

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International GCSE

Friday 14 November 2025

Morning (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

$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{r!}x^r + \dots$ 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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Answer all ELEVEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 A circle has centre O and radius 14 cm

A sector AOB of the circle has a perimeter of 49 cm

Find, in cm^2 , the area of sector AOB

(3)

(Total for Question 1 is 3 marks)



- 2 (a) Use algebra to find the x coordinates of the points where the curve with equation $y = 3x^2 + 9x - 17$ intersects the line with equation $y = 3 - 2x$

(3)

- (b) Hence, or otherwise, find the set of values of x for which $3 - 2x \leq 3x^2 + 9x - 17$

(2)



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Question 2 continued

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(Total for Question 2 is 5 marks)



3 Curve S has equation $y = 2 - \frac{5}{2x+1}$ where $x \neq -\frac{1}{2}$

(a) Write down an equation of the asymptote to S that is parallel to

- (i) the y -axis (ii) the x -axis

(3)

(b) Find the coordinates of the point where S crosses

- (i) the y -axis (ii) the x -axis

(2)

(c) Using the axes on the page opposite, sketch S , showing clearly the asymptotes and the coordinates of the points where S crosses the coordinate axes.

(3)

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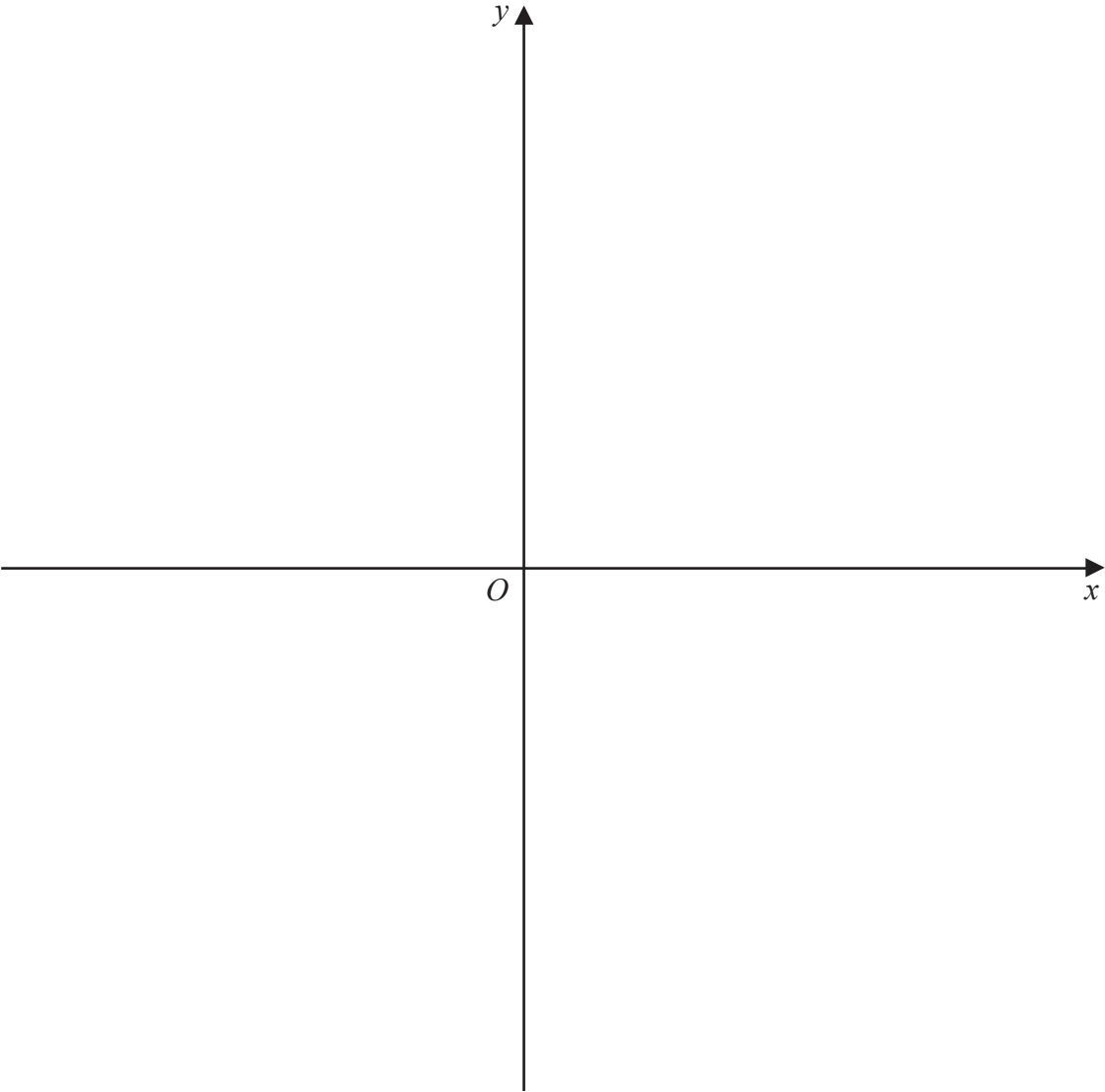


