

Please check the examination details below before entering your candidate information

Candidate surname	Other names
Centre Number	Candidate Number
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Pearson Edexcel International GCSE

Tuesday 20 May 2025

Afternoon (Time: 2 hours)	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; font-weight: bold; font-size: 0.8em;">Paper reference</div> <div style="margin-left: 10px; font-weight: bold; font-size: 1.5em;">4PM1/01R</div> </div>
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Further Pure Mathematics

PAPER 1R



<p style="font-weight: bold; margin-top: 0;">Calculators may be used.</p>	<p style="font-weight: bold; margin-top: 0;">Total Marks</p>
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### 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.*
- You must **NOT** write anything on the formulae page. Anything you write on the formulae page will gain NO credit.

### 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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Y:1/1/1/1/1



## International GCSE in Further Pure Mathematics Formulae sheet

**Mensuration**Surface area of sphere =  $4\pi r^2$ Curved surface area of cone =  $\pi r \times$  slant heightVolume of sphere =  $\frac{4}{3}\pi r^3$ **Series****Arithmetic series**Sum to  $n$  terms,  $S_n = \frac{n}{2}[2a + (n-1)d]$ **Geometric series**Sum to  $n$  terms,  $S_n = \frac{a(1-r^n)}{(1-r)}$ Sum to infinity,  $S_\infty = \frac{a}{1-r}$   $|r| < 1$ **Binomial series** $(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{r!}x^r + \dots$  for  $|x| < 1, n \in \mathbb{Q}$ **Calculus****Quotient rule (differentiation)**

$$\frac{d}{dx} \left( \frac{f(x)}{g(x)} \right) = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

**Trigonometry****Cosine rule**In triangle  $ABC$ :  $a^2 = b^2 + c^2 - 2bc \cos A$ 

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

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

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

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

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

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

**Logarithms**

$$\log_a x = \frac{\log_b x}{\log_b a}$$

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2 An arithmetic series  $F$  has third term 8 and fifth term 20

Given that the sum to  $n$  terms of  $F$  is greater than 220

find the least value of  $n$

(7)

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**Question 2 continued**

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**(Total for Question 2 is 7 marks)**





**Question 3 continued**

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**(Total for Question 3 is 10 marks)**





**Question 4 continued**

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**(Total for Question 4 is 7 marks)**



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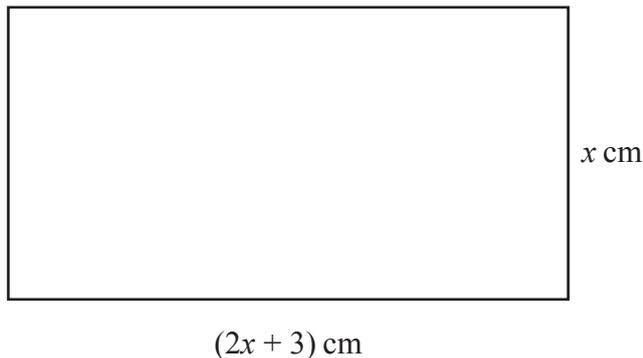


Diagram **NOT** accurately drawn

**Figure 1**

Figure 1 shows a rectangle with width  $x$  cm and length  $(2x + 3)$  cm.

The perimeter of the rectangle is  $P$  cm and the area of the rectangle is  $A$  cm<sup>2</sup>

$$P > 10 \quad \text{and} \quad A < 35$$

Find the set of possible values for  $x$

Give your answer in the form  $a < x < b$  where  $a$  and  $b$  are rational numbers.

Show clear algebraic working.

(7)

Area with horizontal dotted lines for working.

