x^4 + 2$ to find the value of $\int_0^1 \frac{x^7}{(x^4 + 2)^2} dx$, giving your answer in the form $p \ln q + r$, where p , q and r are rational numbers. (6 marks)

QUESTION
PART
REFERENCE**Answer space for question 6**

QUESTION
PART
REFERENCE

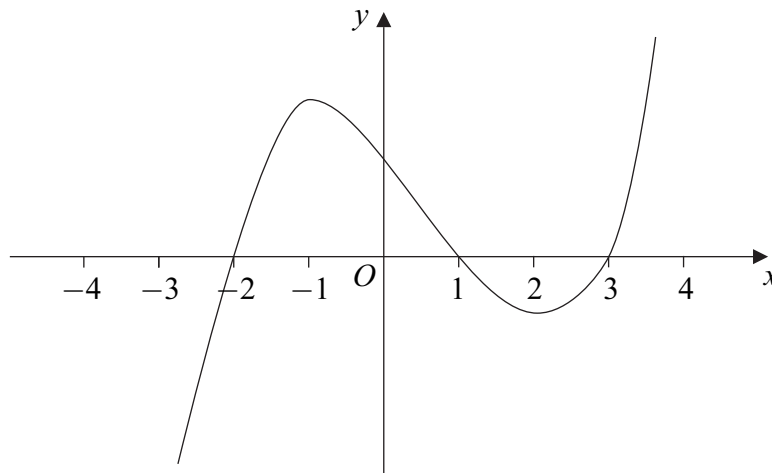
Answer space for question 6

A large rectangular area containing horizontal dotted lines for writing an answer.

Turn over ►



- 7 The sketch shows part of the curve with equation $y = f(x)$.



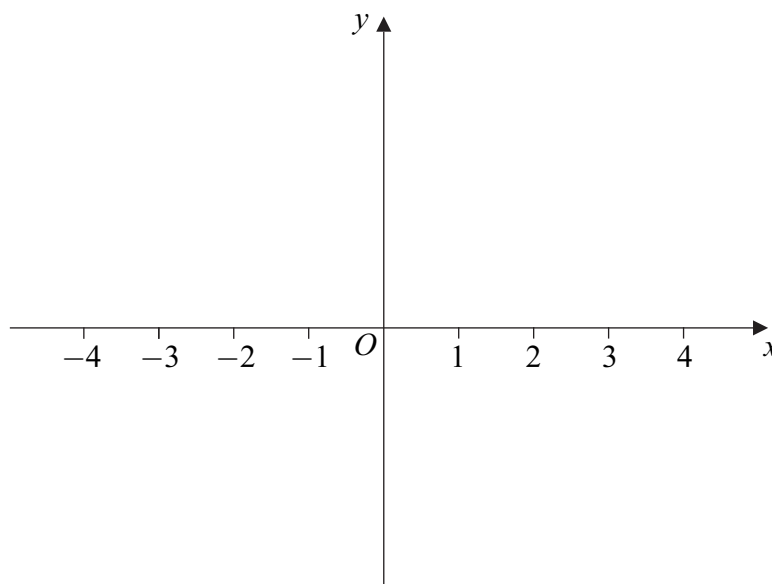
- (a) On **Figure 2** below, sketch the curve with equation $y = |f(x)|$. (3 marks)
- (b) On **Figure 3** opposite, sketch the curve with equation $y = f(|x|)$. (2 marks)
- (c) Describe a sequence of two geometrical transformations that maps the graph of $y = f(x)$ onto the graph of $y = \frac{1}{2}f(x+1)$. (4 marks)
- (d) The maximum point of the curve with equation $y = f(x)$ has coordinates $(-1, 10)$. Find the coordinates of the maximum point of the curve with equation $y = \frac{1}{2}f(x+1)$. (2 marks)

QUESTION
PART
REFERENCE

Answer space for question 7

(a)

Figure 2



8 (a) Show that the equation

$$\frac{1}{1 + \cos \theta} + \frac{1}{1 - \cos \theta} = 32$$

can be written in the form

$$\operatorname{cosec}^2 \theta = 16 \quad (4 \text{ marks})$$

(b) Hence, or otherwise, solve the equation

$$\frac{1}{1 + \cos(2x - 0.6)} + \frac{1}{1 - \cos(2x - 0.6)} = 32$$

giving all values of x in radians to two decimal places in the interval $0 < x < \pi$.

(5 marks)

QUESTION
PART
REFERENCE

Answer space for question 8



QUESTION
PART
REFERENCE

Answer space for question 8

A large rectangular area with horizontal dotted lines for writing an answer.

Turn over ►



QUESTION
PART
REFERENCE

Answer space for question 9

A large rectangular area for writing, bounded by a solid line on the top, bottom, and right, and a solid line on the left. The left boundary is adjacent to the 'QUESTION PART REFERENCE' column. The interior of the box is filled with horizontal dotted lines, providing a guide for writing.



