

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International GCSE

Tuesday 19 May 2026

Afternoon (Time: 2 hours)

Paper reference **4PM1/01**

Further Pure Mathematics

PAPER 1



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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International GCSE in Further Pure Mathematics Formulae sheet

Mensuration

Surface area of sphere = $4\pi r^2$

Curved surface area of cone = $\pi r \times \text{slant height}$

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

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



Answer all ELEVEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1

$$f(x) = -3x^2 + 12x - 2$$

- (a) Show that $f(x)$ can be written in the form $a(x + b)^2 + c$
where a , b and c are integers.
Show your working clearly.

(3)

- (b) Hence write down the equation of the line of symmetry for the curve
with equation $y = f(x)$

(1)

(Total for Question 1 is 4 marks)



2 Find the set of values of x for which

both

$$4 < 2x + 7 < 20$$

and

$$(x - 5)(x + 7) \leq 0$$

(5)



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Question 2 continued

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(Total for Question 2 is 5 marks)



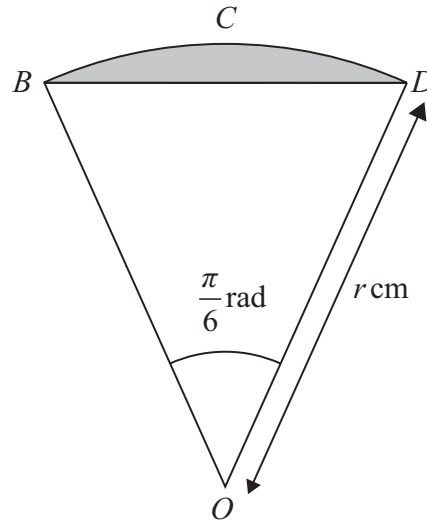


Diagram **NOT**
accurately drawn

Figure 1

Figure 1 shows sector $OBCD$ of a circle with centre O and radius r cm

The size of angle BOD is $\frac{\pi}{6}$ radians.

The region shown shaded in Figure 1 is bounded by the arc BCD and the line BD
The area of this shaded region is A cm²

(a) Show that
$$A = \frac{1}{12}r^2(\pi - 3)$$
 (3)

(b) Find, in cm, the perimeter of sector $OBCD$ when $A = 6$
Give your answer to 3 significant figures. (3)

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Question 3 continued

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(Total for Question 3 is 6 marks)



- 4 A particle P is moving along the x -axis. At time t seconds ($t \geq 0$) the velocity of P is v m/s where

$$v = 2t^2 - 7t + 28$$

- (a) Find the acceleration of P when $t = 3$

(2)

Given that the displacement of P from the origin is $\frac{64}{3}$ metres when $t = 2$

- (b) find the displacement of P from the origin when $t = 6$

(5)

- (c) (i) Show that there are no values of t for which P is at rest.

- (ii) Find the least magnitude of the velocity of P

(4)



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Question 4 continued

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(Total for Question 4 is 11 marks)