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Question 3 continued



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(Total for Question 3 is 8 marks)

- 4 A particle P is moving along a straight line. At time t seconds ($t \geq 0$), its velocity, v m/s, is given by $v = 4t^2 - 6t + 5$

(a) Find the minimum speed of P

(3)

The acceleration of P at time T seconds is 18 m/s^2

(b) Find the value of T

(2)

When $t = 0$, P is at the point X , and when $t = 3$, P is at the point Y

(c) Find the distance XY

(4)



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Question 4 continued

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(Total for Question 4 is 9 marks)



Diagram **NOT**
accurately drawn

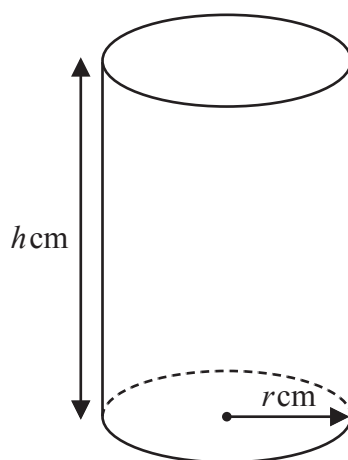


Figure 1

A solid right circular cylinder has base radius r cm and height h cm, as shown in Figure 1

The cylinder has a total surface area of 322π cm² and a volume of V cm³

- (a) Show that $V = \pi r(161 - r^2)$ (3)

Given that r can vary,

- (b) use calculus to find, to 3 significant figures, the value of r for which V is a maximum, justifying that this value of r gives a maximum value of V (5)

- (c) Find, to 3 significant figures, the maximum value of V (2)

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Question 5 continued

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(Total for Question 5 is 10 marks)



- 6 (i) A geometric series G has first term $(3 + \sqrt{3})$ and common ratio r

The second term of G is $\sqrt{3}$

- (a) Find, showing all your working, the exact value of r

Give your answer in the form $\frac{p+\sqrt{3}}{q}$ where p and q are integers to be found. (2)

- (b) Explain why G is convergent. (1)

- (ii) A different geometric series H has first term 8 and common ratio 0.6

The sum to n terms of H is S_n and the sum to infinity of H is T

Find, using logarithms, the least value of n such that $T - S_n < 0.12$



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Question 6 continued

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(Total for Question 6 is 8 marks)



7

$f(x) = 2x^3 + Ax^2 + Bx - 20$ where A and B are constants.

Given that

- $(2x+1)$ is a factor of $f(x)$
- when $f'(x)$ is divided by $(x-1)$ the remainder is -27

(a) show that $A = 3$ and find the value of B

(5)

(b) Hence, using algebra, solve the equation $f(x) = 0$

(3)

