

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Education  
Advanced Subsidiary Examination  
June 2010

# Mathematics

# MPC2

## Unit Pure Core 2

Monday 24 May 2010 1.30 pm to 3.00 pm

**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 the questions in the spaces provided. 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.

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



J U N 1 0 M P C 2 0 1







**4 (a)** The expression  $\left(1 - \frac{1}{x^2}\right)^3$  can be written in the form

$$1 + \frac{p}{x^2} + \frac{q}{x^4} - \frac{1}{x^6}$$

Find the values of the integers  $p$  and  $q$ . (2 marks)

**(b) (i)** Hence find  $\int \left(1 - \frac{1}{x^2}\right)^3 dx$ . (4 marks)

**(ii)** Hence find the value of  $\int_{\frac{1}{2}}^1 \left(1 - \frac{1}{x^2}\right)^3 dx$ . (2 marks)

QUESTION  
PART  
REFERENCE







**7 (a)** Sketch the graph of  $y = \cos x$  in the interval  $0 \leq x \leq 2\pi$ . State the values of the intercepts with the coordinate axes. (2 marks)

**(b) (i)** Given that

$$\sin^2 \theta = \cos \theta (2 - \cos \theta)$$

prove that  $\cos \theta = \frac{1}{2}$ . (2 marks)

**(ii)** Hence solve the equation

$$\sin^2 2x = \cos 2x (2 - \cos 2x)$$

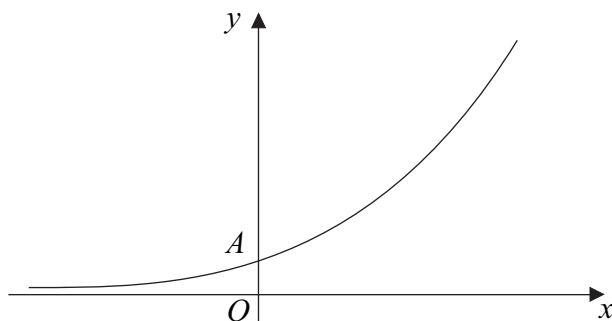
in the interval  $0 \leq x \leq \pi$ , giving your answers in radians to three significant figures. (4 marks)

QUESTION  
PART  
REFERENCE





- 8 The diagram shows a sketch of the curve  $y = 2^{4x}$ .



The curve intersects the  $y$ -axis at the point  $A$ .

- (a) Find the value of the  $y$ -coordinate of  $A$ . (1 mark)

- (b) Use the trapezium rule with six ordinates (five strips) to find an approximate value for  $\int_0^1 2^{4x} dx$ , giving your answer to two decimal places. (4 marks)

- (c) Describe the geometrical transformation that maps the graph of  $y = 2^{4x}$  onto the graph of  $y = 2^{4x-3}$ . (2 marks)

- (d) The curve  $y = 2^{4x}$  is translated by the vector  $\begin{bmatrix} 1 \\ -\frac{1}{2} \end{bmatrix}$  to give the curve  $y = g(x)$ .

The curve  $y = g(x)$  crosses the  $x$ -axis at the point  $Q$ . Find the  $x$ -coordinate of  $Q$ . (4 marks)

- (e) (i) Given that

$$\log_a k = 3 \log_a 2 + \log_a 5 - \log_a 4$$

show that  $k = 10$ . (3 marks)

- (ii) The line  $y = \frac{5}{4}$  crosses the curve  $y = 2^{4x-3}$  at the point  $P$ . Show that the  $x$ -coordinate of  $P$  is  $\frac{1}{4 \log_{10} 2}$ . (3 marks)

QUESTION  
PART  
REFERENCE

