Please check the examination details bel	ow before ente	ring your candidate information
Candidate surname		Other names
Centre Number Candidate Number Pearson Edexcel Inter		al Advanced Level
Tuesday 9 May 2023	3	
Morning (Time: 1 hour 30 minutes)	Paper reference	WMA11/01
Mathematics		○
International Advanced Su Pure Mathematics P1	ubsidiar	y/Advanced Level

Candidates may use any calculator allowed 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.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

 Turn over





1.	In this question you must show all stages of your working.	
	Solutions relying on calculator technology are not acceptable.	
	Solve the inequality	
	$4x^2 - 3x + 7 \geqslant 4x + 9$	(4)
		(4)



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Question 1 continued
(Total for Organian 1 in Amoultan)
(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.	
	A rectangular sports pitch has length x metres and width y metres, where $x > y$	
	Given that the perimeter of the pitch is 350 m,	
	(a) write down an equation linking x and y	
		(1)
	Given also that the area of the pitch is 7350 m ²	
	(b) write down a second equation linking x and y	(1)
	(a) have a find the value of word the value of	(1)
	(c) hence find the value of x and the value of y	(4)



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Question 2 continued
(Total for Question 2 is 6 marks)
(Total for Question 2 is a marks)



3. (a) Express $3x^2 + 12x + 13$ in the form

$$a(x+b)^2+c$$

where a, b and c are integers to be found.

(3)

(b) Hence sketch the curve with equation $y = 3x^2 + 12x + 13$

On your sketch show clearly

- the coordinates of the *y* intercept
- the coordinates of the turning point of the curve

(3)

Question 3 continued
(Total for Question 3 is 6 marks)



4. In this question you must show all stages of your working.

(a) Write

$$y = \frac{5x^2 + \sqrt{x^3}}{\sqrt[3]{8x}}$$

in the form

$$y = Ax^p + Bx^q$$

where A, B, p and q are constants to be found.

(4)

(b) Hence find $\frac{dy}{dx}$ giving each coefficient in simplest form.

(3)

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Question 4 continued
(Total for Question 4 is 7 marks)



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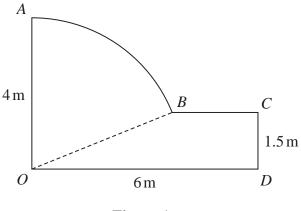


Figure 1

Figure 1 shows the plan for a garden.

In the plan

- OA and CD are perpendicular to OD
- AB is an arc of the circle with centre O and radius 4 metres
- BC is parallel to OD
- *OD* is 6 metres, *OA* is 4 metres and *CD* is 1.5 metres
- (a) Show that angle AOB is 1.186 radians to 4 significant figures.

(2)

(b) Find the perimeter of the garden, giving your answer in metres to 3 significant figures.

(4)

(c) Find the area of the garden, giving your answer in square metres to 3 significant figures.

(4)

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Question 5 continued



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Question 5 continued	
	(Total for Question 5 is 10 marks)



6. In this question you must show all stages of your working.

Solutions relying on calculator technology are not acceptable.

(a) Expand and simplify

$$\left(r-\frac{1}{r}\right)^2$$

(2)

(b) Express
$$\frac{1}{3+2\sqrt{2}}$$
 in the form $p+q\sqrt{2}$ where p and q are integers.

(2)

(c) Use the results of parts (a) and (b), or otherwise, to show that

$$\sqrt{3 + 2\sqrt{2}} - \frac{1}{\sqrt{3 + 2\sqrt{2}}} = 2$$

(3)

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Question 6 continued	
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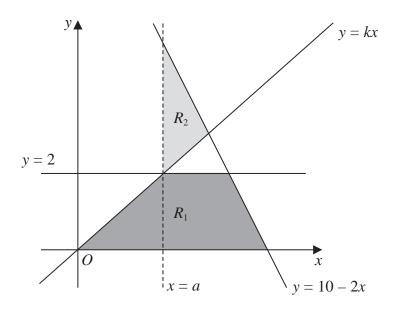


Figure 2

The region R_1 , shown shaded in Figure 2, is defined by the inequalities

$$0 \leqslant y \leqslant 2$$

$$0 \leqslant y \leqslant 2$$
 $y \leqslant 10 - 2x$ $y \leqslant kx$

$$y \leqslant kx$$

where k is a constant.