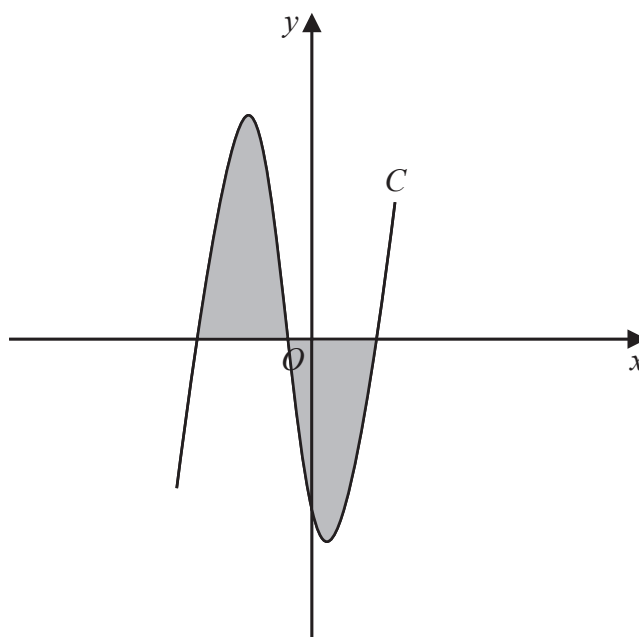


Figure 2

Figure 2 shows a sketch of part of the curve C with equation $y = f(x)$

(c) Use calculus to find the exact area of the finite region bounded by C and the x -axis, shown shaded in Figure 2

(4)



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Question 7 continued

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Question 7 continued

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Question 7 continued

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(Total for Question 7 is 12 marks)



8 Solve, using an algebraic method, the simultaneous equations

$$\log_{27} x^3 - \log_3 y = 2$$

$$\log_6 (x + 3y) = 3$$

(8)

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Question 8 continued

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(Total for Question 8 is 8 marks)



9 The points A, B, C and D are the vertices of a quadrilateral where

$$\overrightarrow{AB} = 2\mathbf{a} + 4\mathbf{b} \quad \overrightarrow{AC} = 7\mathbf{a} + 7\mathbf{b} \quad \overrightarrow{AD} = 10\mathbf{a} + 6\mathbf{b}$$

(a) Show that $ABCD$ is a trapezium.

(4)

Given that $|\mathbf{a}|=1$ and $|\mathbf{b}|=1$ and that $\mathbf{a}$ and $\mathbf{b}$ are perpendicular to each other

(b) find a unit vector parallel to $\overrightarrow{BD}$

(4)

The point Y lies on CD such that $CY:YD=1:2$

The lines AC and BY intersect at the point X

(c) (i) Use a vector method to find the ratio $BX : XY$

(4)

(ii) Hence find, in its simplest form, the ratio

area of triangle CXY : area of trapezium $ABCD$

(4)



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Question 9 continued

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Question 9 continued

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Question 9 continued

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(Total for Question 9 is 16 marks)



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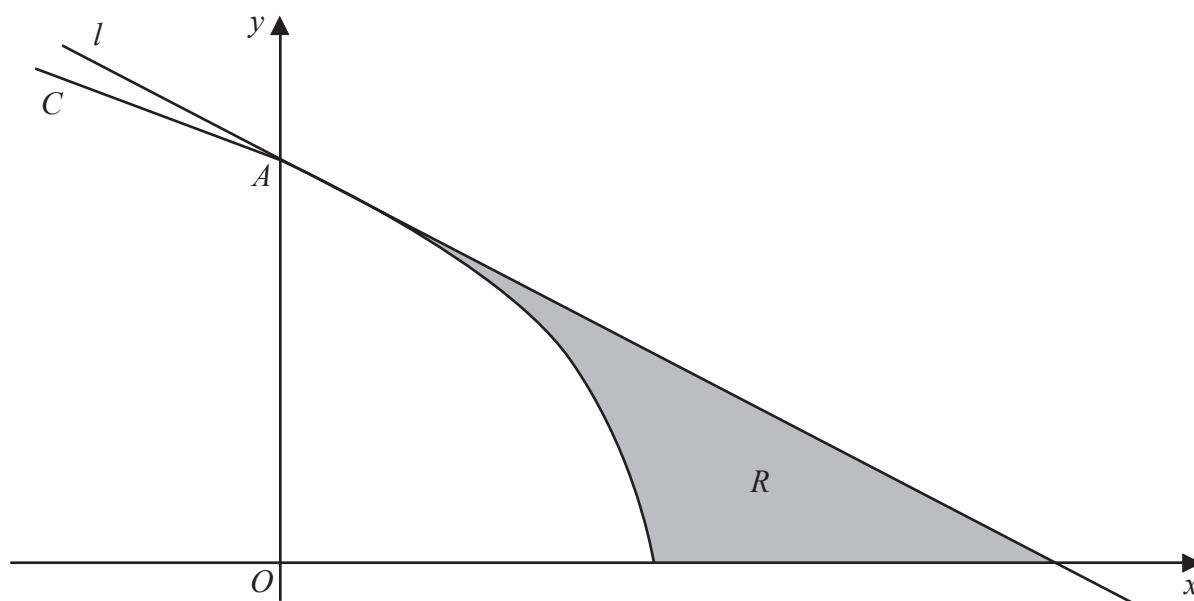


