

Please check the examination details below before entering your candidate information

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| Candidate surname | | | | | Other names | | | | | | | | |
| Pearson Edexcel International Advanced Level | | | | | Centre Number | | | | | Candidate Number | | | |
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| Wednesday 10 June 2020 | | | | | | | | | | | | | |
| Afternoon (Time: 1 hour 30 minutes) | | | | | Paper Reference WMA14/01 | | | | | | | | |
| Mathematics International Advanced Subsidiary/Advanced Level Pure Mathematics P4 | | | | | | | | | | | | | |
| You must have: Mathematical Formulae and Statistical Tables (Lilac), calculator | | | | | | | | Total Marks | | | | | |

Candidates may use any calculator permitted 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 9 questions in this question paper. The total mark for this paper is 75.
- 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.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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1. Given that n is an integer, use algebra, to prove by contradiction, that if n^3 is even then n is even.

(4)

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2. (a) Use the binomial expansion to expand

$$(4 - 5x)^{-\frac{1}{2}} \quad |x| < \frac{4}{5}$$

in ascending powers of x , up to and including the term in x^2 giving each coefficient as a fully simplified fraction.

(4)

$$f(x) = \frac{2 + kx}{\sqrt{4 - 5x}} \quad \text{where } k \text{ is a constant and } |x| < \frac{4}{5}$$

Given that the series expansion of $f(x)$, in ascending powers of x , is

$$1 + \frac{3}{10}x + mx^2 + \dots \quad \text{where } m \text{ is a constant}$$

- (b) find the value of k ,

(2)

- (c) find the value of m .

(2)

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6. A curve C has equation

$$y = x^{\sin x} \quad x > 0 \quad y > 0$$

(a) Find, by firstly taking natural logarithms, an expression for $\frac{dy}{dx}$ in terms of x and y . (5)

(b) Hence show that the x coordinates of the stationary points of C are solutions of the equation

$$\tan x + x \ln x = 0 \quad (2)$$

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7. (i) Using a suitable substitution, find, using calculus, the value of

$$\int_1^5 \frac{3x}{\sqrt{2x-1}} dx$$

(Solutions relying entirely on calculator technology are not acceptable.)

(6)

- (ii) Find

$$\int \frac{6x^2 - 16}{(x+1)(2x-3)} dx$$

(6)

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8. Relative to a fixed origin O , the lines l_1 and l_2 are given by the equations

$$l_1: \mathbf{r} = \begin{pmatrix} 4 \\ -3 \\ 2 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix} \quad \text{where } \lambda \text{ is a scalar parameter}$$

$$l_2: \mathbf{r} = \begin{pmatrix} 2 \\ 0 \\ -9 \end{pmatrix} + \mu \begin{pmatrix} 2 \\ -1 \\ -3 \end{pmatrix} \quad \text{where } \mu \text{ is a scalar parameter}$$

Given that l_1 and l_2 meet at the point X ,

(a) find the position vector of X .

(5)

The point $P(10, -7, 0)$ lies on l_1

The point Q lies on l_2

Given that \vec{PQ} is perpendicular to l_2

(b) calculate the coordinates of Q .

(5)

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