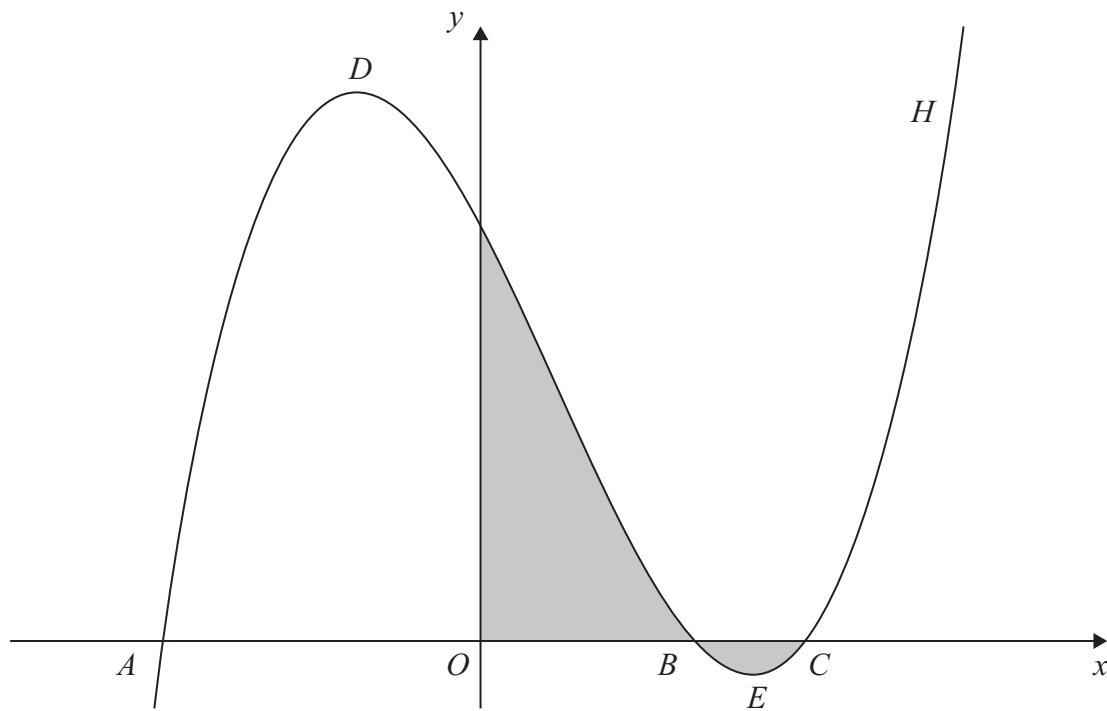


Figure 2

Figure 2 shows part of a curve H with equation

$$f(x) = x^3 - 2x^2 - 9x + 18$$

H crosses the x -axis at the points A , B and C

- (a) (i) Use the factor theorem to show that $(x - 3)$ is a factor of $f(x)$
- (ii) Hence, without using a calculator, find the coordinates of A , B and C
Show your working clearly.

(7)

H has a maximum at the point D and a minimum at the point E

- (b) Use calculus to find the exact values of the x coordinates of D and E

(3)

The finite region, shown shaded in Figure 2, is bounded by H , the y -axis and the part of the x -axis from O to C

- (c) Using algebraic integration, find the total area of the shaded region.
Give your answer as a simplified fraction.

(5)

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Question 5 continued

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Question 5 continued

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Question 5 continued

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(Total for Question 5 is 15 marks)



- Give your answers to 2 decimal places where appropriate.

