

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 10 June 2025

Afternoon (Time: 2 hours)	Paper reference	4PM1/02
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Further Pure Mathematics

PAPER 2



Calculators may be used.	Total Marks
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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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Pearson

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 height

Volume 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

$$(1 + x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{r!}x^r + \dots \quad \text{for } |x| < 1, n \in \mathbb{Q}$$

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 : $a^2 = b^2 + c^2 - 2bc \cos A$

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

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

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

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

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

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

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

Logarithms

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

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Question 2 continued

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(Total for Question 2 is 5 marks)



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Question 3 continued

Handwriting practice area consisting of 25 horizontal dotted lines for writing answers.

(Total for Question 3 is 5 marks)



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Question 4 continued

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

(Total for Question 4 is 6 marks)



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Question 5 continued

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(Total for Question 5 is 8 marks)



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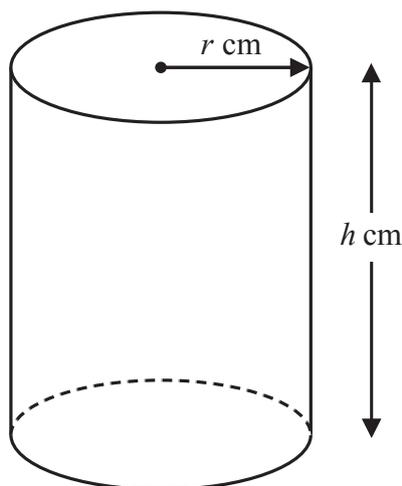


Diagram **NOT** accurately drawn

Figure 1

Figure 1 shows a solid right circular cylinder with radius r cm and height h cm

The total surface area of the cylinder is 700π cm²

The volume of the cylinder is V cm³

(a) Show that $V = \pi r(350 - r^2)$ (4)

Given that r can vary and using calculus,

(b) find, in cm to 3 significant figures, the value of r for which V is a maximum.
Justify that this value of r gives a maximum value of V (5)

(c) Find, to 3 significant figures, the height h cm for which V is a maximum. (1)

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Question 6 continued

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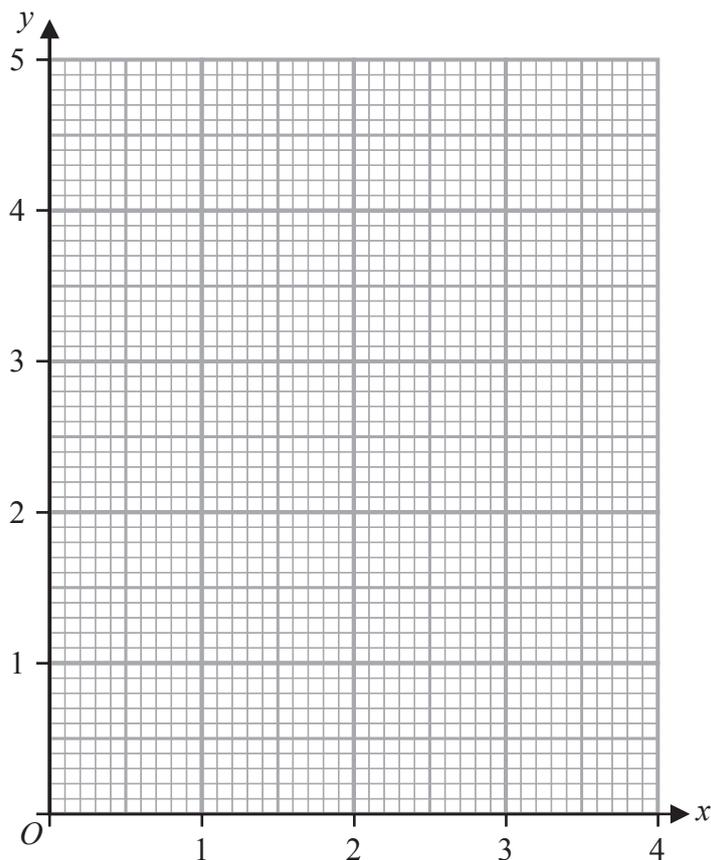


