

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL AS MATHEMATICS

(9660/MA01) Unit P1 Pure Mathematics

Wednesday 17 May 2023 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

- For this paper you must have the Oxford International AQA Booklet of Formulae and Statistical Tables (enclosed).
- You may use a graphical calculator.

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.

Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- Show all necessary working; otherwise marks may be lost.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	



Answer **all** questions in the spaces provided.

1 (a) It is given that

$$m = 8a^{\frac{4}{3}} \text{ and } n = 2a^{\frac{1}{2}}$$

where a is a positive constant.

1 (a) (i) Find mn

Circle your answer.

[1 mark]

$10a^{\frac{2}{3}}$

$16a^{\frac{2}{3}}$

$10a^{\frac{11}{6}}$

$16a^{\frac{11}{6}}$

1 (a) (ii) Find $\sqrt{\frac{m}{n}}$

Circle your answer.

[1 mark]

$2a^{\frac{5}{12}}$

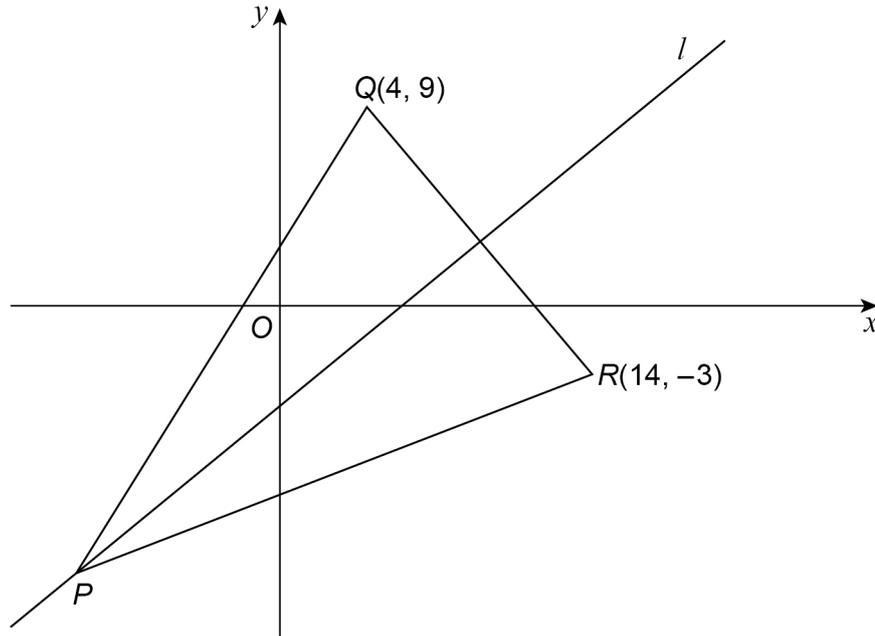
$\sqrt{6} a^{\frac{5}{12}}$

$2a^{\frac{5}{6}}$

$\sqrt{6} a^{\frac{5}{6}}$



- 2 The line l and an isosceles triangle with vertices at the points P , Q and R are shown in the diagram.



The coordinates of Q are $(4, 9)$

The coordinates of R are $(14, -3)$

- 2 (a) Find the exact length of the line segment QR

[2 marks]

Answer _____



3 An arithmetic sequence has first term a , common difference d and n th term u_n

The sum of the first n terms of the sequence is S_n

For this sequence $S_{30} - S_{10} = 522$

3 (a) Show that $10a + 195d = 261$

[3 marks]

3 (b) It is also given that $u_{36} = 5u_9 + 27$

Find a formula in terms of n for the n th term of the arithmetic sequence.

Give your answer in the form $u_n = pn - q$ where p and q are positive constants.

[5 marks]



6 The function f is given by

$$f(x) = x^3 + ax^2 - 6bx + 7$$

where a and b are constants.

When $f(x)$ is divided by $(x-4)$ the remainder is 23

6 (a) Use the Remainder Theorem to show that $2a - 3b = -6$

[2 marks]

6 (b) The value of the gradient of the tangent of the curve $y = f(x)$
at the point where $x = -5$ is 21

Use the value of the gradient to find an equation of the form $pa + qb = r$
where p , q and r are integers.

[3 marks]

Answer _____



7 (c) (i) Find $\frac{d^2y}{dx^2}$

[1 mark]

$$\frac{d^2y}{dx^2} =$$

7 (c) (ii) Use your answers to **part (b)** and **part (c)(i)** to show that Q is a minimum.

[1 mark]

7 (d) (i) Explain why it is **not** possible to use the x -coordinate of P with your answer to **part (c)(i)** to determine whether P is a minimum or a maximum.

[1 mark]

7 (d) (ii) Calculate the values of the gradient of the curve at the points where $x = -0.1$ and $x = 0.1$ and hence deduce that P is a maximum.

[2 marks]



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