

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	
TOTAL	



General Certificate of Education  
Advanced Subsidiary Examination  
June 2015

# Mathematics

# MPC1

## Unit Pure Core 1

Wednesday 13 May 2015 9.00 am to 10.30 am

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>the blue AQA booklet of formulae and statistical tables.</li> </ul> <p>You must <b>not</b> use a calculator.</p>	
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**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.
  - The use of calculators is **not** permitted.

**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.



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QUESTION  
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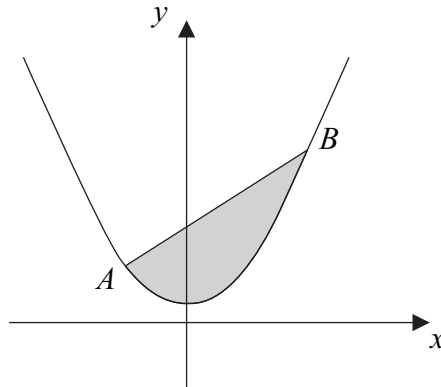
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- 3 The diagram shows a sketch of a curve and a line.



The curve has equation  $y = x^4 + 3x^2 + 2$ . The points  $A(-1, 6)$  and  $B(2, 30)$  lie on the curve.

- (a) Find an equation of the tangent to the curve at the point  $A$ . [4 marks]
- (b) (i) Find  $\int_{-1}^2 (x^4 + 3x^2 + 2) dx$ . [5 marks]
- (ii) Calculate the area of the shaded region bounded by the curve and the line  $AB$ . [3 marks]

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**5 (a)** Express  $x^2 + 3x + 2$  in the form  $(x + p)^2 + q$ , where  $p$  and  $q$  are rational numbers. **[2 marks]**

**(b)** A curve has equation  $y = x^2 + 3x + 2$ .

**(i)** Use the result from part **(a)** to write down the coordinates of the vertex of the curve. **[2 marks]**

**(ii)** State the equation of the line of symmetry of the curve. **[1 mark]**

**(c)** The curve with equation  $y = x^2 + 3x + 2$  is translated by the vector  $\begin{bmatrix} 2 \\ 4 \end{bmatrix}$ .

Find the equation of the resulting curve in the form  $y = x^2 + bx + c$ .

**[3 marks]**

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- 7 (a)** Sketch the curve with equation  $y = x^2(x - 3)$ . **[3 marks]**
- (b)** The polynomial  $p(x)$  is given by  $p(x) = x^2(x - 3) + 20$ .
- (i)** Find the remainder when  $p(x)$  is divided by  $x - 4$ . **[2 marks]**
- (ii)** Use the Factor Theorem to show that  $x + 2$  is a factor of  $p(x)$ . **[2 marks]**
- (iii)** Express  $p(x)$  in the form  $(x + 2)(x^2 + bx + c)$ , where  $b$  and  $c$  are integers. **[2 marks]**
- (iv)** Hence show that the equation  $p(x) = 0$  has exactly one real root and state its value. **[3 marks]**

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QUESTION  
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**Answer space for question 8**

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**END OF QUESTIONS**

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