

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International GCSE

Thursday 4 June 2026

Afternoon (Time: 2 hours)

Paper reference **4PM1/02R**

Further Pure Mathematics

PAPER 2R



Calculators may be used.

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.*
- 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, $S_\infty = \frac{a}{1-r} \quad |r| < 1$

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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- (1)

(b) Hence, or otherwise, show that $(3x^2 - 17x + 10)$ is a factor of $f(x)$

(3)



- 2 The curve C with equation $y = f(x)$ passes through the point with coordinates $(2, -1)$

Given that $f'(x) = 6x^2 - x - 12$

- (a) find $f(x)$

(3)

- (b) Find the range of values of x for which the gradient of C is positive.

(3)



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Question 2 continued

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(Total for Question 2 is 6 marks)



- 3 (i) Given that k is a constant such that

$$\frac{16^{(x+2)} - 4^{(2x+3)}}{2^x \times 8^{(x+1)}} = k$$

find the value of k

(4)

- (ii) Given that $\frac{10}{\sqrt{12} - 2} = \frac{A\sqrt{3} + A}{B}$ where A and B are prime numbers

find the value of A and the value of B

You must show **all** stages of your working.

(3)



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Question 3 continued

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(Total for Question 3 is 7 marks)



4 (a) On the grid opposite, draw the line with equation

(i) $y = 5 - 2x$ (ii) $2y - 6x + 5 = 0$

(2)

(b) Show, by shading, the region R defined by the inequalities

$$y \leq 5 - 2x \quad x \geq -2 \quad 2y - 6x + 5 \geq 0$$

(1)

For all points in R with coordinates (x, y)

