

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 2011

Mathematics

MPC1

Unit Pure Core 1

Wednesday 18 May 2011 9.00 am to 10.30 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> the blue AQA booklet of formulae and statistical tables. <p>You must not 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 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.
- 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.



J U N 1 1 M P C 1 0 1

QUESTION
PART
REFERENCE

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2 (a) (i) Express $\sqrt{48}$ in the form $k\sqrt{3}$, where k is an integer. (1 mark)

(ii) Simplify $\frac{\sqrt{48} + 2\sqrt{27}}{\sqrt{12}}$, giving your answer as an integer. (3 marks)

(b) Express $\frac{1 - 5\sqrt{5}}{3 + \sqrt{5}}$ in the form $m + n\sqrt{5}$, where m and n are integers. (4 marks)

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QUESTION
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- 4 (a)** Express $x^2 + 5x + 7$ in the form $(x + p)^2 + q$, where p and q are rational numbers. *(3 marks)*
- (b)** A curve has equation $y = x^2 + 5x + 7$.
- (i)** Find the coordinates of the vertex of the curve. *(2 marks)*
- (ii)** State the equation of the line of symmetry of the curve. *(1 mark)*
- (iii)** Sketch the curve, stating the value of the intercept on the y -axis. *(3 marks)*
- (c)** Describe the geometrical transformation that maps the graph of $y = x^2$ onto the graph of $y = x^2 + 5x + 7$. *(3 marks)*

QUESTION
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7 Solve each of the following inequalities:

(a) $2(4 - 3x) > 5 - 4(x + 2);$ *(2 marks)*

(b) $2x^2 + 5x \geq 12.$ *(4 marks)*

QUESTION
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8 A circle has centre $C(3, -8)$ and radius 10.

(a) Express the equation of the circle in the form

$$(x - a)^2 + (y - b)^2 = k \quad (2 \text{ marks})$$

(b) Find the x -coordinates of the points where the circle crosses the x -axis. (3 marks)

(c) The tangent to the circle at the point A has gradient $\frac{5}{2}$. Find an equation of the line CA , giving your answer in the form $rx + sy + t = 0$, where r , s and t are integers. (3 marks)

(d) The line with equation $y = 2x + 1$ intersects the circle.

(i) Show that the x -coordinates of the points of intersection satisfy the equation

$$x^2 + 6x - 2 = 0 \quad (3 \text{ marks})$$

(ii) Hence show that the x -coordinates of the points of intersection are of the form $m \pm \sqrt{n}$, where m and n are integers. (2 marks)

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QUESTION
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END OF QUESTIONS



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ANSWER IN THE SPACES PROVIDED**

