

Write your name here

Surname

Other names

**Pearson Edexcel
International GCSE**

Centre Number

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Candidate Number

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Further Pure Mathematics

Paper 1

Monday 20 January 2014 – Morning
Time: 2 hours

Paper Reference

4PM0/01

Calculators may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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3 Differentiate with respect to x

(a) $e^{3x}(5x-7)^2$ (3)

(b) $\frac{\cos 2x}{x+9}$ (3)

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Question 3 continued

A series of horizontal dotted lines for writing.

(Total for Question 3 is 6 marks)



4 The sum of the first n terms of an arithmetic series is $2n(n + 3)$

Find

(a) the first term of the series, (1)

(b) the common difference of the series, (3)

(c) the 25th term of the series. (2)

Lined area for student answers, consisting of multiple horizontal dotted lines.



Question 4 continued

A series of 25 horizontal dotted lines for writing answers.

(Total for Question 4 is 6 marks)



5 (a) Solve the equation $\log_7(2x - 3) = 2$ (2)

(b) (i) Factorise $2x \ln 3x - 4x - 4 \ln 3x + 8$

(ii) Hence find the exact roots of the equation $2x \ln 3x - 4x - 4 \ln 3x + 8 = 0$ (5)



Question 5 continued

A series of horizontal dotted lines for writing answers.

(Total for Question 5 is 7 marks)



