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 ▶

P79484A

P:1/1/1/1/1/

P 7 9 4 8 4 A 0 1 3 6

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

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

Calculus

Quotient rule (differentiation)

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{\mathrm{f}(x)}{\mathrm{g}(x)}\right) = \frac{\mathrm{f}'(x)\mathrm{g}(x) - \mathrm{f}(x)\mathrm{g}'(x)}{[\mathrm{g}(x)]^2}$$

Trigonometry

Cosine rule
In triangle ABC: $a^2 = b^2 + c^2 - 2bc\cos A$

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

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

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

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

Logarithms

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

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

2 Find the set of values of x for which

both

$4 < 2x + 7 < 20$

and

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

(5)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 2 continued

(Total for Question 2 is 5 marks)

3

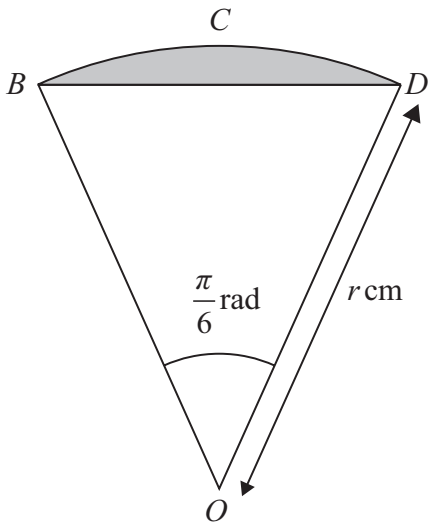


Diagram **NOT** accurately drawn

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 cm^2

(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)

Question 3 continued

(Total for Question 3 is 6 marks)

4 A particle P is moving along the x-axis. At time t seconds ($t \geqslant 0$) 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)

Question 4 continued

(Total for Question 4 is 11 marks)

5

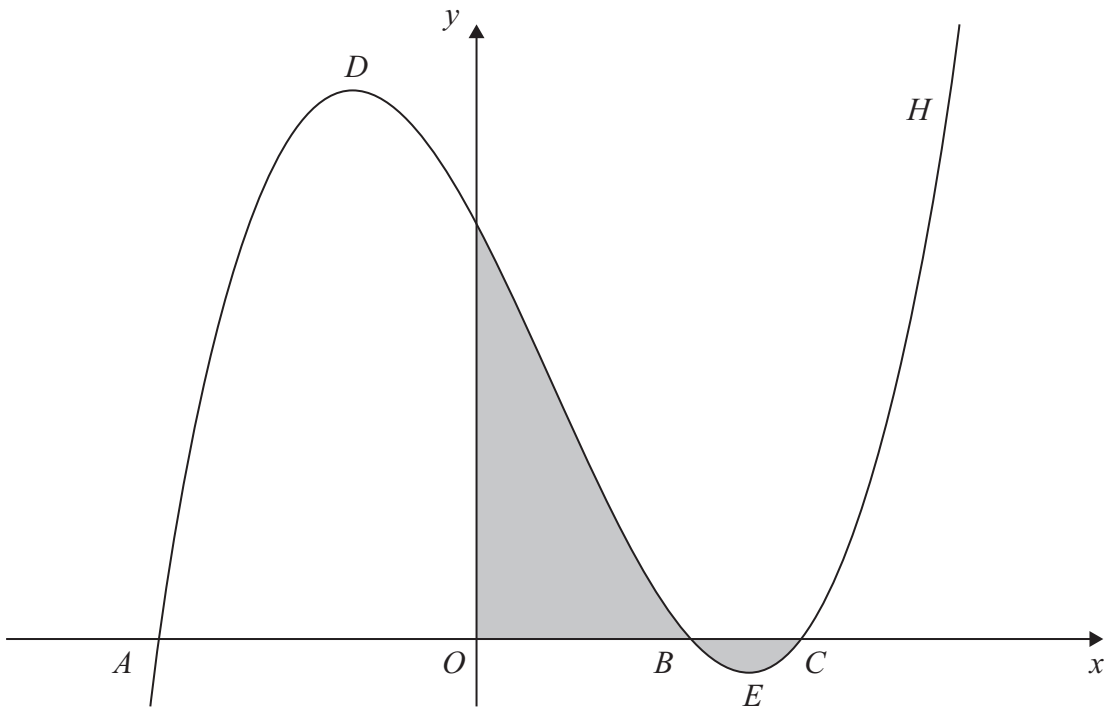


Figure 2

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)

.....