x	-1	-0.5	0	0.5	1
y		1.96	1.25		

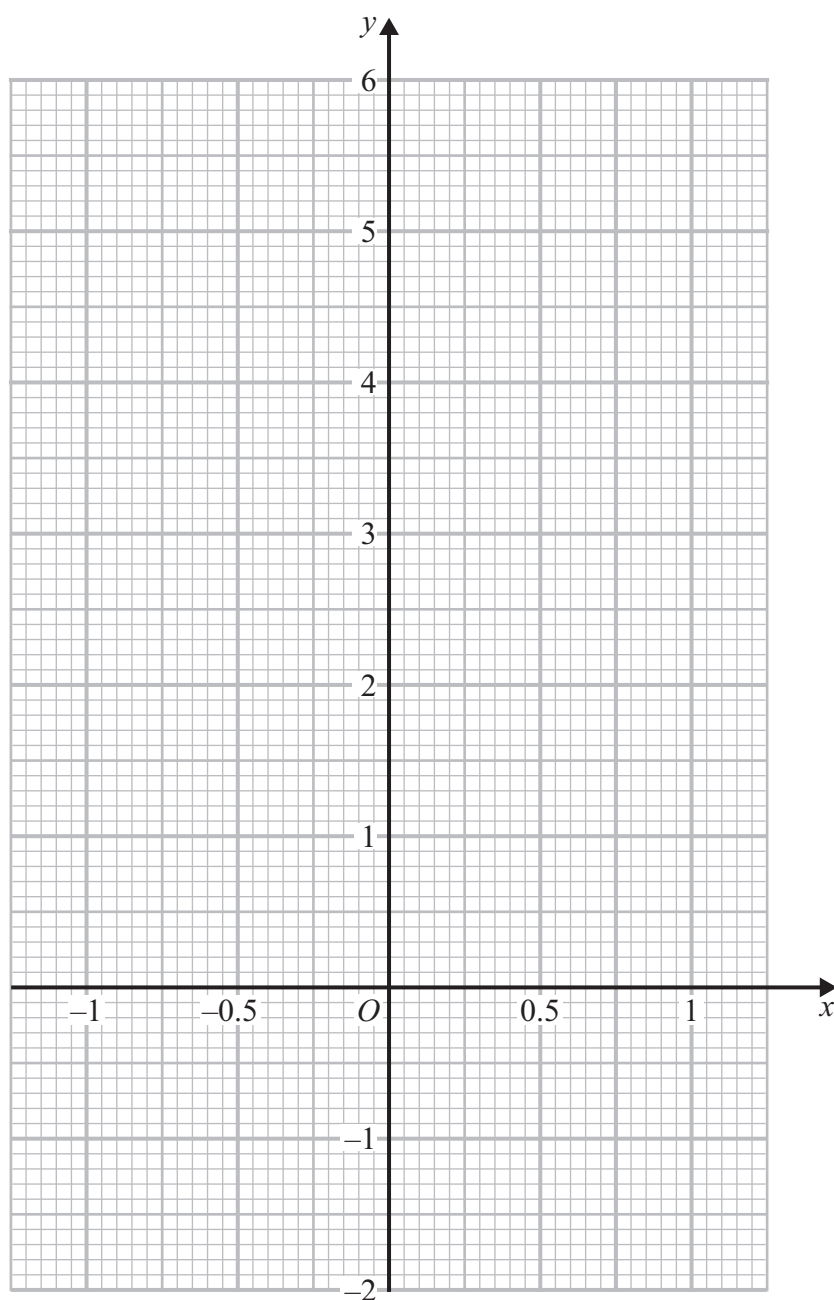
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- (2)

- (4)

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Question 6 continued



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Question 6 continued

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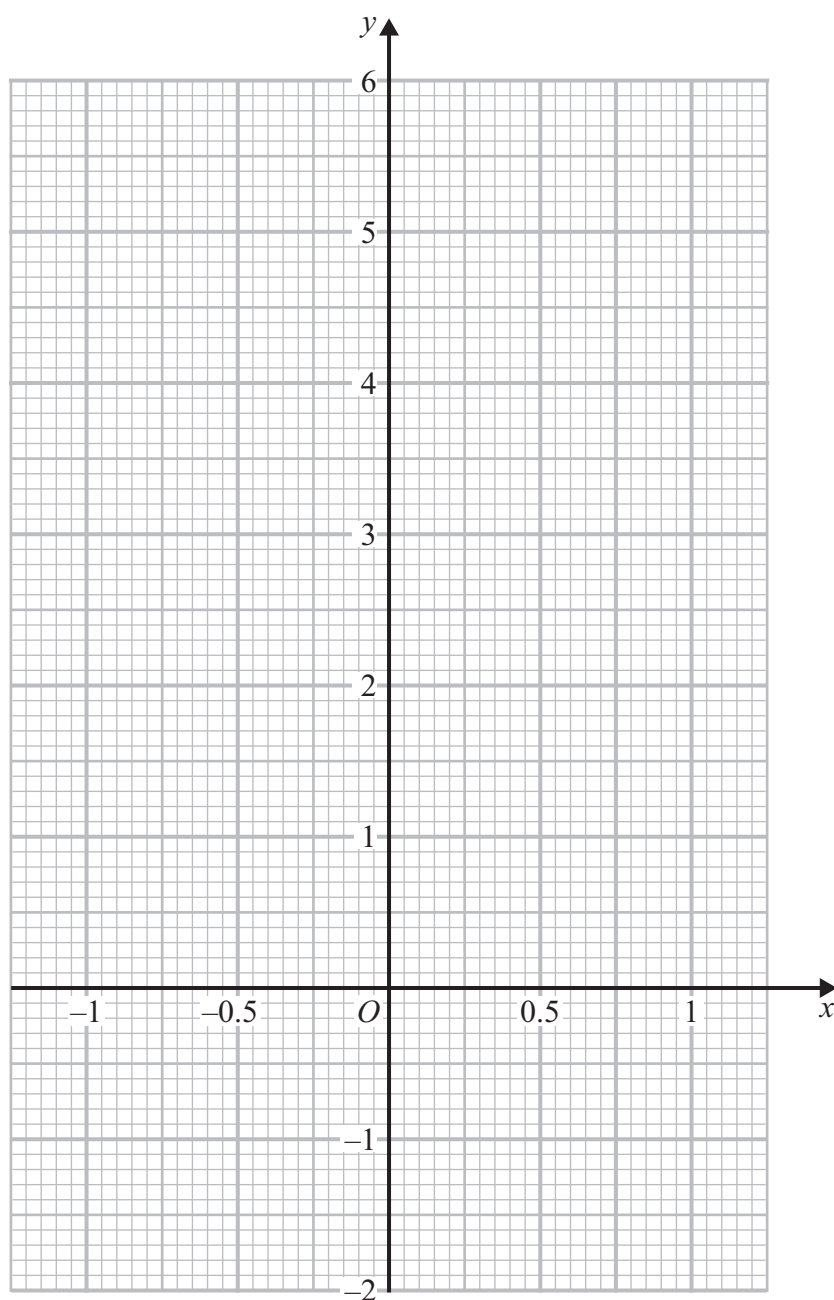
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Question 6 continued