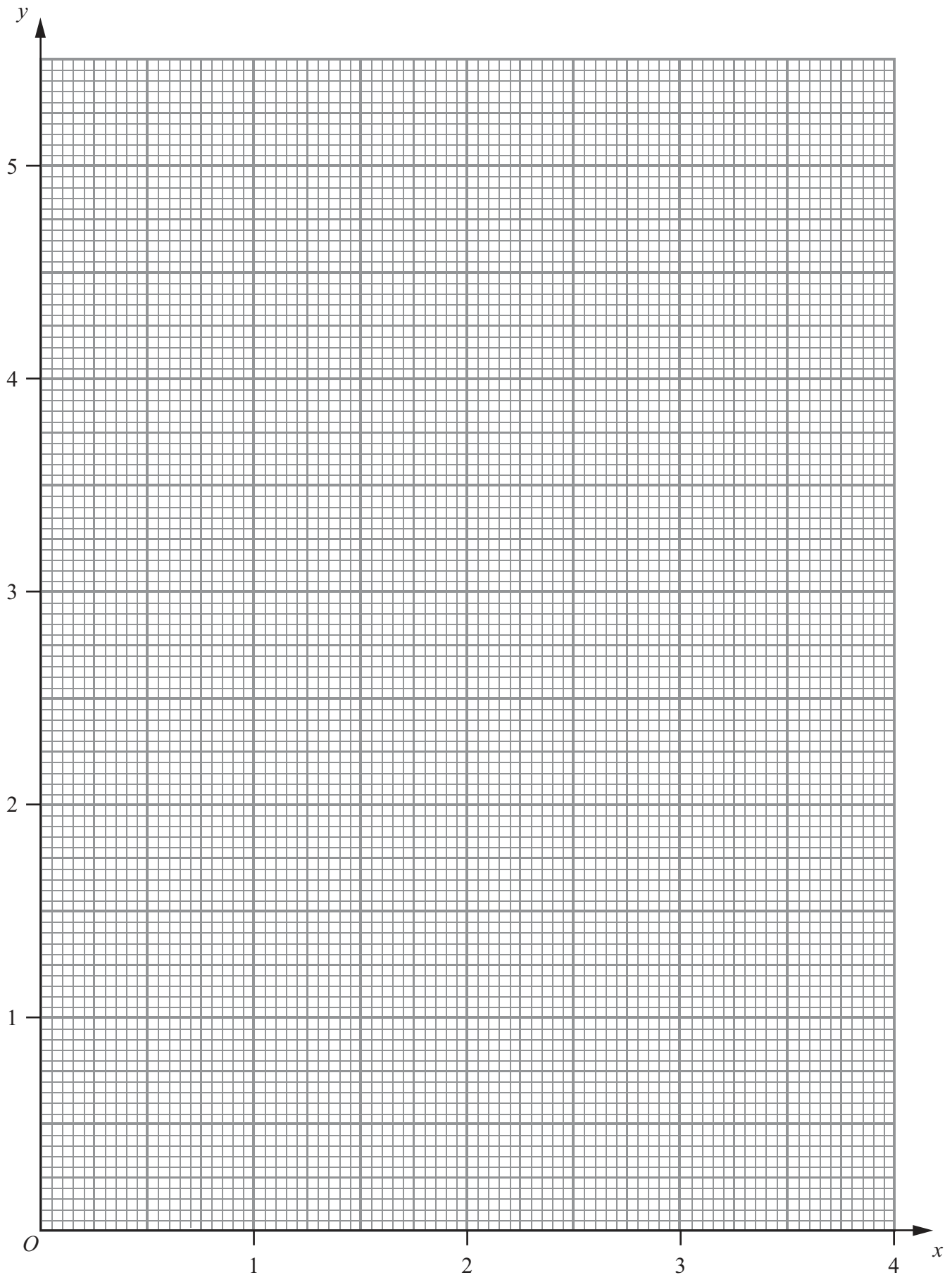
Question 6 continued

Dotted lines for writing.

(Total for Question 6 is 8 marks)



Question 7 continued



Use the grid on page 15 if you need to redraw your graph.



