

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 ►

P42950A

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Answer all ELEVEN questions

Write your answers in the spaces provided

You must write down all stages in your working

1 Find

$$\sum_{r=4}^{40} (7r - 2)$$

(4)

Dotted lines for writing answers and working.

(Total for Question 1 is 4 marks)



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

Ruled area for writing the answer to Question 3.

(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)

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Question 4 continued

A series of 20 horizontal dotted lines for writing answers.

(Total for Question 4 is 6 marks)



Question 5 continued

Dotted lines for writing.

(Total for Question 5 is 7 marks)



6 In triangle ABC , $AB = x$ cm, $BC = 7$ cm, $AC = (5x - 6)$ cm and $\angle BAC = 60^\circ$

(a) Find, to 3 significant figures, the value of x .

(5)

Using your value of x

(b) find, in degrees to 1 decimal place, the size of $\angle ACB$.

(3)

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7 (a) Complete the table of values for $y = 2x - 4 + \frac{5}{x^2}$, giving your answers to 2 decimal places where appropriate.

x	0.8	1	1.5	1.7	2	2.5	3	4
y	5.41		1.22			1.8		4.31

(2)

(b) On the grid opposite, draw the graph of $y = 2x - 4 + \frac{5}{x^2}$ for $0.8 \leq x \leq 4$

(2)

(c) Use your graph to obtain estimates, to 1 decimal place, of the roots of the equation

$$2x + \frac{5}{x^2} = 6 \text{ in the interval } 0.8 \leq x \leq 4$$

(2)

(d) By drawing a straight line on your graph obtain an estimate, to 1 decimal place, of

$$\text{the root of the equation } 4x + \frac{5}{x^2} = 12 \text{ in the interval } 0.8 \leq x \leq 4$$

(4)

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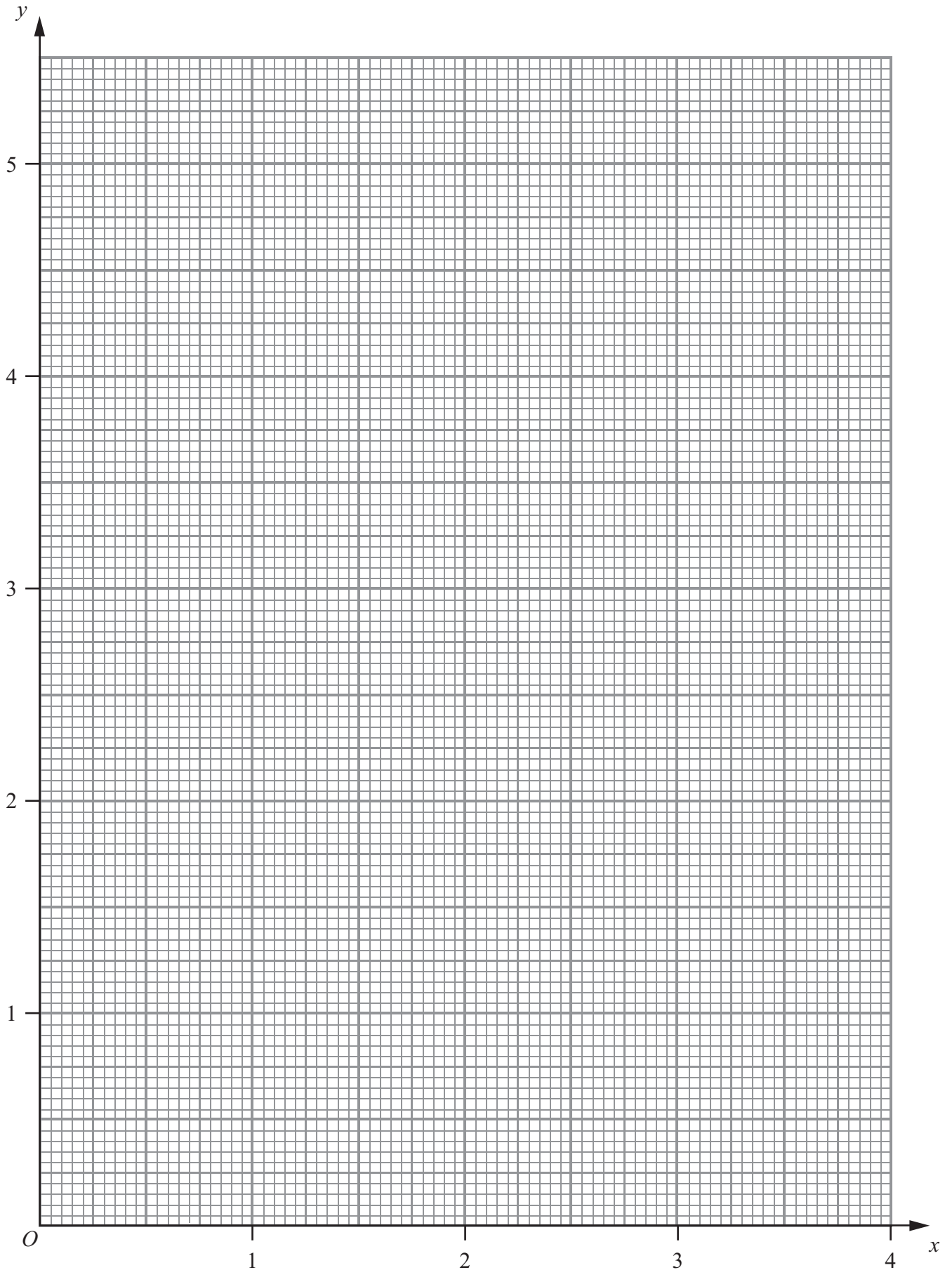
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Question 7 continued



