

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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**Wednesday 21 October 2020**

Morning (Time: 1 hour 30 minutes)

Paper Reference **WMA12/01**

**Mathematics**

**International Advanced Subsidiary/Advanced Level**  
**Pure Mathematics P2**

**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. (a) Find the first 4 terms, in ascending powers of  $x$ , of the binomial expansion of

$$\left(2 - \frac{x}{4}\right)^{10}$$

giving each term in its simplest form.

(4)

- (b) Hence find the constant term in the series expansion of

$$\left(3 - \frac{1}{x}\right)^2 \left(2 - \frac{x}{4}\right)^{10}$$

(3)

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**Question 1 continued**

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**Question 1 continued**

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(Total 7 marks)

Q1



2.

$$y = \frac{2^x}{\sqrt{(5x^2 + 3)}}$$

(a) Complete the table below, giving the values of  $y$  to 3 decimal places.

$x$	-0.25	0	0.25	0.5	0.75
$y$	0.462		0.653		0.698

(1)

(b) Use the trapezium rule, with all the values of  $y$  from the completed table, to find an approximate value for

$$\int_{-0.25}^{0.75} \frac{2^x}{\sqrt{(5x^2 + 3)}} dx$$

(3)

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**Question 2 continued**

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Q2







**Question 3 continued**

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**Question 3 continued**

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Q3



4. The points  $P$  and  $Q$  have coordinates  $(-11, 6)$  and  $(-3, 12)$  respectively.

Given that  $PQ$  is a diameter of the circle  $C$ ,

- (a) (i) find the coordinates of the centre of  $C$ ,

- (ii) find the radius of  $C$ .

(4)

- (b) Hence find an equation of  $C$ .

(2)

- (c) Find an equation of the tangent to  $C$  at the point  $Q$  giving your answer in the form  $ax + by + c = 0$  where  $a$ ,  $b$  and  $c$  are integers to be found.

(3)

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**Question 4 continued**

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**Question 4 continued**

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Q4



5. Ben is saving for the deposit for a house over a period of 60 months.

Ben saves £100 in the first month and in each subsequent month, he saves £5 more than the previous month, so that he saves £105 in the second month, £110 in the third month, and so on, forming an arithmetic sequence.

- (a) Find the amount Ben saves in the 40th month.

(2)

- (b) Find the total amount Ben saves over the 60-month period.

(3)

Lina is also saving for a deposit for a house.

Lina saves £600 in the first month and in each subsequent month, she saves £10 less than the previous month, so that she saves £590 in the second month, £580 in the third month, and so on, forming an arithmetic sequence.

Given that, after  $n$  months, Lina will have saved exactly £18 200 for her deposit,

- (c) form an equation in  $n$  and show that it can be written as

$$n^2 - 121n + 3640 = 0$$

(3)

- (d) Solve the equation in part (c).

(2)

- (e) State, with a reason, which of the solutions to the equation in part (c) is **not** a sensible value for  $n$ .

(1)





**Question 5 continued**

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Q5



6.

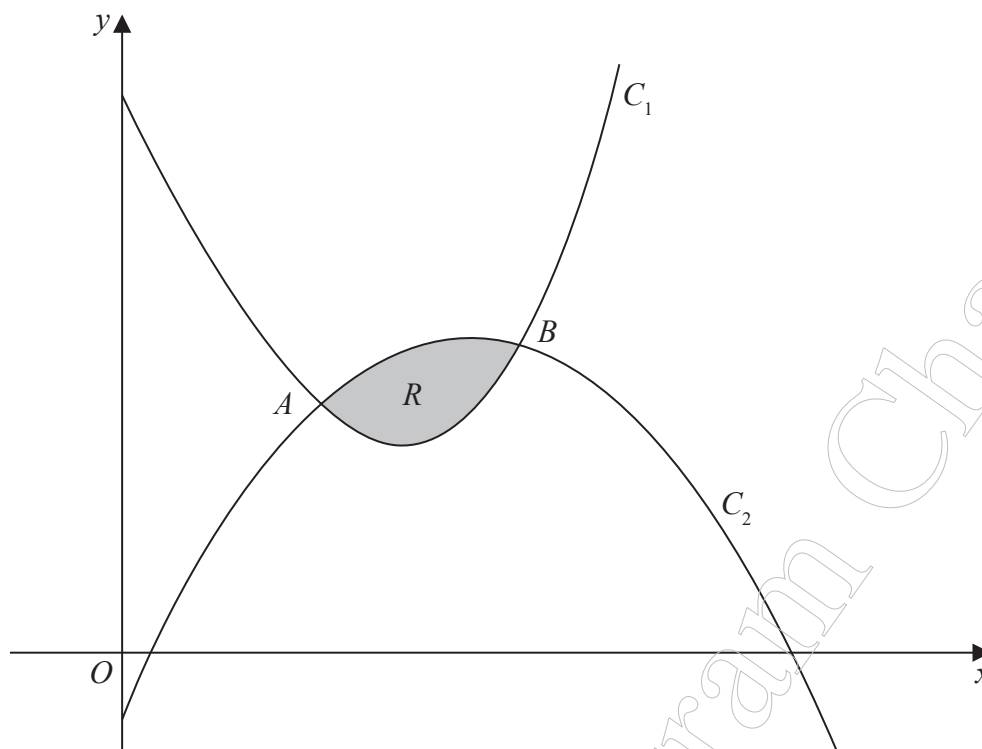
**Figure 1**

Figure 1 shows a sketch of part of the curves  $C_1$  and  $C_2$  with equations

$$C_1 : y = x^3 - 6x + 9 \quad x \geq 0$$

$$C_2 : y = -2x^2 + 7x - 1 \quad x \geq 0$$

The curves  $C_1$  and  $C_2$  intersect at the points  $A$  and  $B$  as shown in Figure 1.

The point  $A$  has coordinates  $(1, 4)$ .

Using algebra and showing all steps of your working,

(a) find the coordinates of the point  $B$ .

**(4)**

The finite region  $R$ , shown shaded in Figure 1, is bounded by  $C_1$  and  $C_2$

(b) Use algebraic integration to find the exact area of  $R$ .

**(5)**

**Question 6 continued**

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**Question 6 continued**

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**Question 6 continued**

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Q6



7. (i) Show that

$$\tan \theta + \frac{1}{\tan \theta} \equiv \frac{1}{\sin \theta \cos \theta} \quad \theta \neq \frac{n\pi}{2} \quad n \in \mathbb{Z}$$

(3)

(ii) Solve, for  $0 \leq x < 90^\circ$ , the equation

$$3 \cos^2(2x + 10^\circ) = 1$$

giving your answers in degrees to one decimal place.

*(Solutions based entirely on graphical or numerical methods are not acceptable.)*

(4)

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**Question 7 continued**

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(Total 7 marks)

Q7



- $$S_n = \frac{a(1 - r^n)}{1 - r}$$

(b) Find the value of the common ratio.

- (c) Hence find the sum of the first 13 terms of the series, giving your answer to 2 decimal places.



**Question 8 continued**

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**Question 8 continued**

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Q8

(Total 8 marks)



$$\log_3(x + 5) - 4 = \log_3(2x - 1)$$

(4)

$$3^{y+3} \times 2^{1-2y} = 108$$
$$0.75^y = 2$$

(4)

(b) Hence find the value of  $y$ , giving your answer to 3 decimal places.

(2)



**Question 9 continued**

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**Question 9 continued**

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(Total 10 marks)

Q9

END

TOTAL FOR PAPER IS 75 MARKS

