

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 Level 3 GCE

Time 2 hours

Paper  
reference

**8MA0/01**

### Mathematics

Advanced Subsidiary

**PAPER 1: Pure Mathematics**

**You must have:**

Mathematical Formulae and Statistical Tables (Green), 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 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 ►

P69201A

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Q:1/1/1/



  
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1. Find

$$\int \left( 8x^3 - \frac{3}{2\sqrt{x}} + 5 \right) dx$$

giving your answer in simplest form.

(4)

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10.

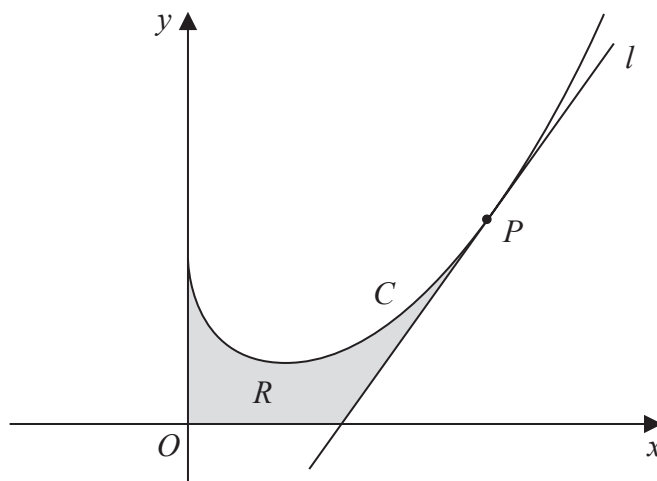


Figure 2

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

Solutions relying on calculator technology are not acceptable.

Figure 2 shows a sketch of part of the curve  $C$  with equation

$$y = \frac{1}{3}x^2 - 2\sqrt{x} + 3 \quad x \geq 0$$

The point  $P$  lies on  $C$  and has  $x$  coordinate 4

The line  $l$  is the tangent to  $C$  at  $P$ .

(a) Show that  $l$  has equation

$$13x - 6y - 26 = 0 \quad (5)$$

The region  $R$ , shown shaded in Figure 2, is bounded by the  $y$ -axis, the curve  $C$ , the line  $l$  and the  $x$ -axis.

(b) Find the exact area of  $R$ . (5)

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11.

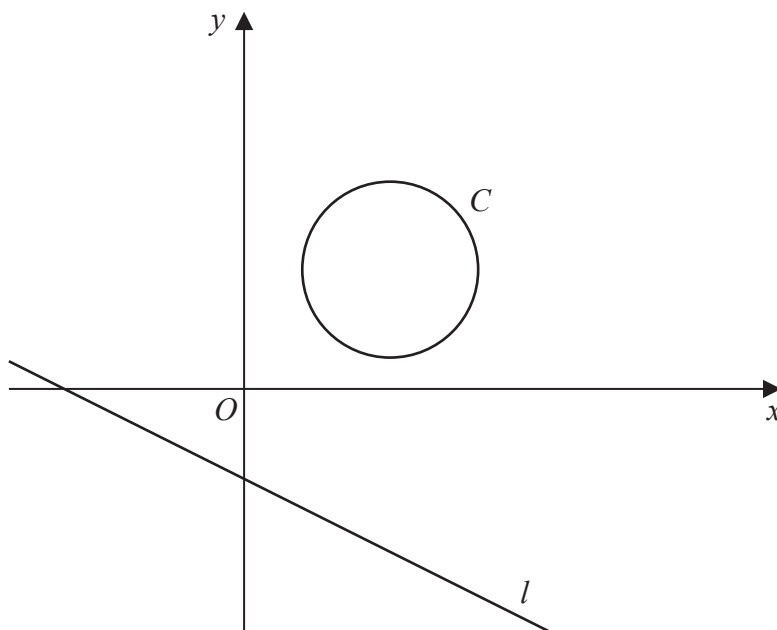


Figure 3

Figure 3 shows the circle  $C$  with equation

$$x^2 + y^2 - 10x - 8y + 32 = 0$$

and the line  $l$  with equation

$$2y + x + 6 = 0$$

(a) Find

- (i) the coordinates of the centre of  $C$ ,
- (ii) the radius of  $C$ .

(3)

(b) Find the shortest distance between  $C$  and  $l$ .

(5)

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Question 11 continued

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**12.** A company makes drinks containers out of metal.

The containers are modelled as closed cylinders with base radius  $r$  cm and height  $h$  cm and the capacity of each container is  $355 \text{ cm}^3$

The metal used

- for the circular base and the curved side costs  $0.04 \text{ pence/cm}^2$
- for the circular top costs  $0.09 \text{ pence/cm}^2$

Both metals used are of negligible thickness.

- (a) Show that the total cost,  $C$  pence, of the metal for one container is given by

$$C = 0.13\pi r^2 + \frac{28.4}{r} \quad (4)$$

- (b) Use calculus to find the value of  $r$  for which  $C$  is a minimum, giving your answer to 3 significant figures. (4)

- (c) Using  $\frac{d^2C}{dr^2}$  prove that the cost is minimised for the value of  $r$  found in part (b). (2)

- (d) Hence find the minimum value of  $C$ , giving your answer to the nearest integer. (2)

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**Question 12 continued**

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Question 12 continued

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13.

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

Solutions relying entirely on calculator technology are not acceptable.

(a) Show that

$$\frac{1}{\cos \theta} + \tan \theta \equiv \frac{\cos \theta}{1 - \sin \theta} \quad \theta \neq (2n + 1)90^\circ \quad n \in \mathbb{Z} \quad (3)$$

Given that  $\cos 2x \neq 0$

(b) solve for  $0 < x < 90^\circ$

$$\frac{1}{\cos 2x} + \tan 2x = 3 \cos 2x$$

giving your answers to one decimal place.

(5)









14. (i) A student states

“if  $x^2$  is greater than 9 then  $x$  must be greater than 3”

Determine whether or not this statement is true, giving a reason for your answer. (1)

(ii) Prove that for all positive integers  $n$ ,

$$n^3 + 3n^2 + 2n$$

is divisible by 6 (3)

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**Question 14 continued**

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