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INTERNATIONAL A LEVEL MATHEMATICS • PURE 1 (WMA11)

Pure 1 Practice Paper 2

Edexcel IAL Pure Mathematics 1

AIMING FOR A

Written in the style of the Pearson Edexcel International Advanced Level paper (WMA11/01) • Calculator allowed

A full 75-mark paper, harder than a typical real series, with fewer steps given and topics combined in every question

Time	Total	You must have
1 hour 30 minutes	**75 marks**	**Mathematical Formulae and Statistical Tables, calculator**

Instructions

- Use black ink or ball-point pen. Pencil may be used for diagrams and sketches.
- Answer **all** questions, in the spaces provided.
- Show enough working to make your method clear. Answers without working may not gain full credit.
- Give inexact answers to **three significant figures** unless the question says otherwise.

Information

- There are 9 questions in this paper. The total mark is 75.
- The marks for each question are shown in brackets.

Advice

- Sit the paper in one go, in 1 hour 30 minutes, with the mark scheme closed.
- Read each question carefully and try every question. Check your answers if you have time.
- Then mark it line by line with the mark scheme and fill in your score.

Track your score

Q	Topic	Marks	Score
1	Surds in a right-angled triangle	7	
2	Inequalities in context	8	
3	Trigonometric graph	8	
4	Parallel and perpendicular lines	8	
5	Gradient conditions, $f''(x)$	9	
6	Tangents from a point	8	
7	Radians: segment and triangle	8	
8	Integration, parallel lines	9	
9	Reciprocal graph, intersections	10	
	Total	**75**	

Rough grade guide (out of 75): A **49** • B **42** • C **35**

Based on recent WMA11 grade boundaries. Real boundaries change every series, so treat this as a guide, not a grade.

Mark scheme | Exam questions by topic | More practice papers

Name ..... Date .....

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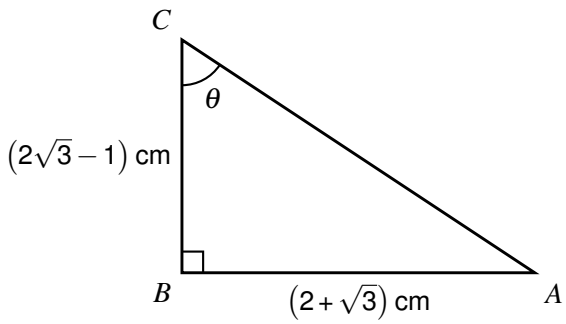

Diagram not drawn to scale

Figure 1

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

Solutions relying on calculator technology are not acceptable.

Figure 1 shows a triangle ABC in which angle $ABC = 90°$.

$AB = (2+\sqrt{3})$ cm and $BC = (2\sqrt{3}-1)$ cm.

Angle $ACB = \theta$.

(a) Find the exact length of AC, giving your answer as a simplified surd.

(2)

(b) Find the exact area of triangle ABC, giving your answer in the form $p+q\sqrt{3}$, where p and q are rational numbers.

(2)

(c) Show that $\tan\theta = \dfrac{a+b\sqrt{3}}{c}$, where a, b and c are integers to be found.

(3)

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Question 1 continued

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(Total for Question 1 is 7 marks)

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

Solutions relying on calculator technology are not acceptable.

A rectangular animal enclosure has length $(2x+1)$ metres and width $(x-2)$ metres.

The perimeter of the enclosure must be less than 56 metres.

(a) Show that $x < \frac{29}{3}$

(2)

The area of the enclosure must be greater than $52\,\text{m}^2$.

(b) Find the set of possible values of x.

