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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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10.

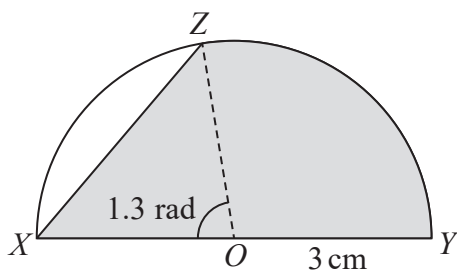


Diagram not drawn to scale

Figure 1

Figure 1 shows a semicircle with centre O and radius 3 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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11. The curve C has equation $y = f(x)$, $x > 0$, where

$$f'(x) = \frac{5x^2 + 4}{2\sqrt{x}} - 5$$

It is given that the point $P(4, 14)$ lies on C .

(a) Find $f(x)$, writing each term in a simplified form. (6)

(b) Find the equation of the tangent to C at the point P , giving your answer in the form $y = mx + c$, where m and c are constants. (4)

Handwriting lines for answers



13. The point $A(9, -13)$ lies on a circle C with centre the origin and radius r .

(a) Find the exact value of r . (2)

(b) Find an equation of the circle C . (1)

A straight line through point A has equation $2y + 3x = k$, where k is a constant.

(c) Find the value of k . (1)

This straight line cuts the circle again at the point B .

(d) Find the exact coordinates of point B . (6)

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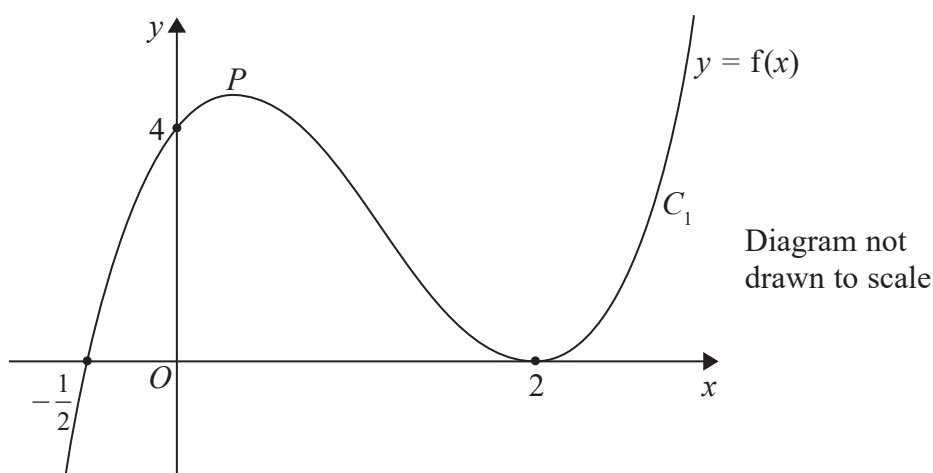


Figure 2

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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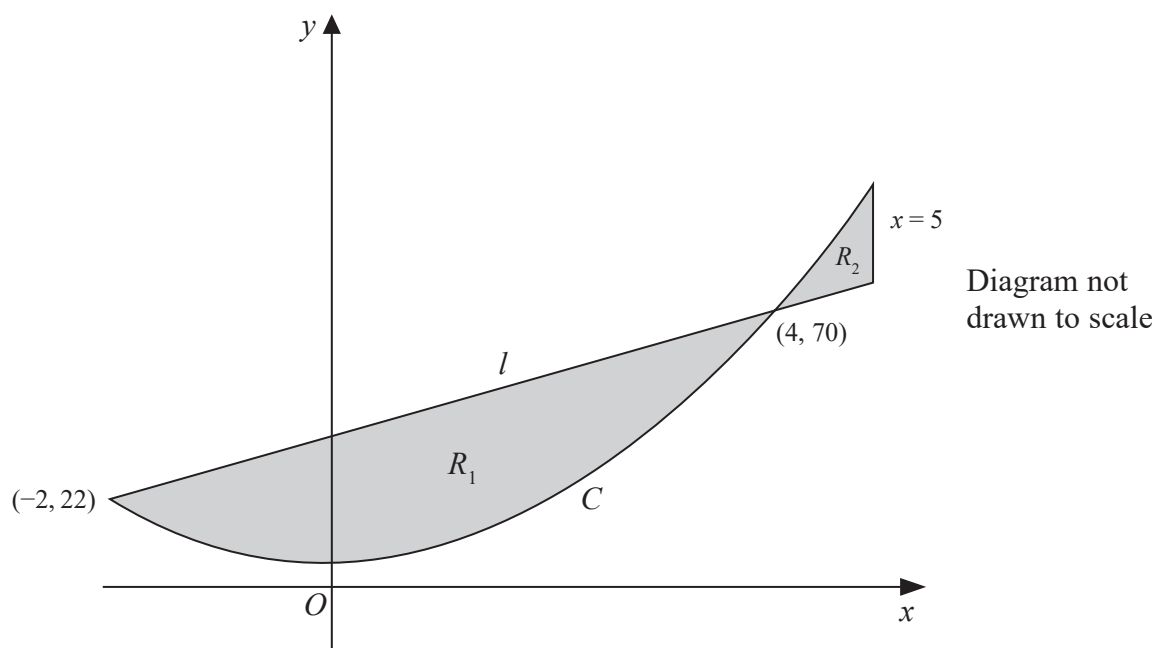


Figure 3

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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