

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

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Candidate Number

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Thursday 14 January 2021

Morning (Time: 1 hour 30 minutes)

Paper Reference **WMA13/01**

Mathematics
International Advanced Level
Pure Mathematics P3

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 10 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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Pearson

1. Find

$$\int \frac{x^2 - 5}{2x^3} dx \quad x > 0$$

giving your answer in simplest form.

(3)

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Question 1 continued

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(Total 3 marks)

Q1



2.

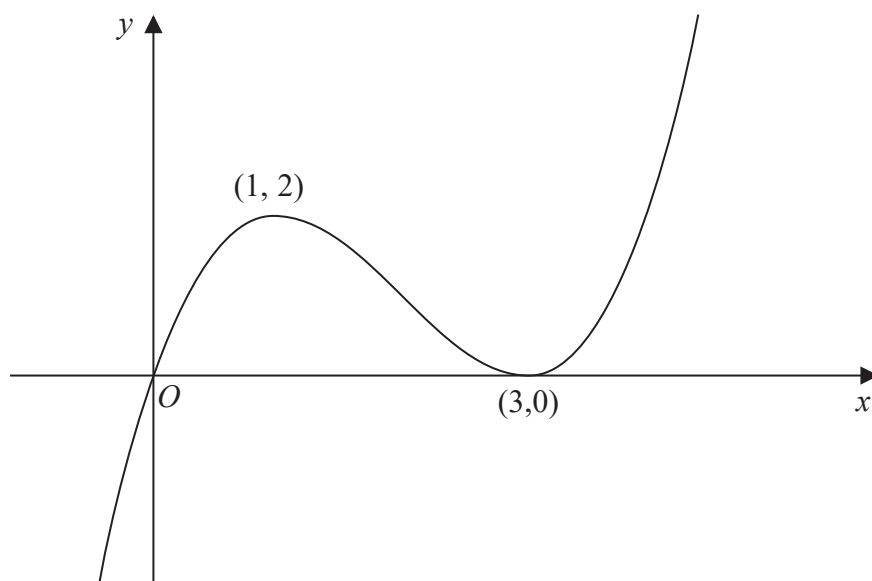


Figure 1

Figure 1 shows a sketch of the curve with equation $y = f(x)$, where $x \in \mathbb{R}$ and $f(x)$ is a polynomial.

The curve passes through the origin and touches the x -axis at the point $(3, 0)$

There is a maximum turning point at $(1, 2)$ and a minimum turning point at $(3, 0)$

On separate diagrams, sketch the curve with equation

(i) $y = 3f(2x)$ (3)

(ii) $y = f(-x) - 1$ (3)

On each sketch, show clearly the coordinates of

- the point where the curve crosses the y -axis
- any maximum or minimum turning points

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Question 2 continued

Q2

(Total 6 marks)



$$f(x) = 3 - \frac{x-2}{x+1} + \frac{5x+26}{2x^2-3x-5} \quad x > 4$$
$$f(x) = \frac{ax + b}{cx + d} \quad x > 4$$

(4)

(2)

(2)

Question 3 continued

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Question 3 continued

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(Total 8 marks)

Q3



4.

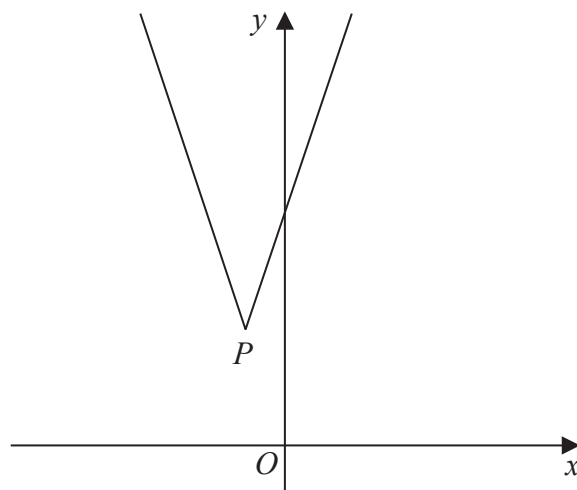


Figure 2

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

$$f(x) = |3x + a| + a$$

and where a is a positive constant.

The graph has a vertex at the point P , as shown in Figure 2.

(a) Find, in terms of a , the coordinates of P . (2)

(b) Sketch the graph with equation $y = g(x)$, where

$$g(x) = |x + 5a|$$

On your sketch, show the coordinates, in terms of a , of each point where the graph cuts or meets the coordinate axes. (2)

The graph with equation $y = g(x)$ intersects the graph with equation $y = f(x)$ at two points.

(c) Find, in terms of a , the coordinates of the two points. (5)

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Question 4 continued

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Question 4 continued

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Question 4 continued

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(Total 9 marks)

Q4

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Question 5 continued

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Question 5 continued

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(Total 11 marks)

Q5



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Question 6 continued

Lined area for writing the answer to Question 6.



Question 6 continued

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Question 6 continued

Lined area for writing the answer to Question 6.

(Total 8 marks)

Q6



Solutions relying entirely on calculator technology are not acceptable.

- (3)

- (6)

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Question 7 continued

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Question 7 continued

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Question 7 continued

Lined area for writing the answer to Question 7.

(Total 9 marks)

Q7



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Question 8 continued

Lined area for writing the answer to Question 8.

(Total 7 marks)

Q8



9. Find

$$(i) \int \frac{3x - 2}{3x^2 - 4x + 5} dx \quad (2)$$

$$(ii) \int \frac{e^{2x}}{(e^{2x} - 1)^3} dx \quad x \neq 0 \quad (2)$$

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Question 9 continued

Lined area for writing the answer to Question 9.

(Total 4 marks)

Q9



10. The curve C has equation

$$x = 3\sec^2 2y \quad x > 3 \quad 0 < y < \frac{\pi}{4}$$

(a) Find $\frac{dx}{dy}$ in terms of y .

(2)

(b) Hence show that

$$\frac{dy}{dx} = \frac{p}{qx\sqrt{x-3}}$$

where p is irrational and q is an integer, stating the values of p and q .

(3)

(c) Find the equation of the normal to C at the point where $y = \frac{\pi}{12}$, giving your answer in the form $y = mx + c$, giving m and c as exact irrational numbers.

(5)

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Question 10 continued

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Q10

Question 10 continued

Lined area for writing the answer to Question 10.

(Total 10 marks)

TOTAL FOR PAPER IS 75 MARKS

END

