

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

--	--	--	--	--

--	--	--	--

Pearson Edexcel International Advanced Level

Time 1 hour 30 minutes

Paper
reference**WMA13/01**

Mathematics

International Advanced Level

Pure Mathematics P3

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 10 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.

Turn over ►

P69204A

©2021 Pearson Education Ltd.

1/1/1/1



Pearson



Leave
blank**Question 1 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 6 9 2 0 4 A 0 3 3 2

Leave
blank

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 1 continued

Lined area for writing the answer to Question 1.



Leave
blank**Question 1 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q1

(Total 9 marks)

P 6 9 2 0 4 A 0 5 3 2

2.

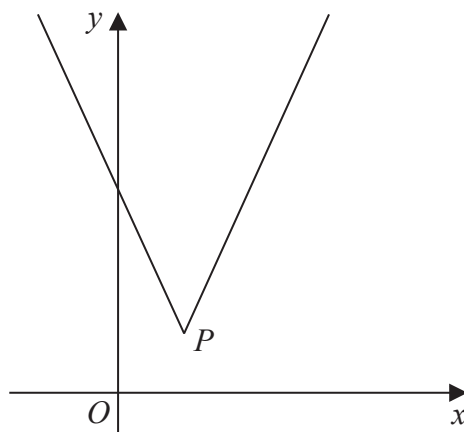


Figure 1

Figure 1 shows a sketch of part of the graph with equation $y = f(x)$, where

$$f(x) = |3x - 13| + 5 \quad x \in \mathbb{R}$$

The vertex of the graph is at point P , as shown in Figure 1.

(a) State the coordinates of P . (2)

(b) (i) State the range of f .
 (ii) Find the value of $ff(4)$ (2)

(c) Solve, using algebra and showing your working,
 $16 - 2x > |3x - 13| + 5$ (4)

The graph with equation $y = f(x)$ is transformed onto the graph with equation $y = af(x + b)$

The vertex of the graph with equation $y = af(x + b)$ is $(4, 20)$

Given that a and b are constants,

(d) find the value of a and the value of b . (2)



Leave
blank**Question 2 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 6 9 2 0 4 A 0 7 3 2

DO NOT WRITE IN THIS AREA

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Q2

(Total 10 marks)



3.

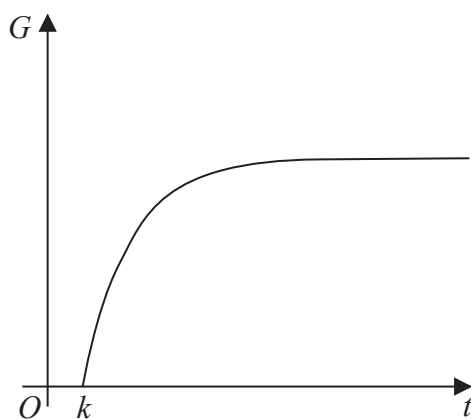


Figure 2

$$G = 40 - 30e^{1-0.05t} \quad t \geq k \quad G \geq 0$$

Figure 2 shows a sketch of G against t .

Use the equation of the model to answer parts (a), (b) and (c).

- (a) (i) Find the value of k .
- (ii) Hence find the year and month in which gold started being extracted from the mine.
- (3)**

- (b) Find the total mass of gold extracted from the mine up to 1st January 1870. (2)

There is a limit to the mass of gold that can be extracted from the mine.

- (c) State the value of this limit. (1)

Leave
blank**Question 3 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q3

(Total 6 marks)

P 6 9 2 0 4 A 0 1 1 3 2

4.

In this question you should show detailed reasoning.**Solutions relying entirely on calculator technology are not acceptable.**

- (a) Show that the equation

$$2 \sin(\theta - 30^\circ) = 5 \cos \theta$$

can be written in the form

$$\tan \theta = 2\sqrt{3}$$

(4)

- (b) Hence, or otherwise, solve for
- $0 \leq x \leq 360^\circ$

$$2 \sin(x - 10^\circ) = 5 \cos(x + 20^\circ)$$

giving your answers to one decimal place.

(3)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank**Question 4 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 6 9 2 0 4 A 0 1 3 3 2

Leave
blank

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 4 continued

Lined area for writing the answer to Question 4.