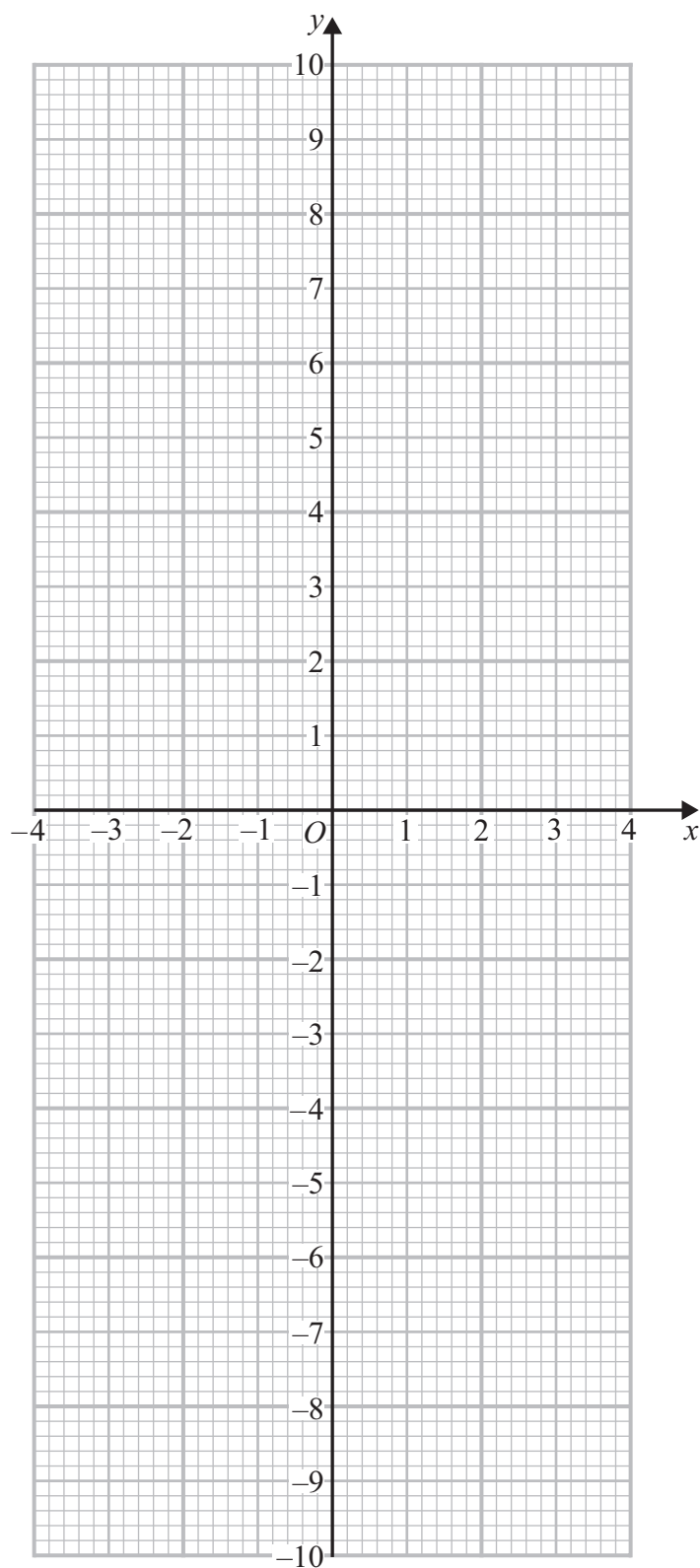
$$P = 3x - 2y$$

(c) Find the greatest value of P

(4)



Question 4 continued



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



P 7 9 5 1 6 A 0 9 3 6

Question 4 continued

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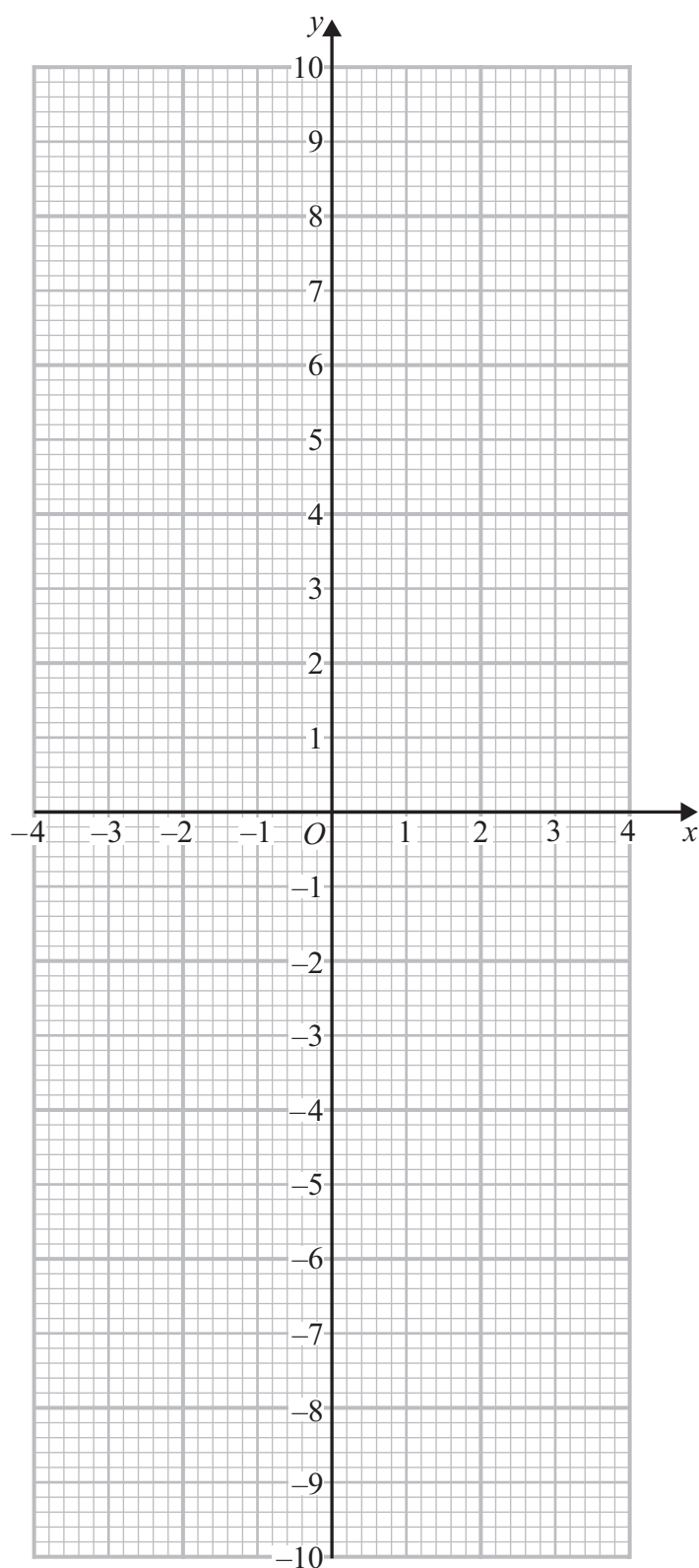
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Question 4 continued

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



(Total for Question 4 is 7 marks)



5

$$f(x) = 6x - x^2$$

Given that $f(x)$ can be written in the form $a(x + b)^2 + c$ where a , b and c are constants

(a) find the value of a , the value of b and the value of c (3)

(b) Hence, or otherwise, find

(i) the maximum value of $f(x)$

(ii) the value of x for which this maximum occurs. (2)

The curve C has equation $y = f(x)$

The line l has equation $y = 3x$

The finite region bounded by C and l is rotated through 2π radians about the x -axis.