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(Total for Question 6 is 8 marks)



7 A geometric series G and an arithmetic series A both have first term 125

The fourth term of G is 27

The ninth term of A is equal to the third term of G

- (a) Find the sum of the first 20 terms of A

(6)

- (b) Find the sum to infinity of G

(2)

The sum of the first n terms of G is greater than 300

- (c) Find, using logarithms, the least value of n
Show your working clearly.

(5)



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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 13 marks)

Diagram **NOT**
accurately drawn

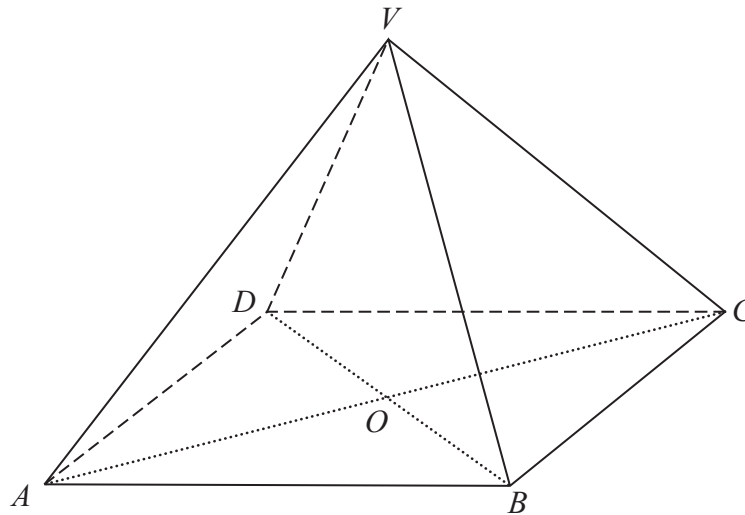


Figure 3

Figure 3 shows a right pyramid $ABCDV$ with horizontal square base $ABCD$ and vertex V

$$VA = VB = VC = VD = AB = 2x \text{ cm}$$

The diagonals of the base $ABCD$ intersect at the point O
 V is vertically above O

(a) Show that angle $AVC = 90^\circ$ (4)

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

The area of the plane ABV is $49\sqrt{3} \text{ cm}^2$

(c) Find the value of x (3)

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Question 8 continued

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Question 8 continued

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Question 8 continued

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(Total for Question 8 is 10 marks)



9 Solve the equation

$$\log_{81} x + \log_9 x + \log_3 x^2 = 22$$

Show your working clearly.

