

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson Edexcel**  
**International**  
**Advanced Level**

Centre Number

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Candidate Number

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**Monday 11 January 2021**

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 (Lilac), 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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**Question 1 continued**

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Lined area for writing the answer to Question 1.

(Total 8 marks)

Q1



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2. A tree was planted.

Exactly 3 years after it was planted, the height of the tree was 2 m.

Exactly 5 years after it was planted, the height of the tree was 2.4 m.

Given that the height,  $H$  metres, of the tree,  $t$  years after it was planted, can be modelled by the equation

$$H^3 = pt^2 + q$$

where  $p$  and  $q$  are constants,

(a) find, to 3 significant figures where necessary, the value of  $p$  and the value of  $q$ . (4)

Exactly  $T$  years after the tree was planted, its height was 5 m.

(b) Find the value of  $T$  according to the model, giving your answer to one decimal place. (2)

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Question 2 continued

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Question 2 continued

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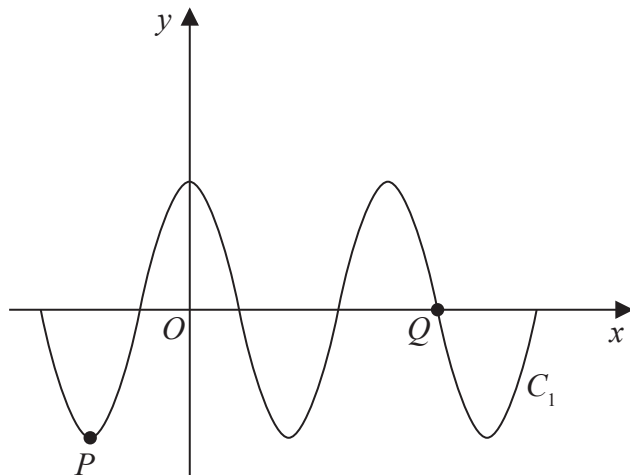
A series of horizontal lines for writing answers, starting from the top of the question area and extending down to the 'Total 6 marks' label.

(Total 6 marks)

Q2



3.



**Figure 1**

Figure 1 shows a sketch of part of the curve  $C_1$  with equation  $y = 4 \cos x^\circ$

The point  $P$  and the point  $Q$  lie on  $C_1$  and are shown in Figure 1.

(a) State

- (i) the coordinates of  $P$ ,
- (ii) the coordinates of  $Q$ .

**(3)**

The curve  $C_2$  has equation  $y = 4 \cos x^\circ + k$ , where  $k$  is a constant.

Curve  $C_2$  has a minimum  $y$  value of  $-1$

The point  $R$  is the maximum point on  $C_2$  with the smallest positive  $x$  coordinate.

(b) State the coordinates of  $R$ .

**(2)**

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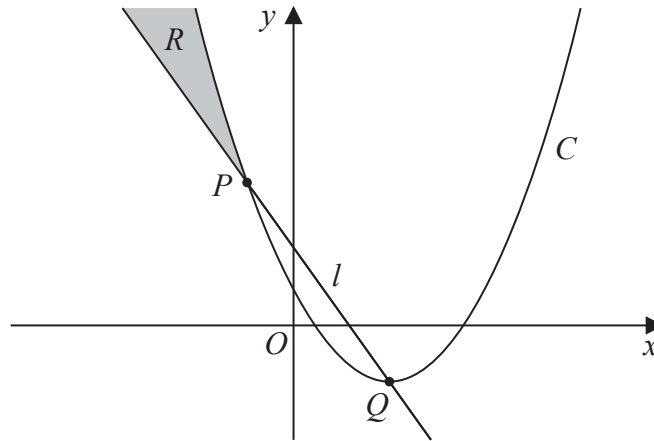


Figure 2

The points  $P$  and  $Q$ , as shown in Figure 2, have coordinates  $(-2, 13)$  and  $(4, -5)$  respectively.

The straight line  $l$  passes through  $P$  and  $Q$ .

- (a) Find an equation for  $l$ , writing your answer in the form  $y = mx + c$ , where  $m$  and  $c$  are integers to be found. **(3)**

The quadratic curve  $C$  passes through  $P$  and has a minimum point at  $Q$ .

- (b) Find an equation for  $C$ . **(3)**

The region  $R$ , shown shaded in Figure 2, lies in the second quadrant and is bounded by  $C$  and  $l$  only.

