

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 31 October 2023

Morning (Time: 2 hours)	Paper reference	4PM1/01
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Further Pure Mathematics

PAPER 1



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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International GCSE in Further Pure Mathematics Formulae sheet

MensurationSurface 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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Question 1 continued

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(Total for Question 1 is 4 marks)



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 8 marks)



Question 4 continued

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Question 4 continued

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(Total for Question 4 is 9 marks)



Question 5 continued

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(Total for Question 5 is 8 marks)



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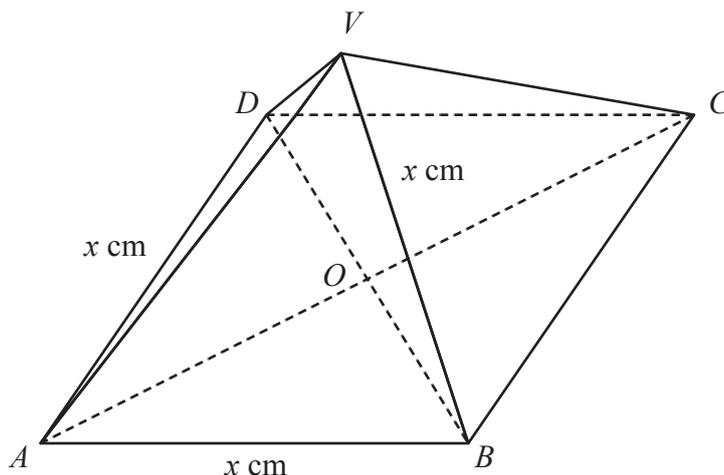


Diagram **NOT** accurately drawn

Figure 3

Figure 3 shows a right pyramid with a horizontal square base.

$$AB = BC = CD = DA = x \text{ cm}$$

$$AV = BV = CV = DV = x \text{ cm}$$

O is the point of intersection of the diagonals of the base.

The vertex V of the pyramid is vertically above O

(a) Show that $VO = \frac{\sqrt{2}}{2}x \text{ cm}$ (3)

(b) Find, in degrees, the size of the angle AVC (2)

(c) Find, in degrees to one decimal place, the size of the angle between the plane VAB and the plane VDC (3)

The volume of the pyramid is 200 cm^3

Given that the volume of a pyramid = $\frac{1}{3} \times \text{base area} \times \text{height}$

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

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Question 6 continued

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Question 6 continued

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(Total for Question 6 is 11 marks)



Question 7 continued

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(Total for Question 7 is 9 marks)



Question 8 continued

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Area for writing the answer to Question 8, featuring horizontal dotted lines.



Question 8 continued

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(Total for Question 8 is 8 marks)



Question 9 continued

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Question 9 continued

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(Total for Question 9 is 11 marks)



Question 10 continued

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Question 10 continued

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Area with horizontal dotted lines for writing answers.

(Total for Question 10 is 17 marks)



11 Solve the simultaneous equations

$$2\log_4 x = \log_3 3y^2$$

$$\log_2 x^3 + 8\log_9 y = 13$$

Show your working clearly.

(8)

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Question 11 continued

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