(c) Use algebraic integration to find the exact volume of the solid generated. (6)

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Question 5 continued

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Question 5 continued

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(Total for Question 5 is 11 marks)



- 6 A solid right circular cylinder has radius r cm and height h cm

The total volume of the cylinder is $V \text{ cm}^3$ and the total surface area of the cylinder is $S \text{ cm}^2$

(a) Show that $V = \frac{r}{2}(S - 2\pi r^2)$ (3)

Given that $S = 900$ and that r can vary

- (b) use calculus to find, to 2 significant figures, the maximum value of V

Justify that the value you have found is a maximum.

(6)



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Question 6 continued

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(Total for Question 6 is 9 marks)



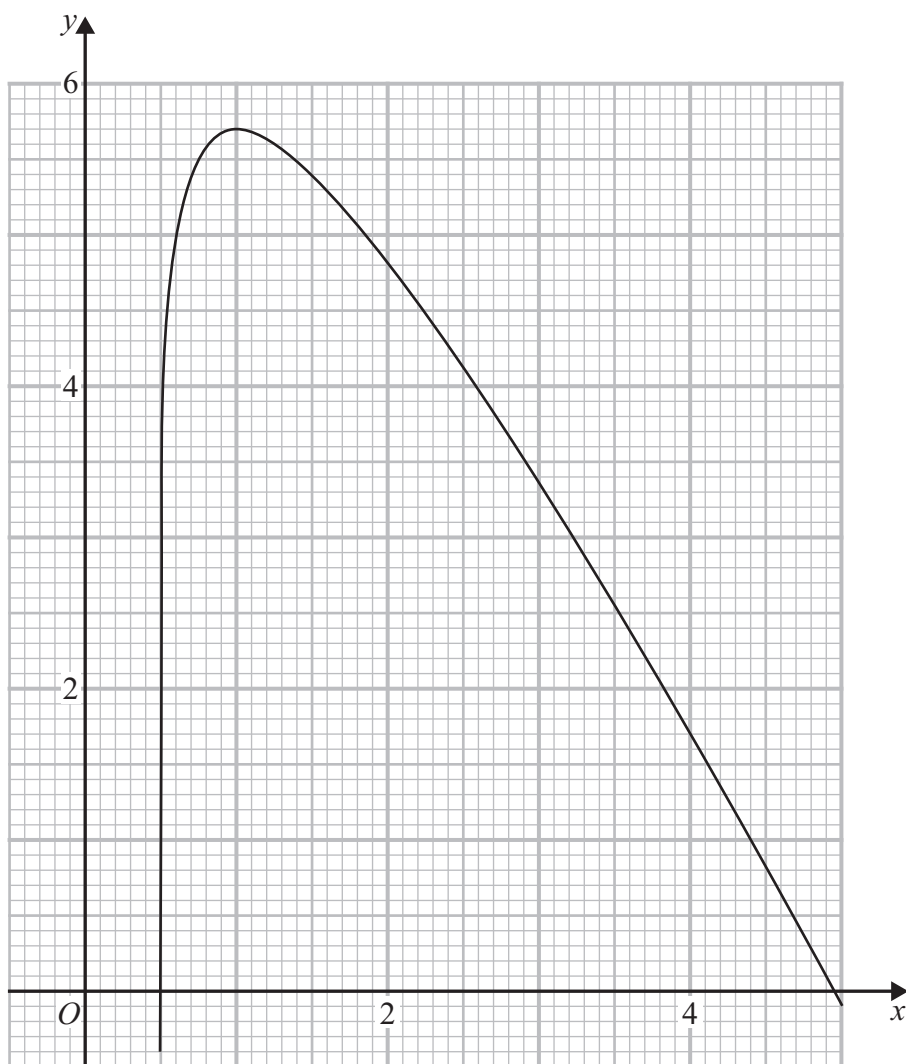


Figure 1

Figure 1 shows the curve with equation $y = \log_3(4x - 2) - 2x + 7$ for $0.5 < x < 5$

By drawing a suitable straight line on the grid, obtain an estimate, to one decimal place, of the root of the equation

$$3^{3x-6} + 2 = 4x$$

in the interval $2 < x < 4$

(5)



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Question 7 continued

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(Total for Question 7 is 5 marks)