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Question 7 continued



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



8

Diagram **NOT**
accurately drawn

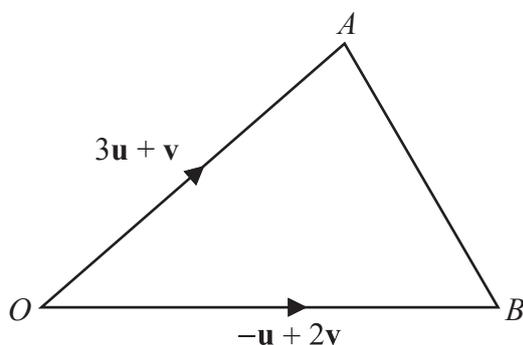


Figure 2

Figure 2 shows triangle OAB with

$$\vec{OA} = 3\mathbf{u} + \mathbf{v} \quad \vec{OB} = -\mathbf{u} + 2\mathbf{v}$$

- (a) Find \vec{AB} as a simplified expression in terms of \mathbf{u} and \mathbf{v} (2)

Point C is such that AC is parallel to OB

Given that $\vec{OC} = \mu\mathbf{v}$

- (b) find the value of μ (4)

The lines OC and AB intersect at point X

Point D lies on \vec{OC} such that

$$\text{area of triangle } BOX : \text{area of triangle } BXD = 2 : 3$$

Using a vector method,

- (c) find \vec{BD} as a simplified expression in terms of \mathbf{u} and \mathbf{v} (5)

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Question 8 continued

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Question 8 continued

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(Total for Question 8 is 11 marks)



Question 9 continued

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Question 9 continued

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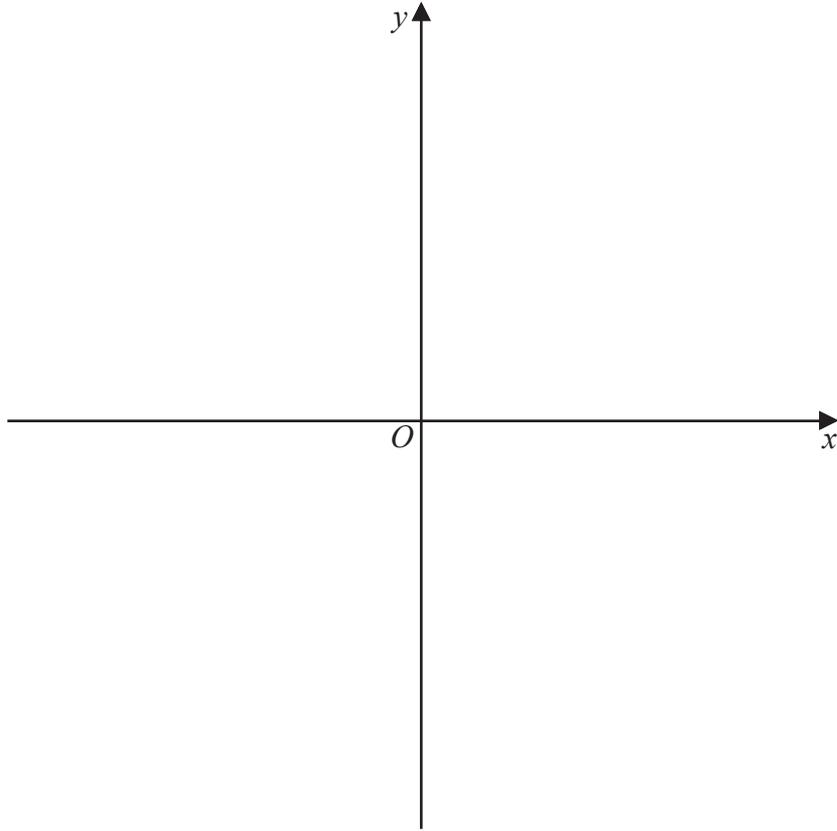
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(Total for Question 9 is 8 marks)



Question 10 continued



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Question 10 continued

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(Total for Question 10 is 17 marks)



Question 11 continued

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