The line x = a, where a is a constant, passes through the intersection of the lines y = 2and y = kx

Given that the area of R_1 is $\frac{27}{4}$ square units,

- (a) find
 - (i) the value of a
 - (ii) the value of k

(4)

(b) Define the region R_2 , also shown shaded in Figure 2, using inequalities.



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Question 7 continued	
(To	otal for Question 7 is 6 marks)



8. In this question you must show all stages of your working.

Solutions relying entirely on calculator technology are not acceptable.

(a) Find the equation of the tangent to the curve with equation

$$y = \frac{1}{4}x^3 - 8x^{-\frac{1}{2}}$$

at the point P(4, 12)

Give your answer in the form ax + by + c = 0 where a, b and c are integers.

(5)

The curve with equation y = f(x) also passes through the point P(4, 12)

Given that

$$f'(x) = \frac{1}{4}x^3 - 8x^{-\frac{1}{2}}$$

(b) find f(x) giving the coefficients in simplest form.

(5)



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Question 8 continued



Question 8 continued

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Question 8 continued	
	(Total for Question 8 is 10 marks)



**9.** (i)

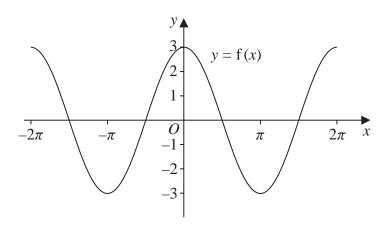


Figure 3

Figure 3 shows part of the graph of the trigonometric function with equation y = f(x)

(a) Write down an expression for f(x)

**(2)** 

On a separate diagram,

(b) sketch, for 
$$-2\pi < x < 2\pi$$
, the graph of the curve with equation  $y = f\left(x + \frac{\pi}{4}\right)$ 

Show clearly the coordinates of all the points where the curve intersects the coordinate axes.

**(3)** 

(ii)

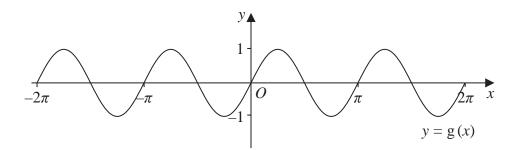


Figure 4

Figure 4 shows part of the graph of the trigonometric function with equation y = g(x)

(a) Write down an expression for g(x)

**(2)** 

On a separate diagram,

(b) sketch, for  $-2\pi < x < 2\pi$ , the graph of the curve with equation y = g(x) - 2Show clearly the coordinates of the *y* intercept.

**(2)** 

Question 9 continued

Question 9 continued			

Question 9 continued	



(Total for Question 9 is 9 marks)

10.

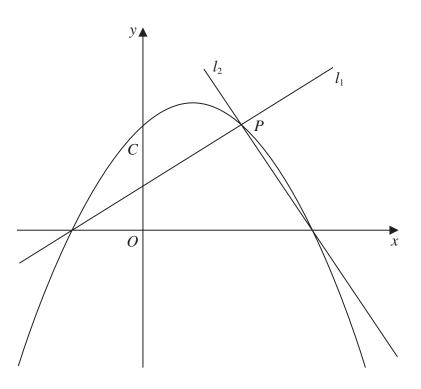


Figure 5

Figure 5 shows a sketch of the quadratic curve C with equation

$$y = -\frac{1}{4}(x+2)(x-b)$$
 where b is a positive constant

The line  $l_1$  also shown in Figure 5,

- has gradient  $\frac{1}{2}$
- intersects C on the negative x-axis and at the point P
- (a) (i) Write down an equation for  $l_1$

(1)

(ii) Find, in terms of b, the coordinates of P

**(3)** 

Given that the line  $l_2$  is perpendicular to  $l_1$  and intersects C on the positive x-axis,

(b) find, in terms of b, an equation for  $l_2$ 

**(2)** 

Given also that  $l_2$  intersects C at the point P

(c) show that another equation for  $l_2$  is

$$y = -2x + \frac{5b}{2} - 4$$

**(2)** 

(d) Hence, or otherwise, find the value of b

**(2)** 

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Question 10 continued	



Question 10 continued

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Question 10 continued



Question 10 continued	
	(Total for Question 10 is 10 marks)
	TOTAL FOR PAPER IS 75 MARKS