8 The line L passes through the points with coordinates $(1, 5)$ and $(7, -1)$

- (a) Show that an equation of L is $y + x = 6$ (2)

The curve S has equation $(x - 7)^2 + (y - 5)^2 = 18$

- (b) Show that L is a tangent to S (3)

Given that L is the tangent to S at the point A

- (c) find the coordinates of A (2)

- (d) find an equation of the normal to S at A

Give your answer in the form $y = mx + c$ (3)

The point B is the intersection of the normal to S at A with another point on S

- (e) Find the exact length of AB (6)

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Question 8 continued

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Question 8 continued

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(Total for Question 8 is 16 marks)



9 O, X, Y and Z are fixed points such that

$$\vec{OX} = 4\mathbf{b} - 3\mathbf{a} \quad \vec{OY} = 6\mathbf{b} \quad \vec{OZ} = 12\mathbf{b} + 9\mathbf{a}$$

(a) Show that X, Y and Z are collinear.

(4)

The point M is the midpoint of OX

The point N is the midpoint of OY

The point P lies on OZ such that $OP : PZ = 2 : 1$

(b) Find in its simplest form the ratio

Area of quadrilateral $MXYN$: Area of triangle YPZ

(6)



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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 10 marks)



10 A curve C has equation $y = \frac{3x+2}{2x-1} \quad x \neq \frac{1}{2}$

- (a) Using the axes on the opposite page, sketch the curve C
Show clearly the asymptotes with their equations, and the coordinates of the points
where C crosses the coordinate axes.

(5)

The curve C crosses the y -axis at the point P

The line l is the normal to C at P

The line l meets C again at the point Q

- (b) Find the x coordinate of Q

(7)

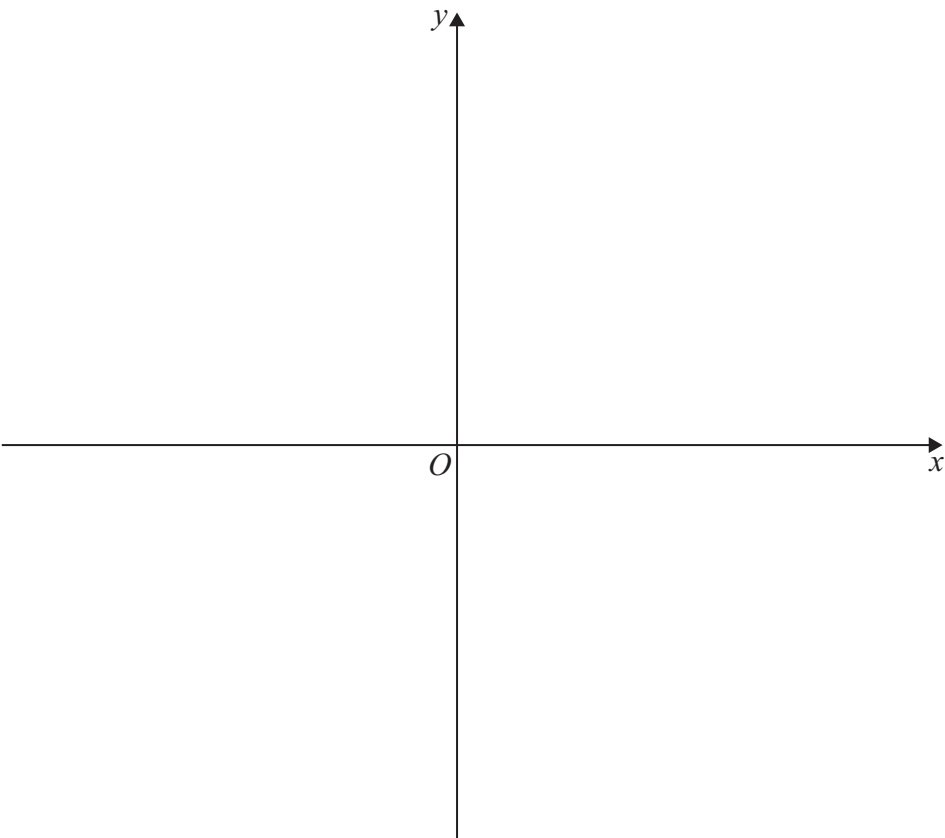


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Question 10 continued



Below the coordinate system, there are ten horizontal dotted lines for writing the answer.

Question 10 continued

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Question 10 continued

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(Total for Question 10 is 12 marks)



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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 13 marks)

TOTAL FOR PAPER IS 100 MARKS



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