

Write your name here

Surname

Other names

Pearson Edexcel
Level 3 GCE

Centre Number

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Candidate Number

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Mathematics

Advanced Subsidiary
Paper 1: Pure Mathematics

Specimen Paper

Time: 2 hours

Paper Reference

8MA0/01

You must have:

Mathematical Formulae and Statistical Tables, calculator

Total Marks

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Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. 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.
- Answers should be given to three significant figures unless otherwise stated.

Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 14 questions in this question paper. The total mark for this paper is 100.
- 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 ►

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3. A tank, which contained water, started to leak from a hole in its base.

The volume of water in the tank 24 minutes after the leak started was 4m^3

The volume of water in the tank 60 minutes after the leak started was 2.8m^3

The volume of water, $V\text{m}^3$, in the tank t minutes after the leak started, can be described by a linear model between V and t .

- (a) Find an equation linking V with t . (4)

Use this model to find

- (b) (i) the initial volume of water in the tank,
(ii) the time taken for the tank to empty. (3)

- (c) Suggest a reason why this linear model may not be suitable. (1)



4.

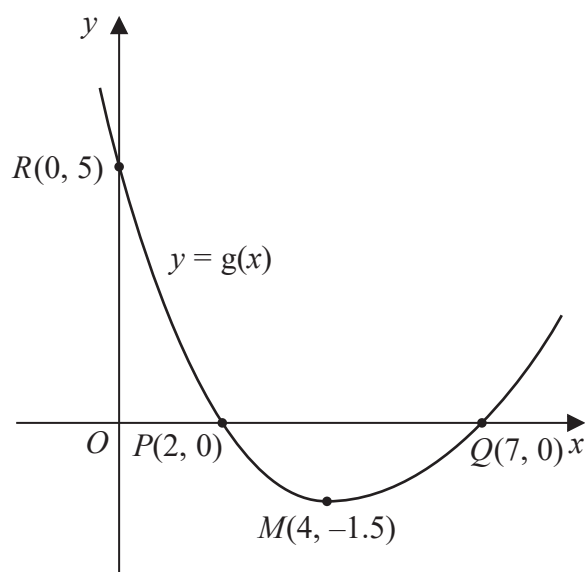


Figure 1

Figure 1 shows a sketch of the curve with equation $y = g(x)$.

The curve has a single turning point, a minimum, at the point $M(4, -1.5)$.

The curve crosses the x -axis at two points, $P(2, 0)$ and $Q(7, 0)$.

The curve crosses the y -axis at a single point $R(0, 5)$.

(a) State the coordinates of the turning point on the curve with equation $y = 2g(x)$. (1)

(b) State the largest root of the equation

$$g(x + 1) = 0 \quad (1)$$

(c) State the range of values of x for which $g'(x) \leq 0$ (1)

Given that the equation $g(x) + k = 0$, where k is a constant, has no real roots,

(d) state the range of possible values for k . (1)



Question 7 continued

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Handwriting practice area with 30 horizontal lines.

(Total for Question 7 is 8 marks)



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8.

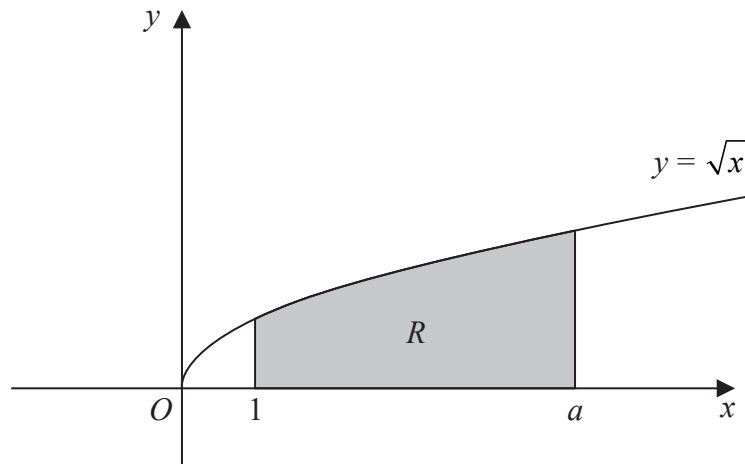


Figure 2

Figure 2 shows a sketch of the curve with equation $y = \sqrt{x}$, $x \geq 0$

The region R , shown shaded in Figure 2, is bounded by the curve, the line with equation $x = 1$, the x -axis and the line with equation $x = a$, where a is a constant.

Given that the area of R is 10

(a) find, in simplest form, the value of

(i) $\int_1^a \sqrt{8x} \, dx$

(ii) $\int_0^a \sqrt{x} \, dx$

(4)

(b) show that $a = 2^k$, where k is a rational constant to be found.

(4)



9. Find any real values of x such that

$$2 \log_4(2 - x) - \log_4(x + 5) = 1$$

(6)

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Question 9 continued

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(Total for Question 9 is 6 marks)



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11. (i) Solve, for $-90^\circ \leq \theta < 270^\circ$, the equation,

$$\sin(2\theta + 10^\circ) = -0.6$$

giving your answers to one decimal place.