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**Question 5 continued**

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





**Question 6 continued**

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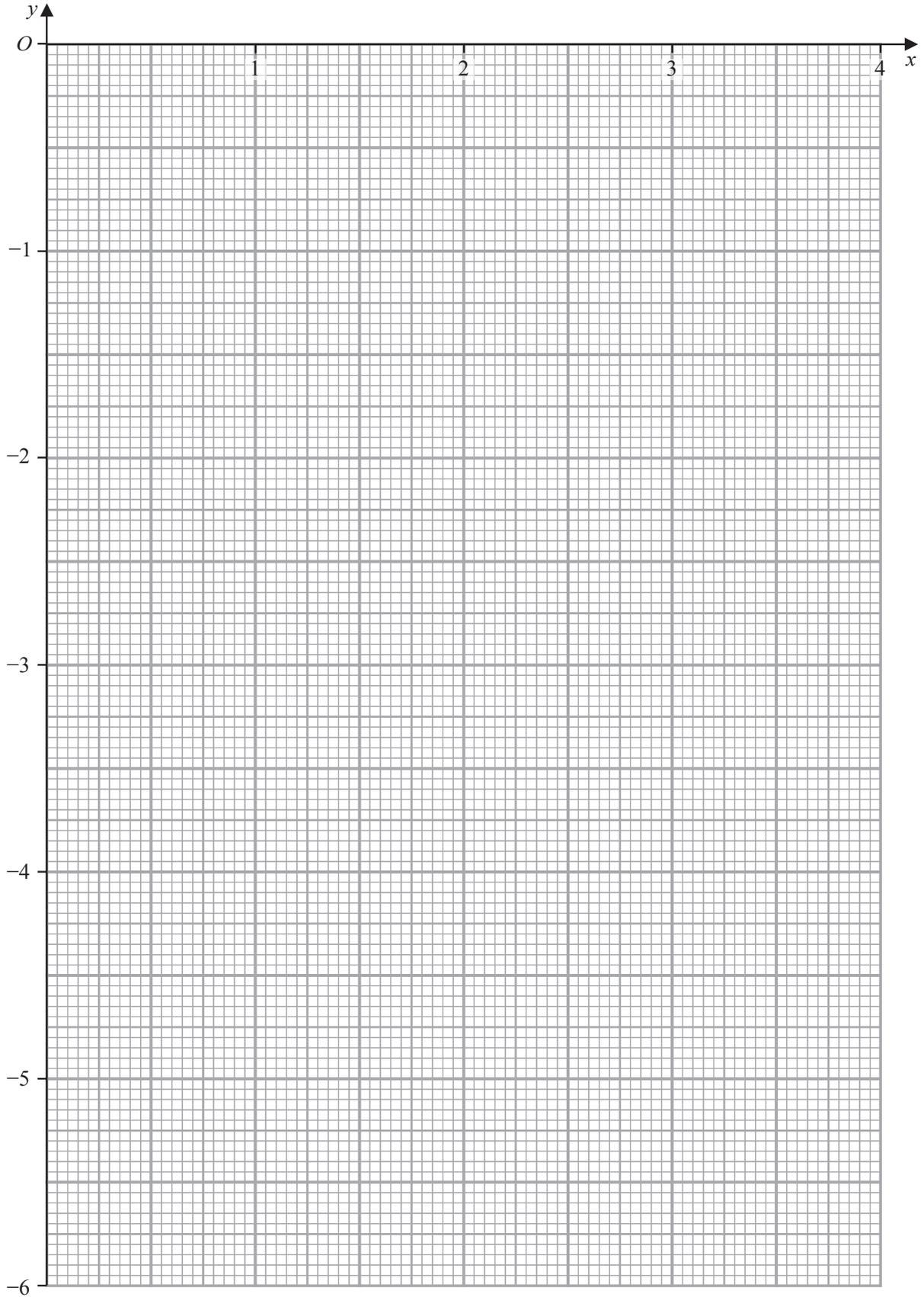
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**Question 7 continued**



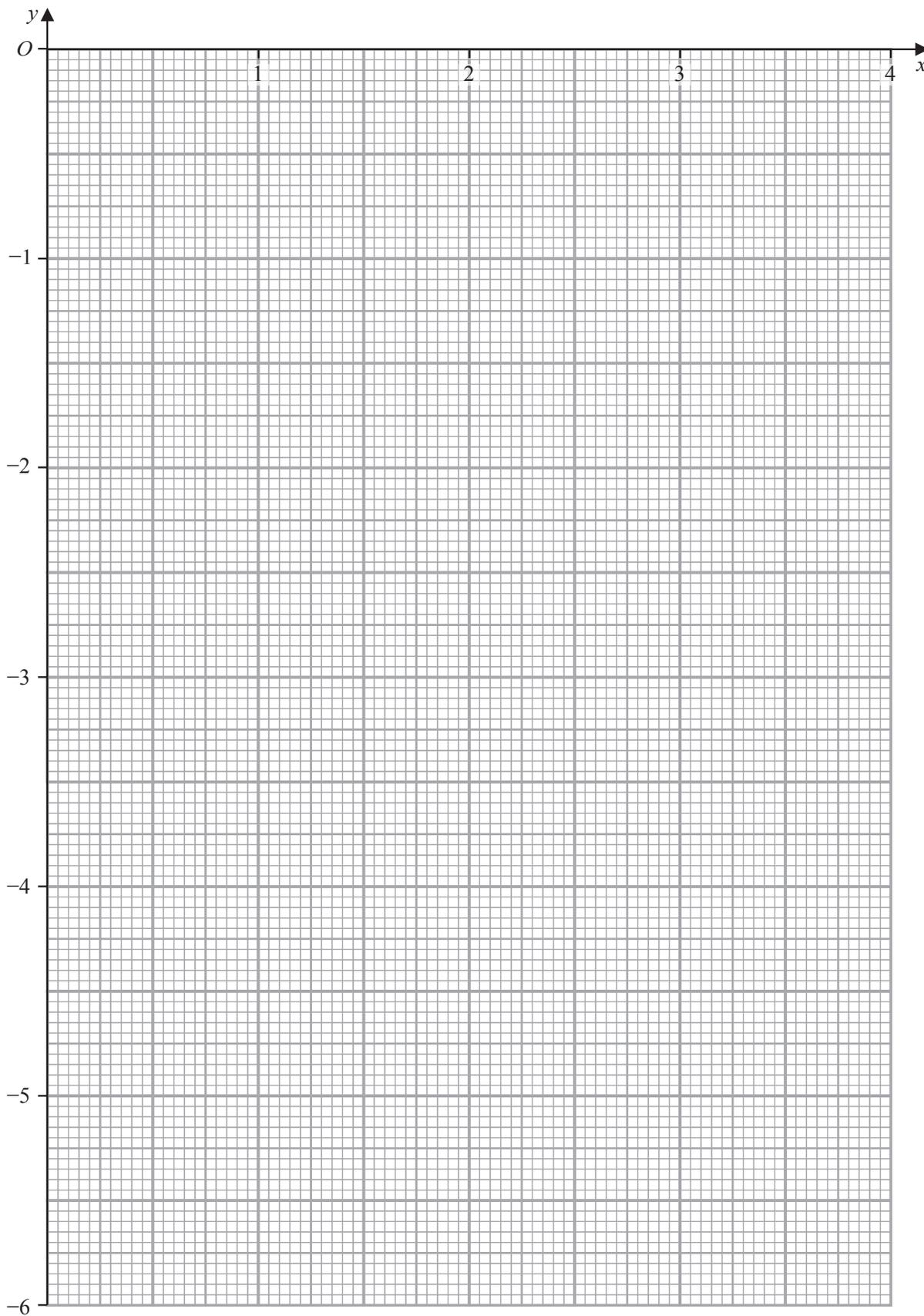
**Turn over for a spare grid if you need to redraw your graph.**