- (c) Use inequalities to define region  $R$ . **(2)**

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Question 4 continued

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Question 4 continued

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(Total 8 marks)



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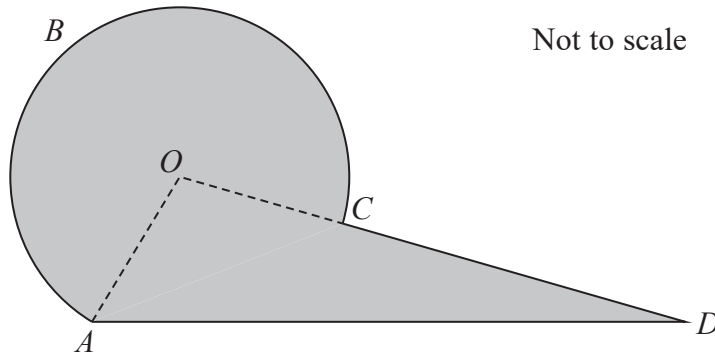


Figure 3

Figure 3 shows the plan view of a viewing platform at a tourist site.

The shape of the viewing platform consists of a sector  $ABCOA$  of a circle, centre  $O$ , joined to a triangle  $AOD$ .

Given that

- $OA = OC = 6\text{ m}$
- $AD = 14\text{ m}$
- angle  $ADC = 0.43$  radians
- angle  $AOD$  is an obtuse angle
- $OCD$  is a straight line

find

(a) the size of angle  $AOD$ , in radians, to 3 decimal places, (3)

(b) the length of arc  $ABC$ , in metres, to one decimal place, (2)

(c) the total area of the viewing platform, in  $\text{m}^2$ , to one decimal place. (4)

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6. (a) Sketch the curve with equation

$$y = -\frac{k}{x} \quad k > 0 \quad x \neq 0 \quad (2)$$

- (b) On a separate diagram, sketch the curve with equation

$$y = -\frac{k}{x} + k \quad k > 0 \quad x \neq 0$$

stating the coordinates of the point of intersection with the  $x$ -axis and, in terms of  $k$ , the equation of the horizontal asymptote.

(3)

- (c) Find the range of possible values of  $k$  for which the curve with equation

$$y = -\frac{k}{x} + k \quad k > 0 \quad x \neq 0$$

does not touch or intersect the line with equation  $y = 3x + 4$

(5)

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Question 6 continued

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**Question 6 continued**

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

$$f(x) = 2x - 3\sqrt{x} - 5 \quad x > 0$$

(a) Solve the equation

$$f(x) = 9 \tag{4}$$

(b) Solve the equation

$$f''(x) = 6 \tag{5}$$

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**Question 7 continued**

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Q7

**(Total 9 marks)**

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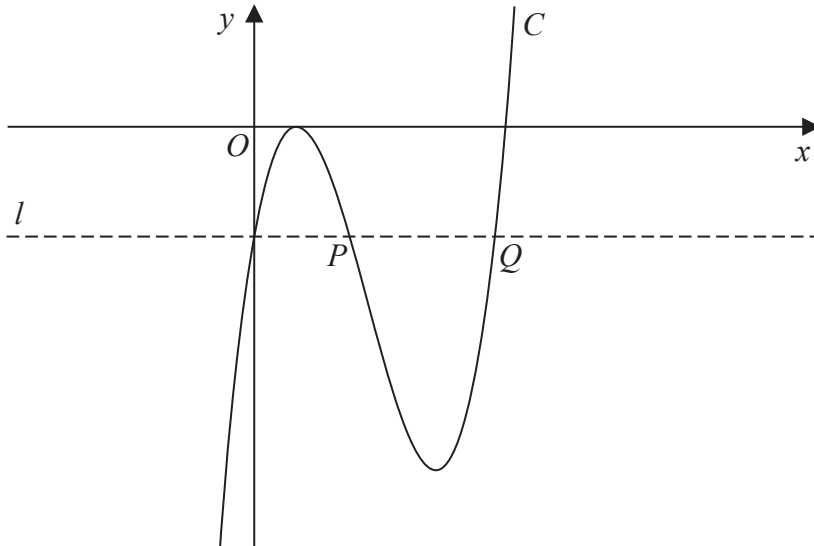


Figure 4

Figure 4 shows a sketch of part of the curve  $C$  with equation  $y = f(x)$ , where

$$f(x) = (3x - 2)^2 (x - 4)$$

(a) Deduce the values of  $x$  for which  $f(x) > 0$  (1)

(b) Expand  $f(x)$  to the form

$$ax^3 + bx^2 + cx + d$$

where  $a, b, c$  and  $d$  are integers to be found. (3)

The line  $l$ , also shown in Figure 4, passes through the  $y$  intercept of  $C$  and is parallel to the  $x$ -axis.

The line  $l$  cuts  $C$  again at points  $P$  and  $Q$ , also shown in Figure 4.

(c) Using algebra and showing your working, find the length of line  $PQ$ . Write your answer in the form  $k\sqrt{3}$ , where  $k$  is a constant to be found.

*(Solutions relying entirely on calculator technology are not acceptable.)* (5)

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Question 8 continued

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Handwriting lines for question 8 continued.



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Question 9 continued

20 horizontal lines for writing the answer.

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Question 9 continued

Lined writing area for the answer to Question 9.

Q9

(Total 11 marks)

TOTAL FOR PAPER IS 75 MARKS

END

