

Write your name here	
Surname	Other names
<b>Pearson Edexcel</b>	Centre Number
<b>International GCSE</b>	Candidate Number
<h1 style="margin: 0;">Further Pure Mathematics</h1> <h2 style="margin: 0;">Paper 1</h2>	
Monday 20 January 2014 – Morning <b>Time: 2 hours</b>	Paper Reference <b>4PM0/01</b>
<b>Calculators may be used.</b>	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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**PEARSON**

**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)

**(Total for Question 1 is 4 marks)**



$$f(x) = 2x^2 - 8x + 5$$

Given that  $f(x)$  can be written in the form  $a(x - b)^2 + c$

(a) find the value of  $a$ , the value of  $b$  and the value of  $c$ .

(3)

(b) Write down

(i) the minimum value of  $f(x)$ ,

(ii) the value of  $x$  at which this minimum occurs.

(2)

**(Total for Question 2 is 5 marks)**





(Total for Question 3 is 6 marks)



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)



**Question 4 continued**

**(Total for Question 4 is 6 marks)**



(2)

(5)

[illegible]



**Question 5 continued**

**(Total for Question 5 is 7 marks)**



- (5)

(3)

**Question 6 continued**

**(Total for Question 6 is 8 marks)**



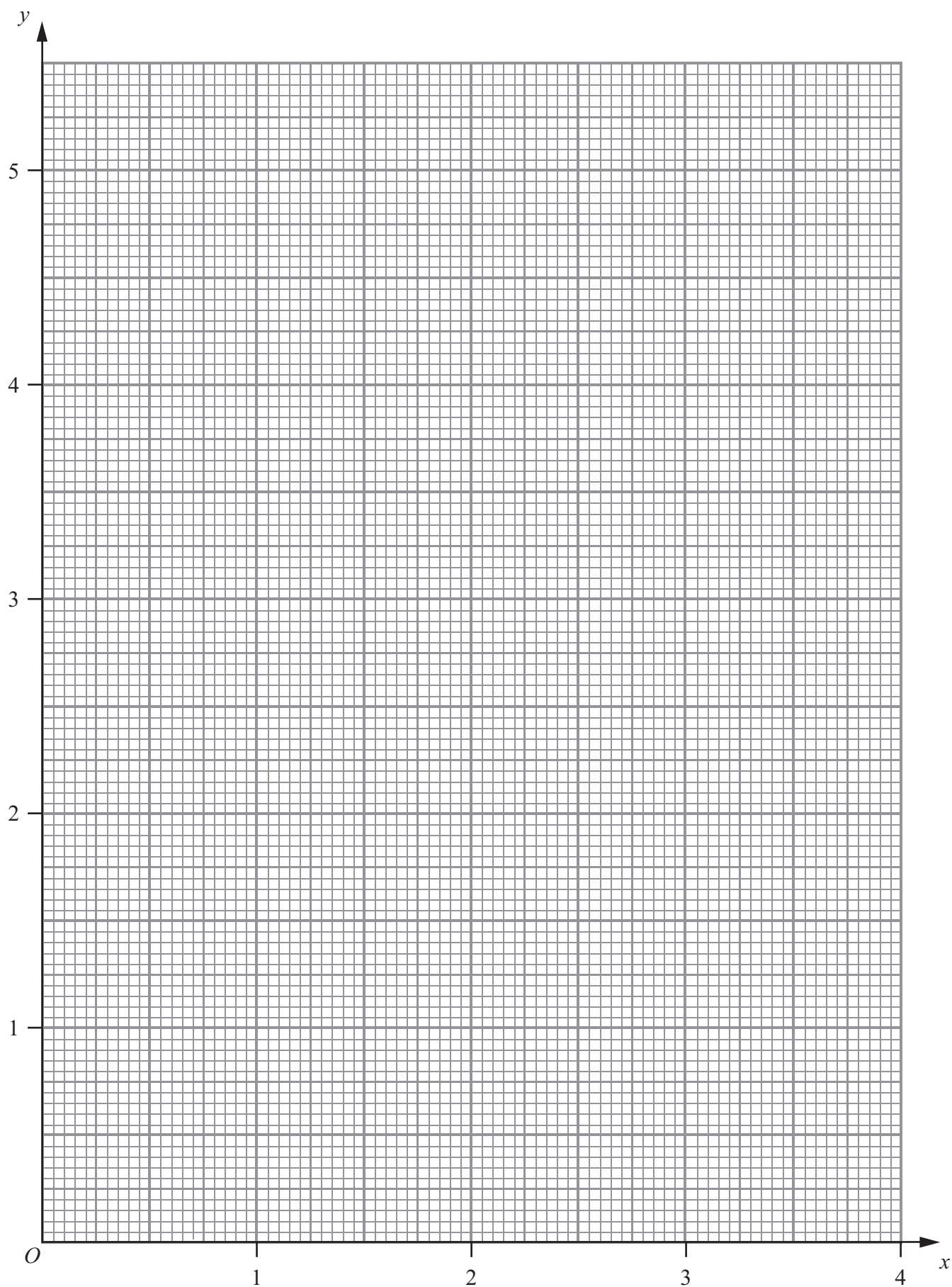
- |     |      |   |      |     |   |     |   |      |
|-----|------|---|------|-----|---|-----|---|------|
| $x$ | 0.8  | 1 | 1.5  | 1.7 | 2 | 2.5 | 3 | 4    |
| $y$ | 5.41 |   | 1.22 |     |   | 1.8 |   | 4.31 |