(6)



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Question 9 continued

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(Total for Question 9 is 6 marks)



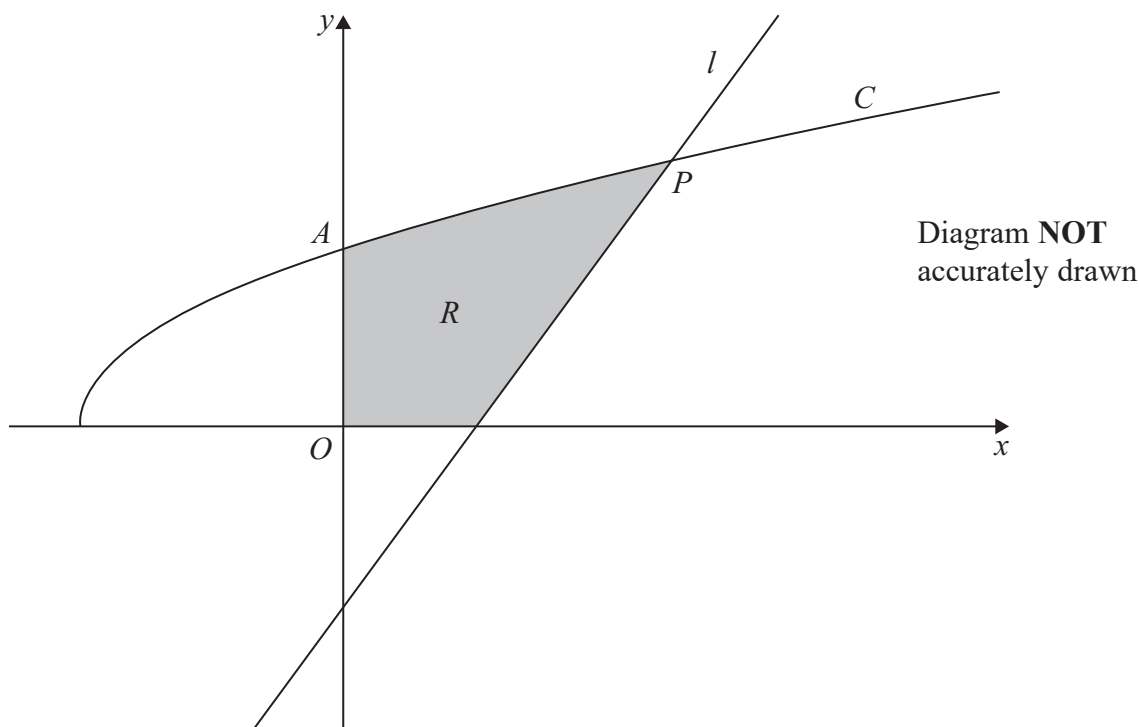


Figure 4

Figure 4 shows part of the line l with equation $y = x - 2$

and part of the curve C with equation $y = \sqrt{x + 4}$ such that

- C intersects the y -axis at the point A
- C and l intersect at the point P

The finite region R bounded by C , the x -axis, the y -axis and l , shown shaded in Figure 4, is rotated through 360° about the y -axis to form a solid S

Use algebraic integration to find the volume of S

Give your answer in the form $\frac{b}{15}\pi$ where b is an integer.

(9)



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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 9 marks)



11 (a) Expand and simplify $(\alpha + \beta)^3$

(1)

$$f(x) = x^2 - 2x + 5$$

The roots of the equation $f(x) = 0$ are α and β

Without solving the equation $f(x) = 0$ and using your expansion from part (a)

(b) find the value of $\alpha^3 + \beta^3$

(3)

Given that $(\alpha + \beta)^5 = \alpha^5 + 5\alpha^4\beta + 10\alpha^3\beta^2 + 10\alpha^2\beta^3 + 5\alpha\beta^4 + \beta^5$

(c) show that the value of $\alpha^5 + \beta^5$ is 82

(3)

(d) Hence form a quadratic equation with integer coefficients that has roots

$$\left(\alpha^3 + \frac{1}{\alpha^2}\right) \text{ and } \left(\beta^3 + \frac{1}{\beta^2}\right)$$

(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 13 marks)

TOTAL FOR PAPER IS 100 MARKS