.....

.....

Question 5 continued

Question 5 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 5 continued

(Total for Question 5 is 15 marks)

6 (a) Complete the table of values for $y = \dfrac{3^{(x^2+2)}}{4} - 1$

Give your answers to 2 decimal places where appropriate.

x	–1	–0.5	0	0.5	1
y		1.96	1.25		

(2)

(b) On the grid opposite, draw the graph of $y = \dfrac{3^{(x^2+2)}}{4} - 1$ for $-1 \leqslant x \leqslant 1$

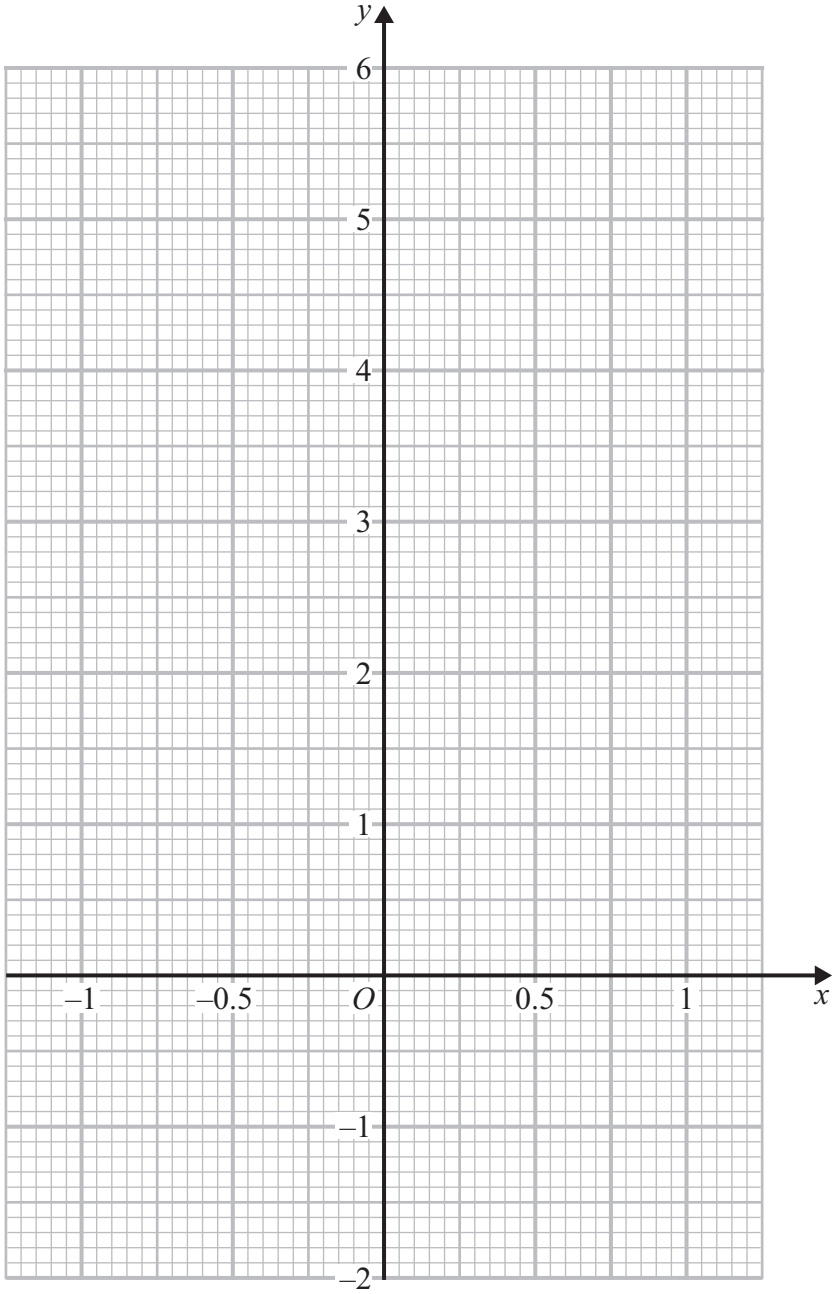
(2)

