Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International Advanced Level

Tuesday 12 May 2026

Morning (Time: 1 hour 30 minutes)

Paper reference **WMA12/01**

Mathematics

International Advanced Subsidiary/Advanced Level
Pure Mathematics P2

You must have:
Mathematical Formulae and Statistical Tables (Yellow), calculator

Total Marks

Candidates may use any calculator permitted by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Inexact answers should be given to three significant figures unless otherwise stated.

Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 9 questions in this question paper. The total mark for this paper is 75.
- 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.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ▶

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1.

$$f(x) = 2x^3 - 7x^2 + 5x + 4$$

(a) Use the remainder theorem to find the remainder when $f(x)$ is divided by $(x - 2)$

(2)

(b) Hence, or otherwise, find the quotient when $f(x)$ is divided by $(x - 2)$

(2)

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Question 1 continued

(Total for Question 1 is 4 marks)

2. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

(i) Solve, for $0 < x \leqslant 2\pi$, the equation

$$1 + \sin^2 x + \cos x = 0$$

(3)

(ii) Solve, for $0 < \theta < 180°$, the equation

$$\sin(\theta + 60°) = 4\cos(\theta + 60°)$$

giving the answer to one decimal place.

(3)

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Question 2 continued

(Total for Question 2 is 6 marks)

3. The first four terms of a sequence are

$$3,\ -6,\ u_3,\ -24,\ ...$$

(a) Decide, showing detailed reasoning, whether the sequence could be

(i) an arithmetic sequence,

(ii) a geometric sequence.

State, for each part, the value of u_3 if such a sequence is possible.

(6)

(b) Given instead that

- the sequence is periodic of period 4
- $\sum_{i=1}^{50} u_i = 141$

find the value of u_3

(3)

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Question 3 continued

Question 3 continued

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Question 3 continued

(Total for Question 3 is 9 marks)

4. **In this question you must show detailed reasoning.**

(i) Show by counterexample that the statement

"$\mathrm{f}(n) = \frac{5}{2}n^3 - \frac{5}{2}n^2 - 19n + 20$ is a perfect cube for all positive integers n"

is **not** true.

(3)

(ii) Prove that the following statement is true

"$(x + 1)^2 > 6x - 4$ for all real x"

(3)

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Question 4 continued

(Total for Question 4 is 6 marks)

5. The table below shows values of x and y for the curve C with equation $y = f(x)$.

x	0.9	1.5	2.1	2.7	3.3	3.9	4.5	5.1
y	1.5	0.48	0.30	0.26	0.26	0.30	0.48	1.5

(a) Using the trapezium rule with all the y values in the table, find an estimate for the area of the region bounded by C and the x-axis between the lines with equations $x = 0.9$ and $x = 5.1$

(3)

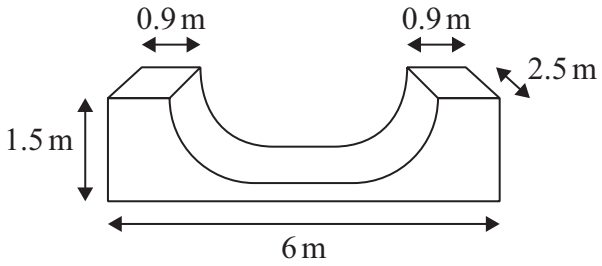


Figure 1

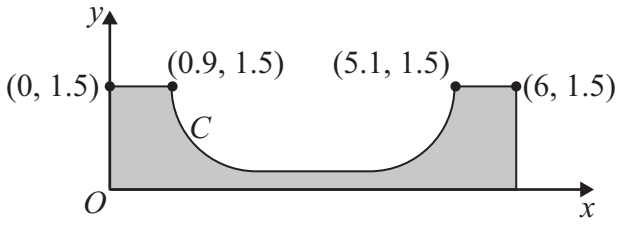


Figure 2

Figure 1 shows a sketch of a solid concrete skateboard ramp.
Figure 2 shows a graph of the cross-section of the same ramp.

The ramp

- has a total length of 6 m
- has a platform at each end at a height of 1.5 m and with a length of 0.9 m
- has a curved section C with equation $y = f(x)$, where x and y are in metres
- has a uniform cross-section and is 2.5 m wide

as shown in Figure 1 and/or Figure 2.

(b) Using the answer to part (a), find an estimate for the volume of concrete in the **whole** of the ramp.

(3)

(c) State, giving a reason for your answer, whether the answer for part (b) is an overestimate or an underestimate of the true volume of concrete in the whole of the skateboard ramp.

(1)

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Question 5 continued

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Question 5 continued

(Total for Question 5 is 7 marks)

6. (i) (a) Sketch a graph of the curve with equation

$$y = \frac{1}{5^x} + 3 \qquad x \in \mathbb{R}$$

Show on your sketch

- the coordinates of any points at which the curve crosses the axes
- the equation of any asymptotes

(3)

(b) Using logarithms and making your method clear, solve the equation

$$\frac{1}{5^x} + 3 = 23$$

giving the answer to 3 significant figures.