**Question 7 continued**

**Only use this grid if you need to redraw your graph.**



**(Total for Question 7 is 10 marks)**

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**Question 8 continued**

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**Question 8 continued**

Area for writing answers, consisting of multiple horizontal dotted lines.

**(Total for Question 8 is 15 marks)**





**Question 9 continued**

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**Question 9 continued**

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**(Total for Question 9 is 9 marks)**



10 (a) Using a formula from page 2, show that

(i)  $\sin^2 A = \frac{1 - \cos 2A}{2}$

(ii)  $\cos^2 A = \frac{\cos 2A + 1}{2}$

(5)

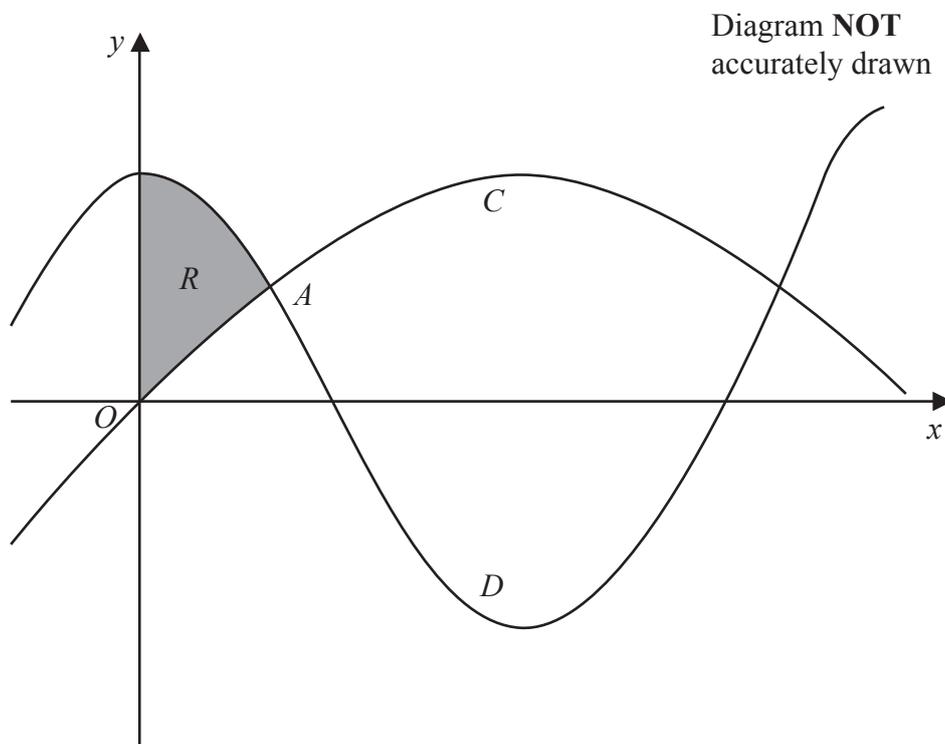


Figure 2

Figure 2 shows part of the curve  $C$  with equation  $y = \sin x$  and part of the curve  $D$  with equation  $y = \cos 2x$   
 Curve  $C$  and curve  $D$  intersect at the point  $A$

(b) Use algebra to find the exact coordinates of  $A$

(5)

The shaded region  $R$  is rotated through  $360^\circ$  about the  $x$ -axis.

(c) Use algebraic integration to find the exact volume of the solid generated.

Give your answer in the form  $\frac{a\sqrt{a}}{b}\pi$

where  $a$  is a prime number and  $b$  is an integer.

(5)

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**Question 10 continued**

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**Question 10 continued**

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**(Total for Question 10 is 15 marks)**





**Question 11 continued**

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