

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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**Pearson Edexcel International Advanced Level**

**Tuesday 9 May 2023**

Morning (Time: 1 hour 30 minutes)

Paper

reference

**WMA11/01**

**Mathematics**

**International Advanced Subsidiary/Advanced Level**

**Pure Mathematics P1**

**You must have:**

Mathematical Formulae and Statistical Tables (Yellow), calculator

Total Marks

**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 ►

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P 7 2 8 6 8 R R A 0 1 3 2



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- In this question you must show all stages of your working.**  
**Solutions relying on calculator technology are not acceptable.**  
Solve the inequality

$$4x^2 - 3x + 7 \geq 4x + 9$$

**(4)**

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**Question 1 continued**

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Lined writing area for the answer to Question 1.

**(Total for Question 1 is 4 marks)**



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Question 3 continued

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(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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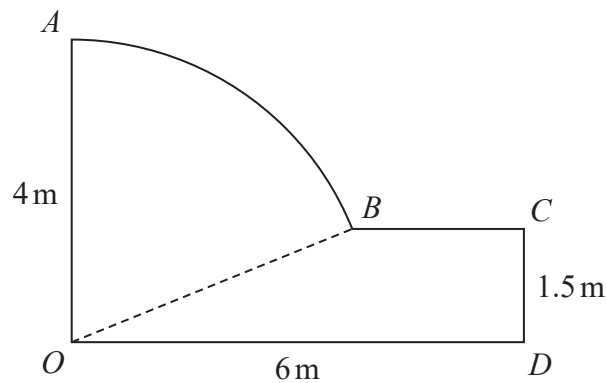


Figure 1

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**

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**(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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Question 6 continued

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**Question 6 continued**

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(Total for Question 6 is 7 marks)



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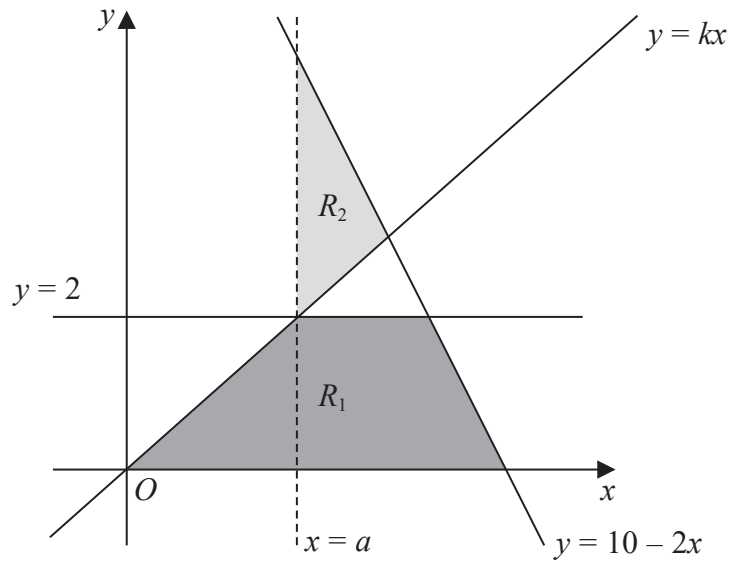


Figure 2

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

$$0 \leq y \leq 2 \quad y \leq 10 - 2x \quad y \leq kx$$

where  $k$  is a constant.

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

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.

(2)

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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)



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9. (i)

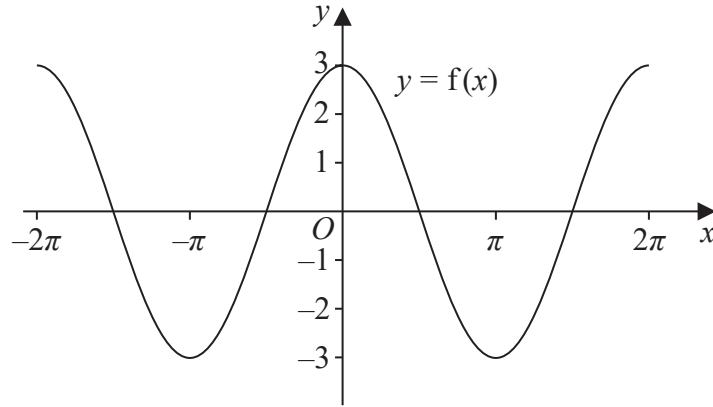


Figure 3

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)

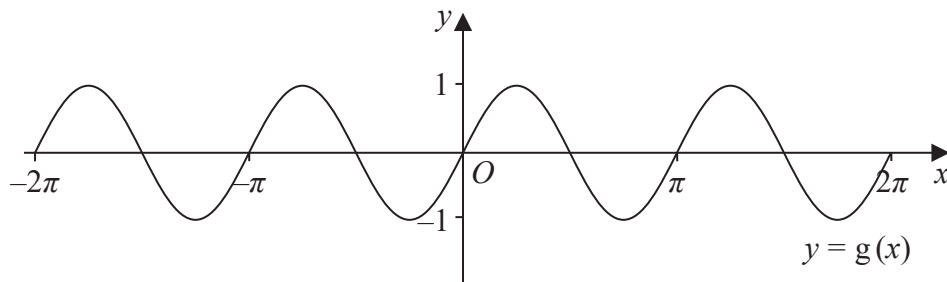


Figure 4

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  $y = g(x) - 2$

Show clearly the coordinates of the  $y$  intercept.

(2)





Question 9 continued

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Question 9 continued

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Question 9 continued

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(Total for Question 9 is 9 marks)



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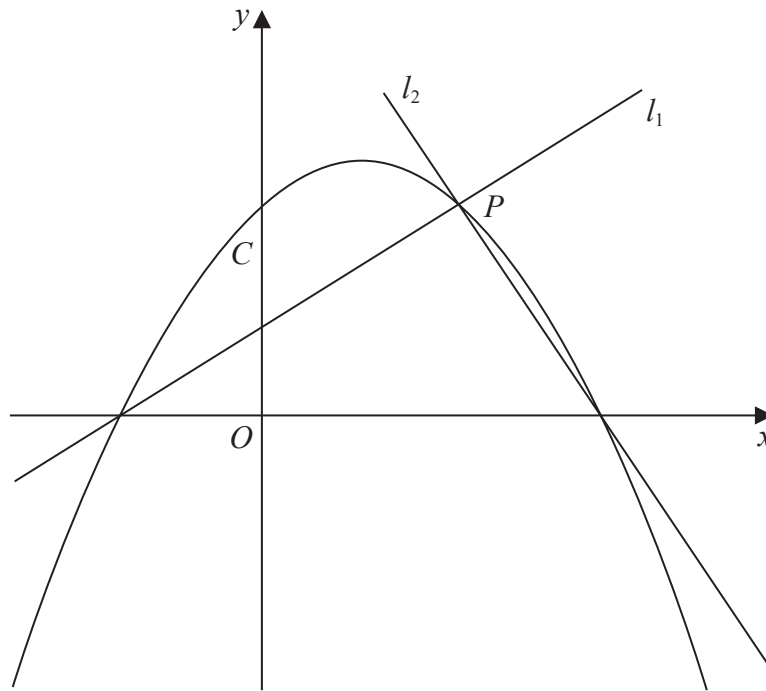


Figure 5

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

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

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 (2)

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

(d) Hence, or otherwise, find the value of  $b$  (2)



**Question 10 continued**

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A series of horizontal lines for writing.



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Question 10 continued

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**Question 10 continued**

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**(Total for Question 10 is 10 marks)**

**TOTAL FOR PAPER IS 75 MARKS**