(c) By drawing a suitable straight line on the grid, obtain estimates, to one decimal place, of the roots of the equation

$$x^2 = \log_3(12x + 12) - 2 \qquad \text{in the interval } -1 < x \leqslant 1$$

(4)

Question 6 continued



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

Question 6 continued

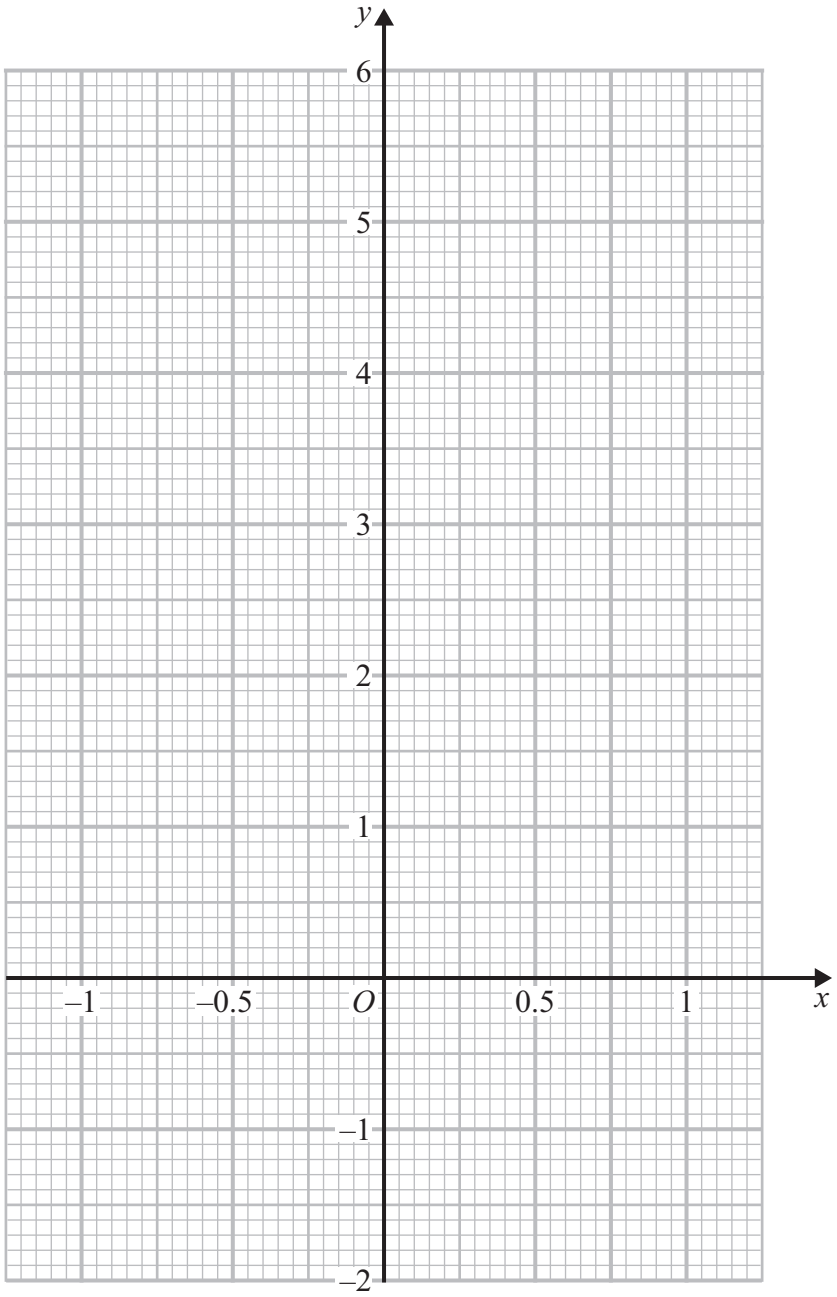
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 6 continued

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



(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)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 7 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 7 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 7 continued

(Total for Question 7 is 13 marks)