(5)

- (ii) (a) A student's attempt at the question

"Solve, for $-90^\circ < x < 90^\circ$, the equation $7 \tan x = 8 \sin x$ "

is set out below.

$$\begin{aligned} 7 \tan x &= 8 \sin x \\ 7 \times \frac{\sin x}{\cos x} &= 8 \sin x \\ 7 \sin x &= 8 \sin x \cos x \\ 7 &= 8 \cos x \\ \cos x &= \frac{7}{8} \\ x &= 29.0^\circ \text{ (to 3 sf)} \end{aligned}$$

Identify two mistakes made by this student, giving a brief explanation of each mistake.

(2)

- (b) Find the smallest positive solution to the equation

$$7 \tan(4\alpha + 199^\circ) = 8 \sin(4\alpha + 199^\circ)$$

(2)



12.

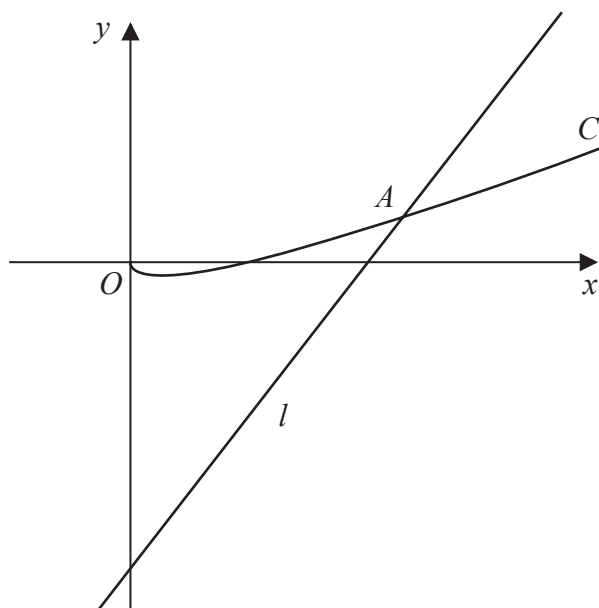


Figure 3

Figure 3 shows a sketch of the curve C with equation $y = 3x - 2\sqrt{x}$, $x \geq 0$ and the line l with equation $y = 8x - 16$

The line cuts the curve at point A as shown in Figure 3.

(a) Using algebra, find the x coordinate of point A .

(5)

(b)

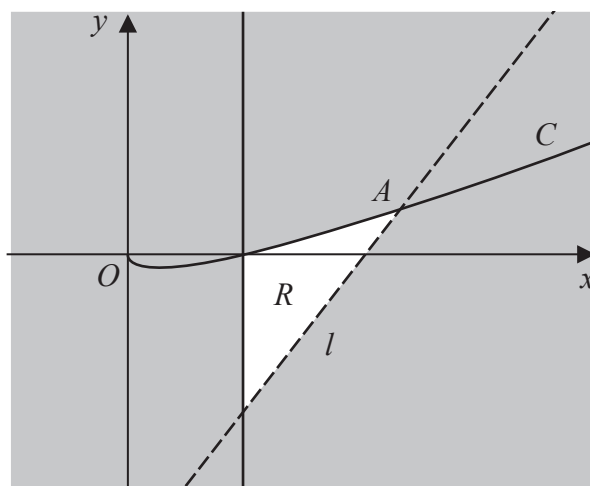


Figure 4

The region R is shown unshaded in Figure 4. Identify the inequalities that define R .

(3)



Question 12 continued

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Question 13 continued

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Multiple horizontal lines for writing the answer to Question 13.

(Total for Question 13 is 8 marks)



14.

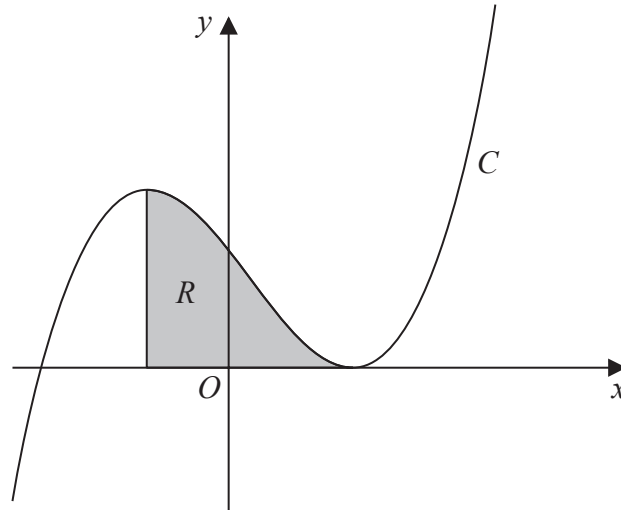


Figure 5

Figure 5 shows a sketch of the curve C with equation $y = (x - 2)^2(x + 3)$

The region R , shown shaded in Figure 5, is bounded by C , the vertical line passing through the maximum turning point of C and the x -axis.

Find the exact area of R .

(Solutions based entirely on graphical or numerical methods are not acceptable.)

(9)

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