(2)

(ii) Given that $\log_4 x = a$, find in simplest form in terms of a

(a) $\log_4(64x)$

(2)

(b) $\log_4\left(\frac{2}{x^2}\right)$

(3)

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Question 6 continued

(Total for Question 6 is 10 marks)

7. (a) Find, in ascending powers of x, up to and including the term in x^2, the binomial expansion of

$$\left(1+\frac{5}{16}x\right)^{10}$$

fully simplifying each coefficient.

(4)

(b) Use $x=\frac{1}{10}$ and the answer to part (a) to show that an estimate for $\left(\frac{33}{32}\right)^{10}$ is

$$\frac{1389}{k}$$

where k is an integer to be found.

(3)

(c) Hence find a rational estimate for $\sqrt[10]{1389}$

(2)

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Question 7 continued

(Total for Question 7 is 9 marks)

8.

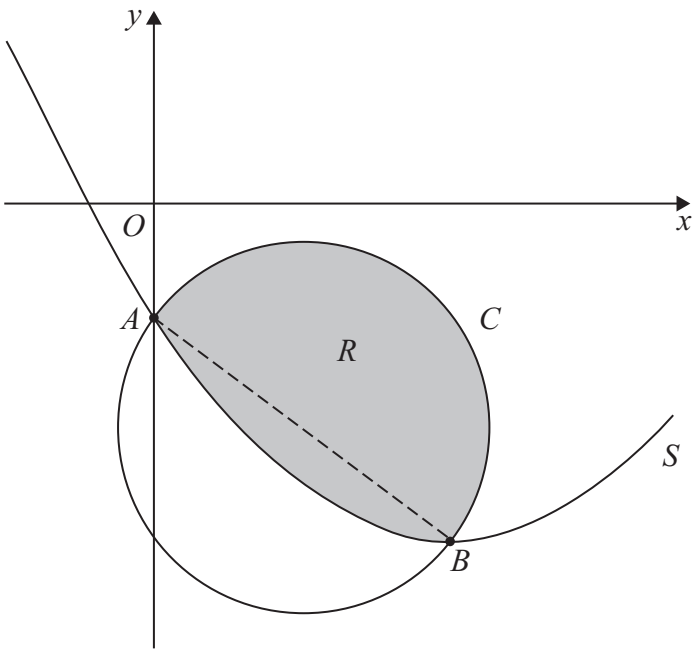


Figure 3

Figure 3 shows a sketch of a circle C and a parabola S.

The circle C has equation $x^2 + y^2 - 8x + 12y + 27 = 0$

(a) Find

(i) the coordinates of the centre of C

(ii) the radius of C

(3)

The parabola S

- has equation $y = ax^2 - \frac{3}{2}x - 3$
- intersects C on the y-axis at the point $A(0, -3)$
- intersects C again at the point B where AB is a diameter of C

Given that B is the minimum point of S,

(b) show that $a = \frac{3}{32}$

(3)

The finite region R is bounded by S and C and is shown shaded in Figure 3.

(c) Use algebraic integration to find the exact area of R.

(7)

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Question 8 continued

Question 8 continued

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Question 8 continued

(Total for Question 8 is 13 marks)

9.

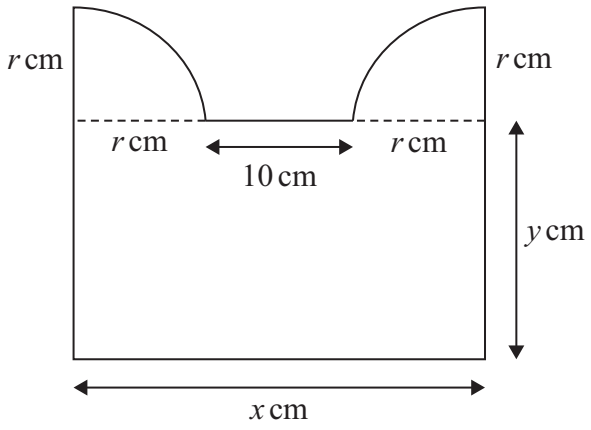


Figure 4

Figure 4 shows a sketch of a design for a logo.

The design consists of a rectangle of base x cm and height y cm with two quarter circles of equal radius r cm joined to the top edge with a gap of 10 cm between the nearest point of each quarter circle, as shown in Figure 4.

(a) Show that the area, A cm^2, of the design is given by

$$A = xy + \frac{\pi}{8}(x - 10)^2$$

(2)

Given that

- the total area of the design is one square metre
- the perimeter, P cm, of the design is given by $P = 2y + \left(2 + \frac{\pi}{2}\right)x - 5\pi$

(b) show that

$$P = \frac{20000 - 25\pi}{x} + \left(2 + \frac{\pi}{4}\right)x$$

(4)

(c) Use algebraic differentiation to find the value of x that gives the minimum value for P, giving the answer to 3 significant figures.

(3)

By considering $\frac{\mathrm{d}^2P}{\mathrm{d}x^2}$

(d) justify that the value for x found in part (c) gives the minimum value for P.

(2)

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Question 9 continued

Question 9 continued

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Question 9 continued

Question 9 continued

(Total for Question 9 is 11 marks)

TOTAL FOR PAPER IS 75 MARKS

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