8

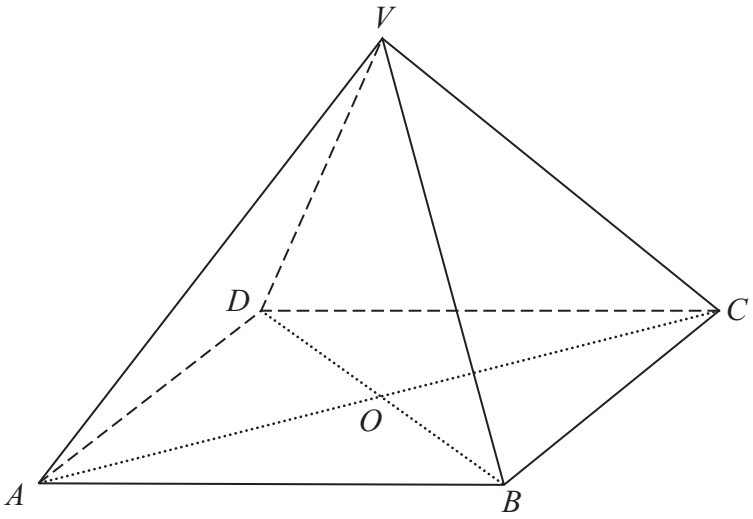


Diagram **NOT** accurately drawn

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 $AVC = 90°$

(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 $49\sqrt{3}$ cm^2

(c) Find the value of x

(3)

Question 8 continued

Question 8 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 8 continued

(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)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 9 continued

(Total for Question 9 is 6 marks)

10

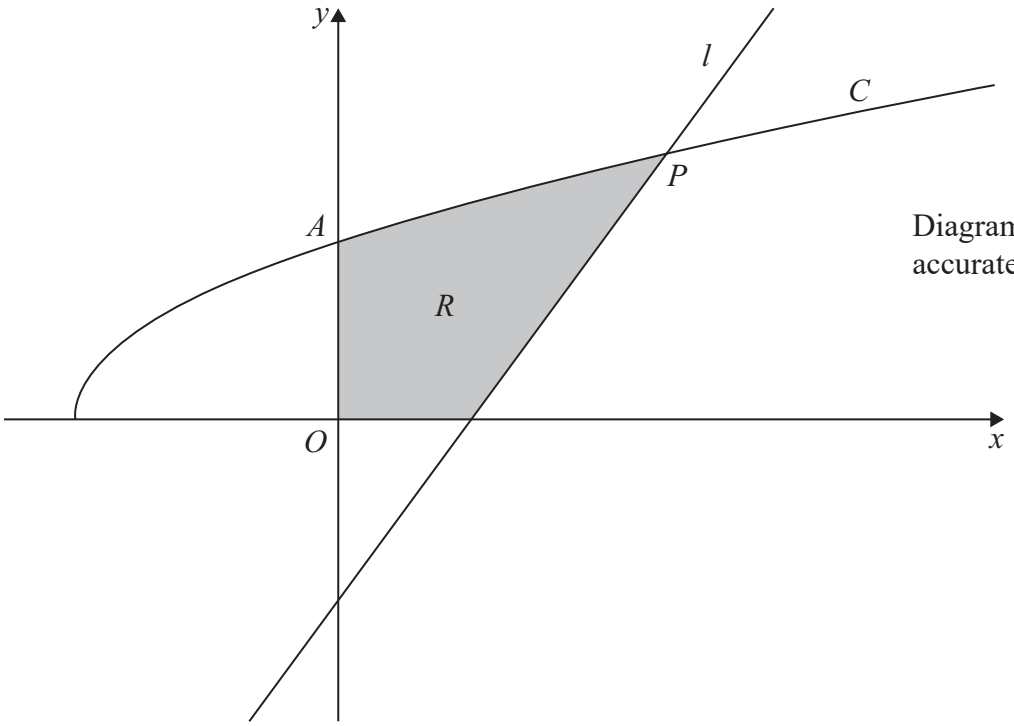


Diagram **NOT** accurately drawn

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)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 10 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 10 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 10 continued

(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)

Question 11 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 11 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 11 continued

Question 11 continued

(Total for Question 11 is 13 marks)

TOTAL FOR PAPER IS 100 MARKS