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



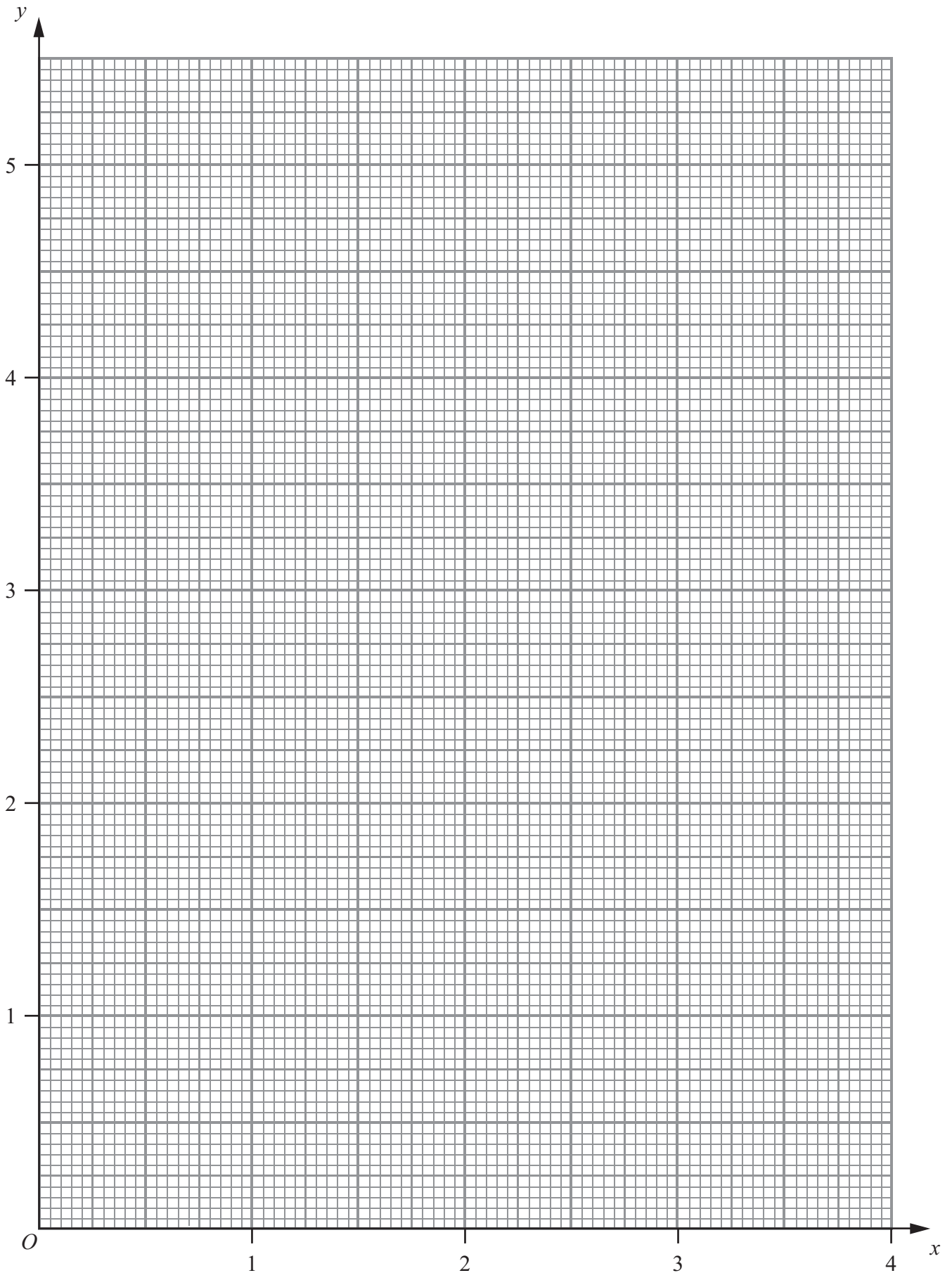
Question 7 continued

A large rectangular area with rounded corners, containing 25 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)



P 4 2 9 5 0 A 0 1 5 3 2

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

A series of horizontal dotted lines for writing.



P 4 2 9 5 0 A 0 1 7 3 2

Question 8 continued

A large rectangular area with rounded corners, containing 25 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

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 9 continued

A large rectangular area with rounded corners, containing 25 horizontal dotted lines for writing.



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

A series of horizontal dotted lines for writing.



Question 10 continued

Ruled area for writing answers, consisting of multiple horizontal dotted lines.

(Total for Question 10 is 13 marks)



P 4 2 9 5 0 A 0 2 7 3 2

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 25 horizontal dotted lines for writing.



Question 11 continued

A series of horizontal dotted lines for writing.



Question 11 continued

Dotted lines for writing.

(Total for Question 11 is 18 marks)

TOTAL FOR PAPER IS 100 MARKS