Q4

(Total 7 marks)



Leave
blank

5. (i) Find, by algebraic integration, the exact value of

$$\int_2^4 \frac{8}{(2x-3)^3} dx \quad (4)$$

- (ii) Find, in simplest form,

$$\int x(x^2 + 3)^7 dx \quad (2)$$

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank**Question 5 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total 6 marks)**Q5**

P 6 9 2 0 4 A 0 1 8 3 2

Leave
blank

Question 6 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q6

(Total 8 marks)



Leave
blank**Question 7 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total 6 marks)**Q7**

8. A curve C has equation $y = f(x)$, where

$$f(x) = \arcsin\left(\frac{1}{2}x\right) \quad -2 \leq x \leq 2 \quad -\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$$

- (a) Sketch C .

(1)

- (b) Given $x = 2 \sin y$, show that

$$\frac{dy}{dx} = \frac{1}{\sqrt{A - x^2}}$$

where A is a constant to be found.

(3)

The point P lies on C and has y coordinate $\frac{\pi}{4}$

- (c) Find the equation of the tangent to C at P . Write your answer in the form $y = mx + c$, where m and c are constants to be found.

(3)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank

Question 8 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 6 9 2 0 4 A 0 2 3 3 2

Leave
blank

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 8 continued

Lined area for writing the answer to Question 8.



Leave
blank**Question 8 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total 7 marks)**Q8**

9.

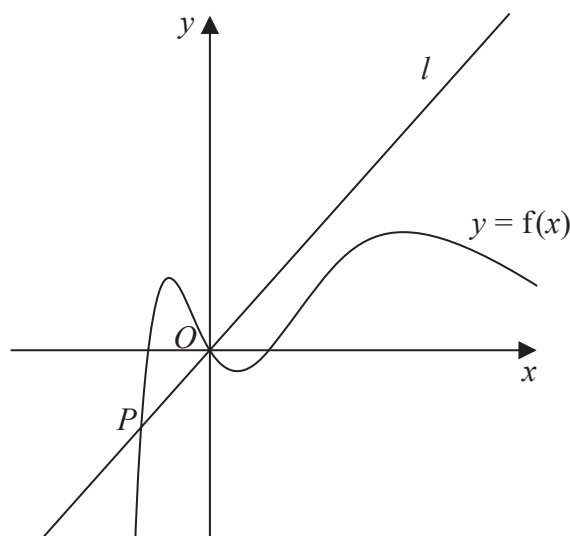
**Figure 3**

Figure 3 shows a sketch of part of the curve with equation $y = f(x)$, where

$$f(x) = x(x^2 - 4)e^{-\frac{1}{2}x}$$

(a) Find $f'(x)$.

(2)

The line l is the normal to the curve at O and meets the curve again at the point P .

The point P lies in the 3rd quadrant, as shown in Figure 3.

(b) Show that the x coordinate of P is a solution of the equation

$$x = -\frac{1}{2}\sqrt{16 + e^{\frac{1}{2}x}}$$

(4)

(c) Using the iterative formula

$$x_{n+1} = -\frac{1}{2}\sqrt{16 + e^{\frac{1}{2}x_n}} \quad \text{with } x_1 = -2$$

find, to 4 decimal places,

(i) the value of x_2

(ii) the x coordinate of P .

(3)

Leave
blank

Question 9 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 6 9 2 0 4 A 0 2 7 3 2

Leave
blank**Question 9 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank**Question 9 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total 9 marks)**Q9**

10.

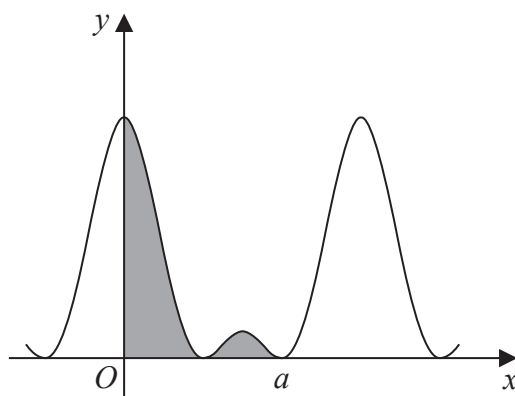


Figure 4

$$y = (1 + 2 \cos 2x)^2$$
$$(1 + 2 \cos 2x)^2 \equiv p + q \cos 2x + r \cos 4x$$

(2)

(5)

Leave
blank**Question 10 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 6 9 2 0 4 A 0 3 1 3 2

Leave
blank

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 10 continued

Handwriting practice lines for Question 10 continued.

Q10

Mark box for Q10

(Total 7 marks)

TOTAL FOR PAPER IS 75 MARKS

END

