

Write your name here

Surname

Other names

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

Centre Number

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Candidate Number

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# Core Mathematics C12

## Advanced Subsidiary

Wednesday 23 May 2018 – Morning  
**Time: 2 hours 30 minutes**

Paper Reference  
**WMA01/01**

**You must have:**

Mathematical Formulae and Statistical Tables (Blue)

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). Coloured pencils and highlighter pens must not be used.
- **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.
- When a calculator is used, the answer should be given to an appropriate degree of accuracy.

### Information

- The total mark for this paper is 125.
- 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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- 5. (a) Find the first 4 terms, in ascending powers of  $x$ , of the binomial expansion of

$$\left(1 + \frac{x}{3}\right)^{18}$$

giving each term in its simplest form.

(4)

- (b) Use the answer to part (a) to find an estimated value for  $\left(\frac{31}{30}\right)^{18}$ , stating the value of  $x$  that you have used and showing your working. Give your estimate to 4 decimal places.

(3)



**Question 5 continued**

Lined writing area for the answer to Question 5.

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Question 5 continued

Lined writing area for the answer to Question 5.

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6. Find the exact values of  $x$  for which

$$2\log_5(x + 5) - \log_5(2x + 2) = 2$$

Give your answers as simplified surds.

(7)

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7. A sequence is defined by

$$\begin{aligned} u_1 &= 3 \\ u_{n+1} &= u_n - 5, \quad n \geq 1 \end{aligned}$$

Find the values of

(a)  $u_2, u_3$  and  $u_4$  **(2)**

(b)  $u_{100}$  **(3)**

(c)  $\sum_{i=1}^{100} u_i$  **(3)**

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**Question 8 continued**

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**Q8**

**(Total 7 marks)**



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10.

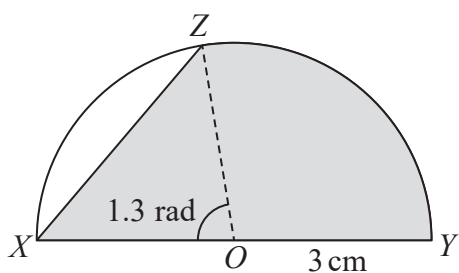


Diagram not drawn to scale

Figure 1

Figure 1 shows a semicircle with centre  $O$  and radius  $3\text{ cm}$ .  $XY$  is the diameter of this semicircle. The point  $Z$  is on the circumference such that angle  $XOZ = 1.3$  radians. The shaded region enclosed by the chord  $XZ$ , the arc  $ZY$  and the diameter  $XY$  is a template for a badge.

Find, giving each answer to 3 significant figures,

- (a) the length of the chord  $XZ$ , (2)
- (b) the perimeter of the template  $XZYX$ , (4)
- (c) the area of the template. (4)

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Question 11 continued

Lined writing area for question 11

(Total 10 marks)

Q11

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Question 13 continued

Ruled area for writing the answer to Question 13.

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**Question 13 continued**

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Handwriting practice area consisting of 27 horizontal lines.

**Q13**

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**(Total 10 marks)**



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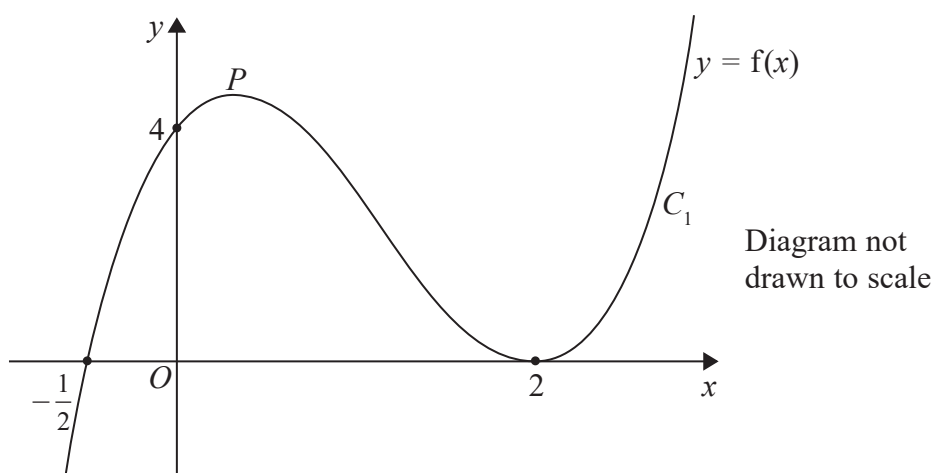


Figure 2

Figure 2 shows a sketch of the curve  $C_1$  with equation  $y = f(x)$  where

$$f(x) = (x - 2)^2(2x + 1), \quad x \in \mathbb{R}$$

The curve crosses the  $x$ -axis at  $\left(-\frac{1}{2}, 0\right)$ , touches it at  $(2, 0)$  and crosses the  $y$ -axis at  $(0, 4)$ . There is a maximum turning point at the point marked  $P$ .