(6)

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Question 2 continued

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(Total for Question 2 is 8 marks)

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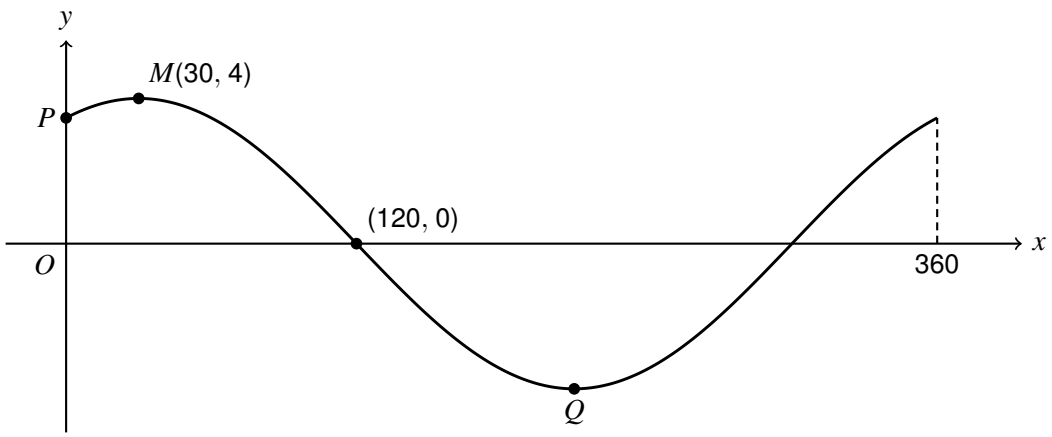

Figure 2

Figure 2 shows a sketch of the curve with equation

$$y = a\sin(x+b)^\circ \qquad 0 \leqslant x \leqslant 360$$

where a and b are constants, $a > 0$ and $0 < b < 360$

The curve has a maximum point at $M(30, 4)$ and crosses the x-axis at $(120, 0)$, as shown.

(a) Find the value of a and the value of b.

(2)

The curve meets the y-axis at P and has a minimum point at Q.

(b) Find the exact coordinates of P and the coordinates of Q.

(2)

The line with equation $y = k$, where k is a constant, meets the curve at exactly two points.

(c) Find the set of possible values of k.

(4)

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Question 3 continued

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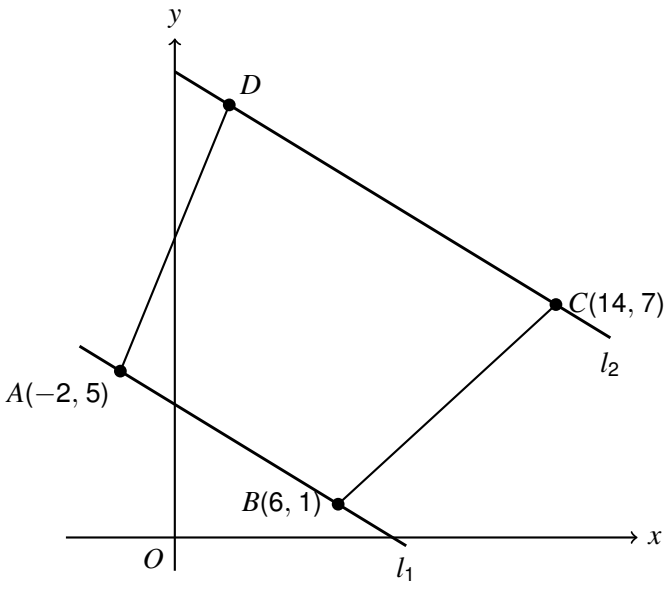

Diagram not drawn to scale

Figure 3

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

Solutions relying on calculator technology are not acceptable.

The line l_1 passes through the points $A(-2, 5)$ and $B(6, 1)$.

The line l_2 is parallel to l_1 and passes through the point $C(14, 7)$.

(a) Find an equation of l_2, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(2)

The point D lies on l_2 such that AD is perpendicular to l_1, as shown in Figure 3.

(b) Find the coordinates of D.

(3)

(c) Find the exact area of the trapezium $ABCD$.

