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INTERNATIONAL A LEVEL MATHEMATICS • PURE 1 (WMA11)

Pure 1 Practice Paper 3

Edexcel IAL Pure Mathematics 1

AIMING FOR A/A*

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

A full 75-mark paper set above the hardest recent series: long questions, unfamiliar settings and very few steps given

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 8 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	Hidden quadratics in indices	8	
2	A right angle on a given line	9	
3	Cosine rule with two positions	9	
4	Normal meeting a curve again	10	
5	Integrating twice	9	
6	Exact radian geometry	10	
7	A cubic in terms of a	10	
8	Reciprocal inequality	10	
	Total	**75**	

Rough grade guide (out of 75): A **45** • B **38** • C **31**

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

Solutions relying on calculator technology are not acceptable.

(a) Solve the equation

$$3^{2x+1} + 9 = 28 \times 3^x$$

(4)

(b) Find all the real values of x for which

$$x^{\frac{4}{3}} - 10x^{\frac{2}{3}} + 9 = 0$$

(4)

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Question 1 continued

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(Total for Question 1 is 8 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.

The points A and B have coordinates (1, 0) and (9, 6) respectively.

The point C lies on the line with equation $y = 2x + 3$ and angle ACB is a right angle.

(a) Find the coordinates of the two possible positions of C.

(6)

(b) Find the area of the larger of the two possible triangles ABC.

(3)

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Question 2 continued

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(Total for Question 2 is 9 marks)

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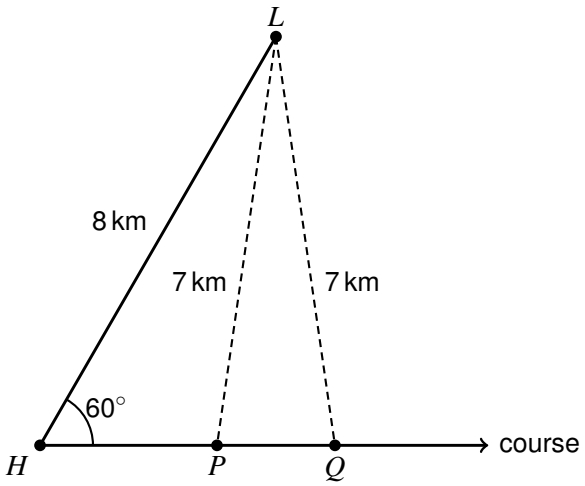

Diagram not drawn to scale

Figure 1

A boat leaves a harbour H and sails in a straight line. A lighthouse L is 8 km from H, and the course of the boat makes an angle of 60° with the line HL, as shown in Figure 1.

The boat is exactly 7 km from the lighthouse at two points on its course, P and Q, where P is closer to H.

In parts (a) and (b) you must show all stages of your working. Solutions relying on calculator technology are not acceptable.

(a) Find the distances HP and HQ.

(4)

(b) Find the exact area of triangle LPQ.

(3)

(c) Find the size of angle HPL, giving your answer in degrees to one decimal place.

(2)

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Question 3 continued

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(Total for Question 3 is 9 marks)

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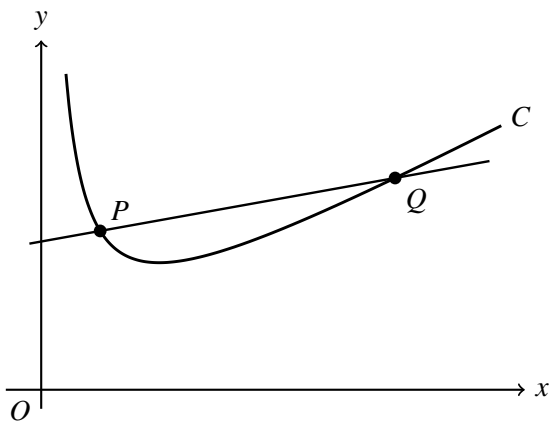

Figure 2

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

Solutions relying on calculator technology are not acceptable.

The curve C has equation

$$y = x + \frac{k}{x} \qquad x > 0$$

where k is a constant.

The point P on C has x coordinate 1. The gradient of C at P is -3

(a) Find the value of k.

(2)

The normal to C at P meets C again at the point Q, as shown in Figure 2.

(b) Find the exact coordinates of Q.

(6)

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

(2)

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Question 4 continued

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(Total for Question 4 is 10 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 $y = f(x)$, $x > 0$, where

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

The point $P(1, 2)$ lies on C.

The normal to C at P passes through the point $(5, 1)$.

(a) Find $f(x)$.

(7)

(b) Show that P is the only point on C at which the gradient of C is equal to the gradient at P.

(2)

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Question 5 continued

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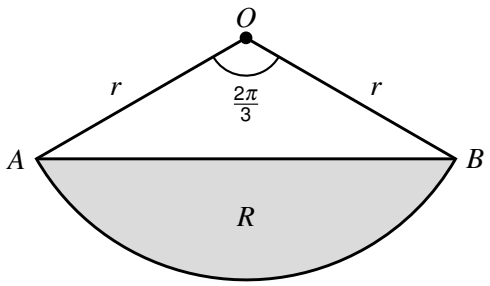

Figure 3

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

Solutions relying on calculator technology are not acceptable.

Figure 3 shows a sector OAB of a circle with centre O and radius r cm.

The angle AOB is $\frac{2\pi}{3}$ radians.

The region R, shown shaded, is bounded by the arc AB and the chord AB.

The length of the chord AB is $(r+2)$ cm.

(a) Find the exact value of r, giving your answer in the form $a+\sqrt{b}$, where a and b are integers.

(4)

(b) Find the exact perimeter of R.

(3)

(c) Find the exact area of R, giving your answer in the form $(p+q\sqrt{3})\pi+s+t\sqrt{3}$, where p, q, s and t are rational numbers.

(3)

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Question 6 continued

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(Total for Question 6 is 10 marks)

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7.

$$f(x) = x(x-a)^2$$

where a is a positive constant.

(a) Sketch the curve with equation $y = f(x)$, showing the coordinates of the points where it meets the coordinate axes.

(2)

(b) On the same diagram, sketch the curve with equation $y = f(x+a)$, showing the coordinates of the points where it meets the coordinate axes.

(2)

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

(c) Find, in terms of a, the coordinates of the points where the two curves meet.

(3)

The curves meet at a point, other than the origin, which lies on the line $y = x$

(d) Find the value of a.

(3)

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Question 7 continued

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Question 7 continued

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(Total for Question 7 is 10 marks)

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8. The curve C has equation $y = \frac{2}{x}$, $x \neq 0$, and the line l has equation $y = 2x - 1$

(a) On the same axes, sketch C and l. Show the coordinates of the points where l meets the coordinate axes and state the equations of the asymptotes of C.

(3)

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

(b) Find the exact coordinates of the points where C and l meet.

(4)

(c) Hence find the set of values of x for which

$$\frac{2}{x} > 2x - 1$$

(3)

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Question 8 continued

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Question 8 continued

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(Total for Question 8 is 10 marks)

TOTAL FOR PAPER IS 75 MARKS

END

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