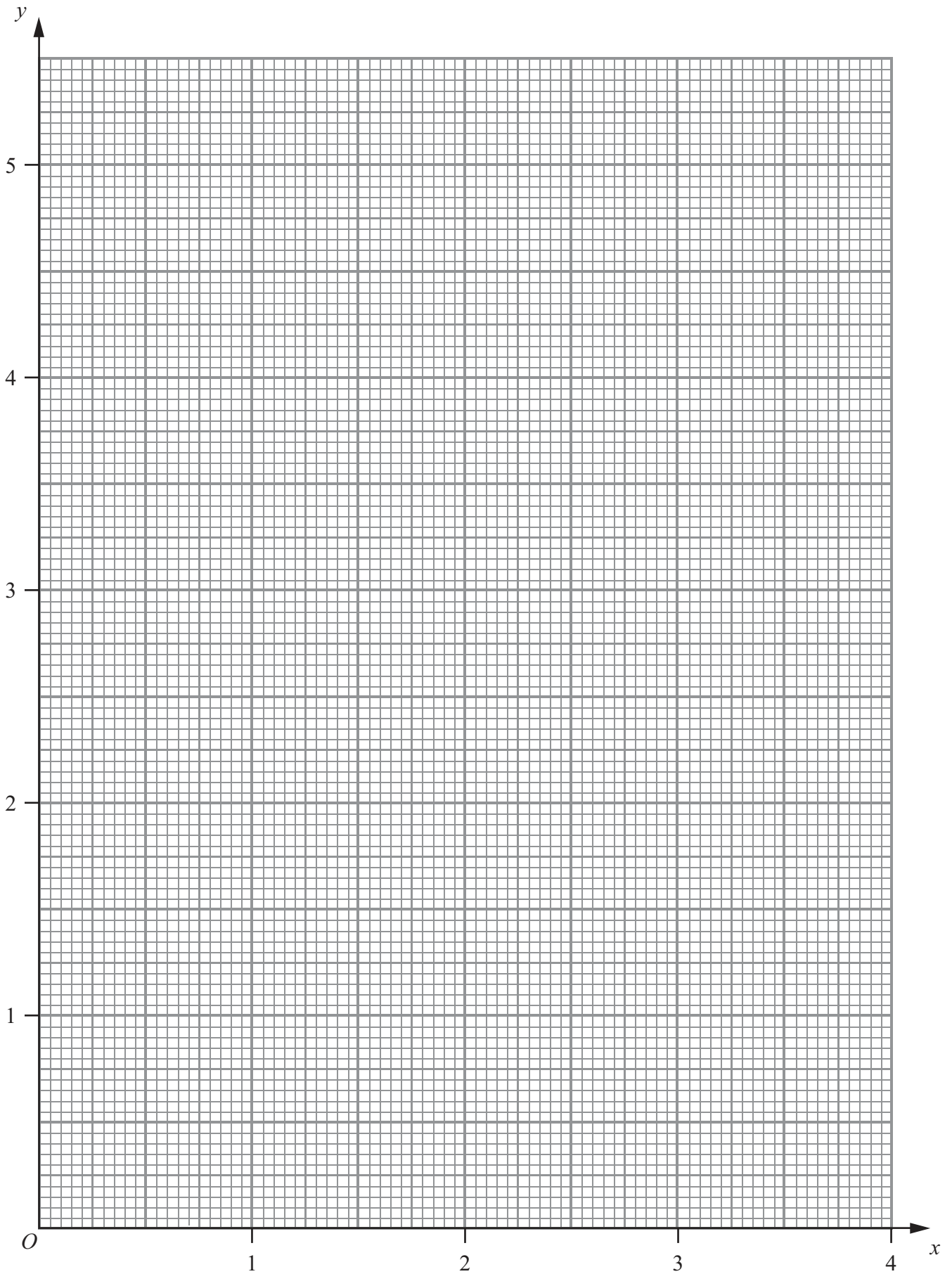
Question 7 continued

A series of horizontal dotted lines for writing.



Question 7 continued

Use this page if you need to redraw your graph.



(Total for Question 7 is 10 marks)



8

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\tan A = \frac{\sin A}{\cos A}$$

(a) Show that the equation

$$4\sin(x + \alpha) = 7\sin(x - \alpha)$$

can be written in the form

$$3\tan x = 11\tan \alpha \tag{5}$$

(b) Hence solve, to 1 decimal place,

$$4\sin(3y + 45)^\circ = 7\sin(3y - 45)^\circ \text{ for } 0 \leq y \leq 180 \tag{6}$$

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Question 8 continued

Ruled writing area with horizontal dotted lines.



Question 8 continued

A large rectangular area containing 30 horizontal dotted lines for writing.



Question 8 continued

Dotted lines for writing.

(Total for Question 8 is 11 marks)



9 A particle P moves in a straight line such that, at time t seconds, its displacement, s metres, from a fixed point O of the line is given by $s = t^3 - 6t^2 + 5t$

Find

(a) the values of t for which P passes through O (3)

(b) the speed of P each time it passes through O (5)

(c) the greatest speed of P in the interval $0 \leq t \leq 5$ (4)

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Question 9 continued

Lined writing area for the answer to Question 9.



Question 9 continued

Ruled area for writing the answer to Question 9.

(Total for Question 9 is 12 marks)



10

$$f(x) = x^2 + (k - 3)x + 4$$

The roots of the equation $f(x) = 0$ are α and β

(a) Find, in terms of k , the value of $\alpha^2 + \beta^2$ (3)

Given that $4(\alpha^2 + \beta^2) = 7\alpha^2\beta^2$

(b) without solving the equation $f(x) = 0$, form a quadratic equation, with integer coefficients, which has roots $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2}$ (5)

(c) find the possible values of k . (5)

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Question 10 continued

A series of horizontal dotted lines for writing.



Question 10 continued

Ruled area for writing the answer to Question 10.

(Total for Question 10 is 13 marks)



11 The curve C has equation $5y = 4(x^2 + 1)$. The coordinates of the point P on the curve are $(p, 8)$, $p > 0$

The line l with equation $5y - 24x + q = 0$ is the tangent to C at P .

(a) (i) Show that $p = 3$

(ii) Find the value of q

(4)

(b) Find an equation, with integer coefficients, for the normal to C at P .

(5)

(c) Find the exact value of the area of the triangle formed by the tangent to C at P , the normal to C at P and the x -axis.

(3)

The finite region bounded by C , the tangent to C at P , the x -axis and the y -axis is rotated through 360° about the x -axis.

(d) Find, to 2 significant figures, the volume of the solid generated.

(6)

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Question 11 continued

A series of horizontal dotted lines for writing.



Question 11 continued

A series of horizontal dotted lines for writing.