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

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

(d) By drawing a straight line on your graph obtain an estimate, to 1 decimal place, of the root of the equation  $4x + \frac{5}{x^2} = 12$  in the interval  $0.8 \leq x \leq 4$

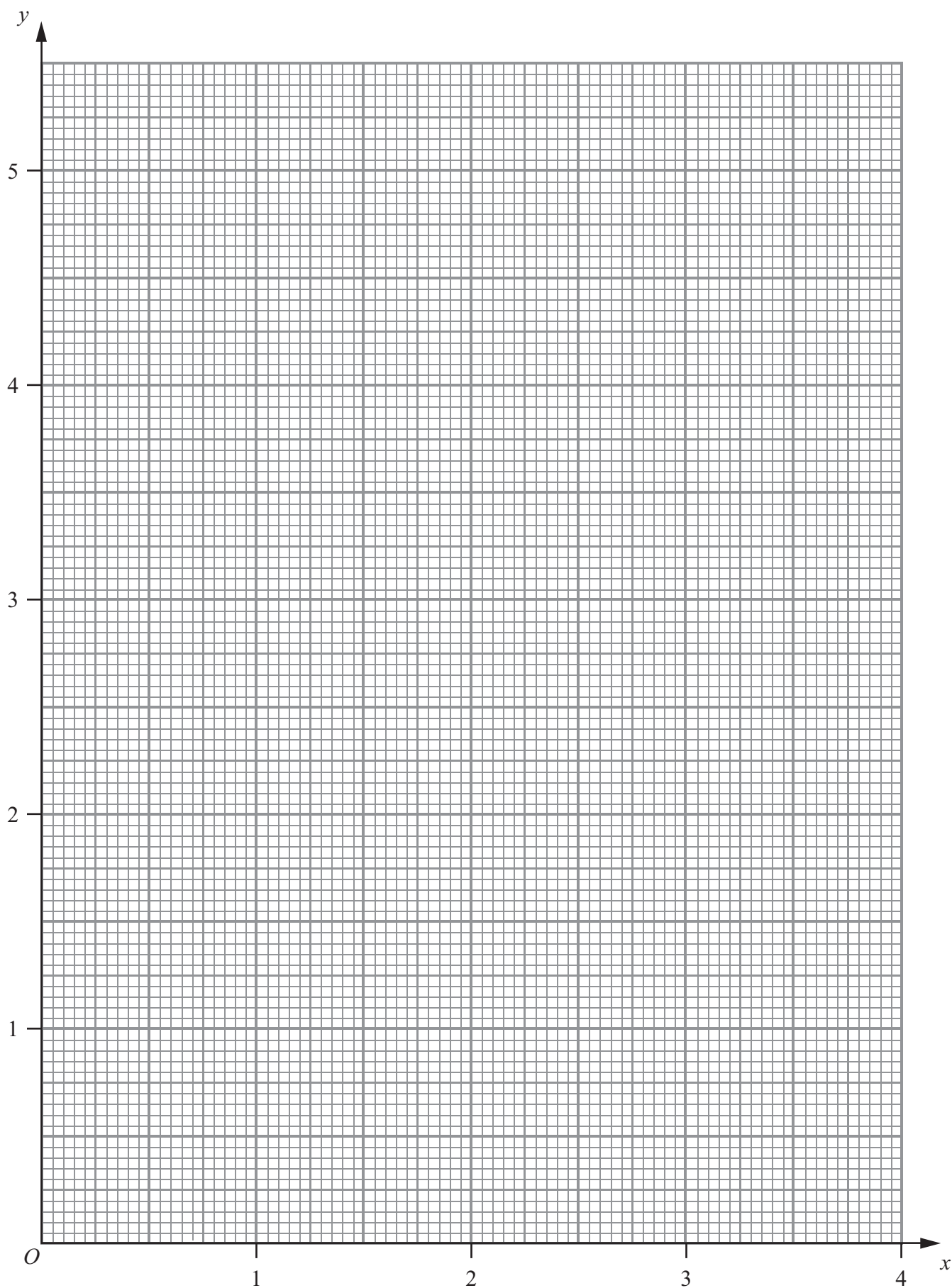
This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings present.

**Question 7 continued**

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





**Question 7 continued****Use this page if you need to redraw your graph.****(Total for Question 7 is 10 marks)**

$$\tan A = \frac{\sin A}{\cos A}$$
$$3 \tan x = 11 \tan \alpha \quad (5)$$
$$4\sin(3y + 45)^\circ = 7\sin(3y - 45)^\circ \text{ for } 0 \leq y \leq 180 \quad (6)$$
This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.







(Total for Question 6 is 11 marks)



- Find

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

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



**Question 9 continued**





(Total for Question 9 is 12 marks)



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

The roots of the equation  $f(x) = 0$  are  $\alpha$  and  $\beta$

- (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)

[illegible]







**Question 10 continued**

**(Total for Question 10 is 13 marks)**











**TOTAL FOR PAPER IS 100 MARKS**