(3)

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Question 4 continued

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(Total for Question 4 is 8 marks)

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

Solutions relying on calculator technology are not acceptable.

The curve C has equation $y = f(x)$, where

$$f(x) = 2x^3 + ax^2 + bx + 3$$

and a and b are constants.

The tangent to C at the point where $x = 1$ is parallel to the line with equation $4x + y = 7$

Given also that $f''(2) = 18$

(a) find the value of a and the value of b.

(4)

(b) Find the coordinates of the other point on C at which the tangent is parallel to the line $4x + y = 7$

(2)

(c) Find the set of values of x for which the gradient of C is less than 8

(3)

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Question 5 continued

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(Total for Question 5 is 9 marks)

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

Solutions relying on calculator technology are not acceptable.

The curve C has equation $y = x^2 - 2x + 7$

The line with equation $y = kx - 2$, where k is a constant, is a tangent to C.

(a) Find the two possible values of k and, for each one, the coordinates of the point where the line touches C.

(6)

(b) The two tangents and the line joining their points of contact form a triangle.

Find the area of this triangle.

(2)

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Question 6 continued

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(Total for Question 6 is 8 marks)

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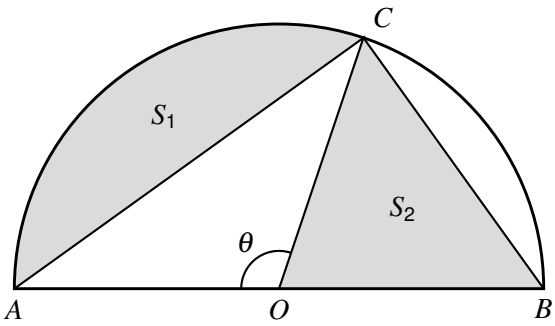

Figure 4

Figure 4 shows a semicircle with centre O and diameter $AB = 12$ cm.

The point C lies on the semicircle and angle $AOC = \theta$ radians, where $\frac{\pi}{2} < \theta < \pi$

The region S_1, shown shaded, is bounded by the chord AC and the arc AC.

The region S_2, shown shaded, is the triangle OBC.

The area of S_1 is equal to the area of S_2.

(a) Show that $\theta = 2\sin\theta$

(3)

Given that $\theta = 1.895$, correct to 3 decimal places,

(b) find the perimeter of S_1, in cm to 3 significant figures.

(3)

(c) Find the total area of the semicircle that is **not** shaded, in cm^2 to 3 significant figures.

(2)

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Question 7 continued

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(Total for Question 7 is 8 marks)

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

Solutions relying on calculator technology are not acceptable.

The curve C has equation $y = f(x)$, $x > 0$, where

$$f'(x) = 3\sqrt{x} + \frac{k}{x^2}$$

and k is a constant.

The point P on C has x coordinate 4. The tangent to C at P is parallel to the line l with equation $y = 5x + 6$

(a) Find the value of k.

(2)

Given that the point $(1, -2)$ lies on C,

(b) find $f(x)$, giving each term in its simplest form.

(3)

(c) Find the exact shortest distance between the tangent to C at P and the line l.

(4)

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Question 8 continued

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(Total for Question 8 is 9 marks)

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9.

$$f(x) = \frac{4}{x+1} - 2 \qquad x \neq -1$$

(a) Sketch the curve with equation $y = f(x)$. On your sketch, show the equations of the asymptotes and the coordinates of any points where the curve meets the coordinate axes.

(4)

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

The line with equation $y = kx + 2$, where k is a constant, meets the curve $y = f(x)$ at the point $(0, 2)$.

(b) Find the values of k for which the line meets the curve at **exactly one** point.

(4)

(c) The curve with equation $y = f(x) + c$, where c is a constant, does not meet the x-axis.

Find the value of c.

(2)

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Question 9 continued

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Question 9 continued

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TOTAL FOR PAPER IS 75 MARKS

END

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