

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 Level Examination  
June 2014

# Mathematics

# MFP3

## Unit Further Pure 3

Monday 19 May 2014 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 4 M F P 3 0 1







QUESTION  
PART  
REFERENCE

### Answer space for question 2

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Turn over ►













QUESTION  
PART  
REFERENCE

**Answer space for question 5**

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**Turn over ►**





QUESTION  
PART  
REFERENCE

**Answer space for question 6**

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**Turn over ►**





QUESTION  
PART  
REFERENCE

**Answer space for question 6**

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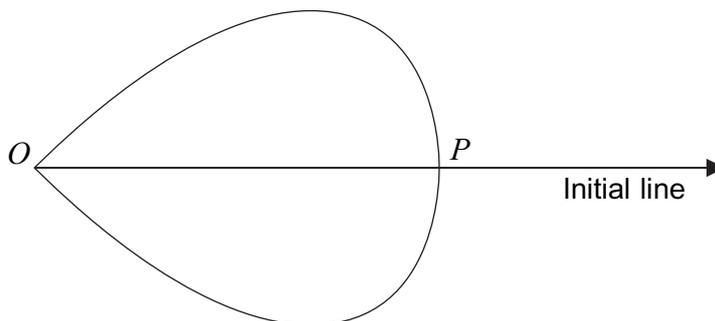








- 8** The diagram shows a sketch of a curve  $C$ , the pole  $O$  and the initial line. The curve  $C$  intersects the initial line at the point  $P$ .



The polar equation of  $C$  is  $r = (1 - \tan^2 \theta) \sec \theta$ ,  $-\frac{\pi}{4} \leq \theta \leq \frac{\pi}{4}$ .

- (a) Show that the area of the region bounded by the curve  $C$  is  $\frac{8}{15}$ . **[5 marks]**

- (b) The curve whose polar equation is

$$r = \frac{1}{2} \sec^3 \theta, \quad -\frac{\pi}{4} \leq \theta \leq \frac{\pi}{4}$$

intersects  $C$  at the points  $A$  and  $B$ .

- (i) Find the polar coordinates of  $A$  and  $B$ . **[3 marks]**

- (ii) Given that angle  $OAP = \text{angle } OBP = \alpha$ , show that  $\tan \alpha = k\sqrt{3}$ , where  $k$  is an integer. **[4 marks]**

- (iii) Using your value of  $k$  from part (b)(ii), state whether the point  $A$  lies inside or lies outside the circle whose diameter is  $OP$ . Give a reason for your answer. **[1 mark]**

QUESTION  
PART  
REFERENCE

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QUESTION  
PART  
REFERENCE

### Answer space for question 8

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QUESTION  
PART  
REFERENCE

**Answer space for question 8**

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**END OF QUESTIONS**

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