Figure 3

Figure 3 shows part of the curve C with equation $y = 3\sqrt{4-x}$ and part of the line l with equation $px + qy + r = 0$ where p and r are integers and q is prime.

The curve C cuts the y -axis at the point A

The line l is the tangent to C at A

- (a) Find the value of p , the value of q and the value of r

(5)

The finite region R , shown shaded in Figure 3, is rotated through 360° about the x -axis.

- (b) Use algebraic integration to find the volume of the solid formed.
Give your answer in terms of π

(5)



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Question 10 continued

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Question 10 continued

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Question 10 continued

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(Total for Question 10 is 10 marks)



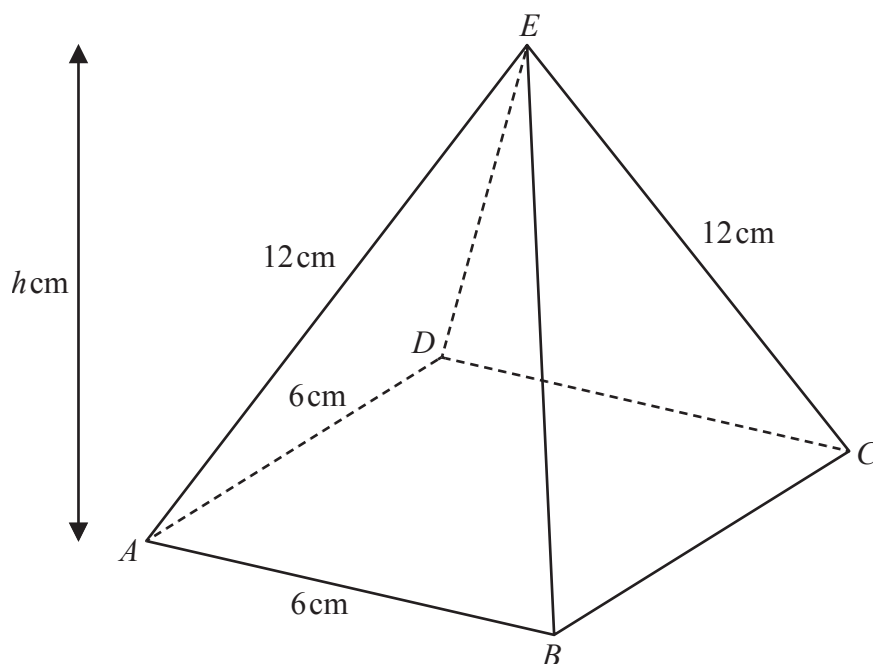


Figure 4

Figure 4 shows a right pyramid $ABCDE$ with

- vertex E
- horizontal square base $ABCD$ of side 6 cm
- $EA = EB = EC = ED = 12$ cm
- vertical height of h cm

(a) Show that $h = 3\sqrt{14}$ (3)

(b) Find, in degrees to one decimal place, the size of the angle between EB and the plane $ABCD$ (2)

The midpoint of AE is P and the midpoint of BE is Q

(c) Find, to the nearest degree, the size of the obtuse angle between the plane EPQ and the plane $PQCD$ (6)

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Question 11 continued

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Question 11 continued

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Question 11 continued

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(Total for Question 11 is 11 marks)

TOTAL FOR PAPER IS 100 MARKS