- (a) Use  $f'(x)$  to find the exact coordinates of the turning point  $P$ . (7)

A second curve  $C_2$  has equation  $y = f(x + 1)$ .

- (b) Write down an equation of the curve  $C_2$ .  
You may leave your equation in a factorised form. (1)

- (c) Use your answer to part (b) to find the coordinates of the point where the curve  $C_2$  meets the  $y$ -axis. (2)

- (d) Write down the coordinates of the two turning points on the curve  $C_2$ . (2)

- (e) Sketch the curve  $C_2$ , with equation  $y = f(x + 1)$ , giving the coordinates of the points where the curve crosses or touches the  $x$ -axis. (3)

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**Question 14 continued**

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**Q14**

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**(Total 15 marks)**



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15.

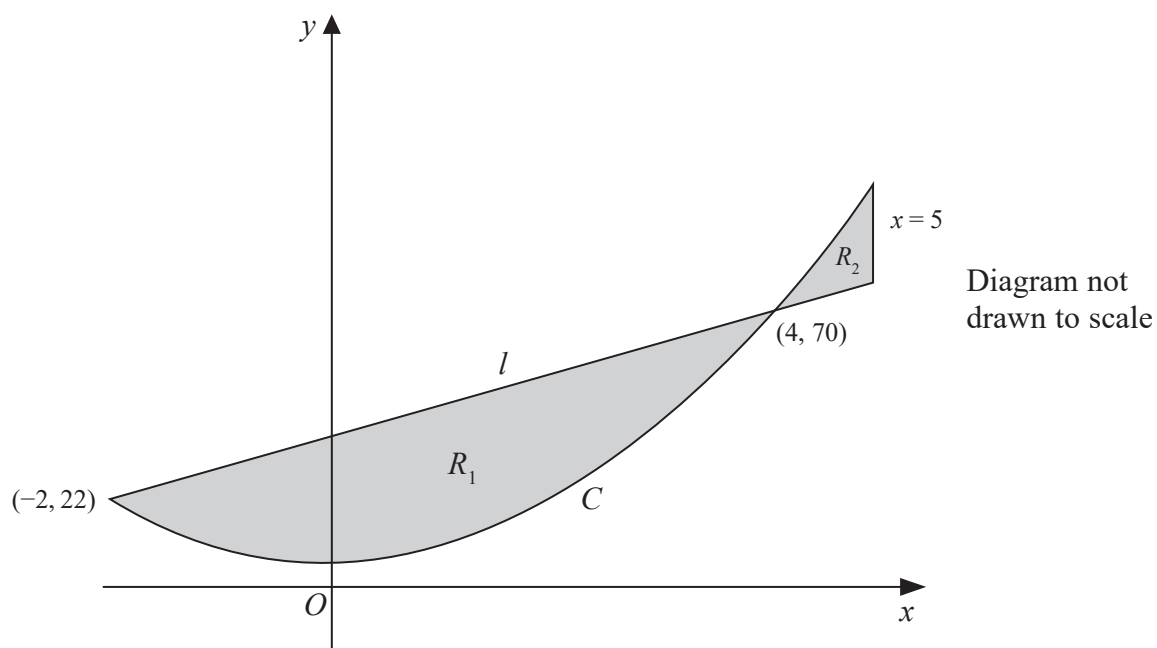


Figure 3

A design for a logo consists of two finite regions  $R_1$  and  $R_2$ , shown shaded in Figure 3.

The region  $R_1$  is bounded by the straight line  $l$  and the curve  $C$ .

The region  $R_2$  is bounded by the straight line  $l$ , the curve  $C$  and the line with equation  $x = 5$

The line  $l$  has equation  $y = 8x + 38$

The curve  $C$  has equation  $y = 4x^2 + 6$

Given that the line  $l$  meets the curve  $C$  at the points  $(-2, 22)$  and  $(4, 70)$ , use integration to find

(a) the area of the larger lower region, labelled  $R_1$  (6)

(b) the exact value of the total area of the two shaded regions. (3)

Given that

$$\frac{\text{Area of } R_1}{\text{Area of } R_2} = k$$

(c) find the value of  $k$ . (1)

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Question 15 continued

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Q15

(Total 10 marks)

TOTAL FOR PAPER: 125 MARKS

END

