

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
AS GCE**

4721/01

**MATHEMATICS
Core Mathematics 1
QUESTION PAPER**

MONDAY 13 MAY 2013: Afternoon

**DURATION: 1 hour 30 minutes
plus your additional time allowance**

MODIFIED ENLARGED

Candidates answer on the Printed Answer Book or any suitable paper provided by the centre. The Printed Answer Book may be enlarged by the centre.

OCR SUPPLIED MATERIALS:

**Printed Answer Book 4721/01
List of Formulae (MF1)**

OTHER MATERIALS REQUIRED:

None

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the spaces provided on the Printed Answer Book or on the paper provided by the centre. Please write clearly and in capital letters.**
- **If you use the Printed Answer Book, write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **You are NOT permitted to use a calculator in this paper.**
- **Give non-exact numerical answers correct to 3 significant figures unless a different degree of accuracy is specified in the question or is clearly appropriate.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question on the Question Paper.
- **YOU ARE REMINDED OF THE NEED FOR CLEAR PRESENTATION IN YOUR ANSWERS.**
- The total number of marks for this paper is 72.

INSTRUCTION TO EXAMS OFFICER/INVIGILATOR

- Do not send this Question Paper for marking; it should be retained in the centre or recycled. Please contact OCR Copyright should you wish to re-use this document.

<p>No calculator can be used for this paper</p>
--

1 Express each of the following in the form $a\sqrt{5}$, where a is an integer.

(i) $4\sqrt{15} \times \sqrt{3}$ [2]

(ii) $\frac{20}{\sqrt{5}}$ [1]

(iii) $5^{\frac{3}{2}}$ [1]

2 Solve the equation $8x^6 + 7x^3 - 1 = 0$. [5]

3 It is given that $f(x) = \frac{6}{x^2} + 2x$.

(i) Find $f'(x)$. [3]

(ii) Find $f''(x)$. [2]

4 (i) Express $3x^2 + 9x + 10$ in the form $3(x + p)^2 + q$. [3]

(ii) State the coordinates of the minimum point of the curve $y = 3x^2 + 9x + 10$. [2]

(iii) Calculate the discriminant of $3x^2 + 9x + 10$. [2]

- 5 (i) Sketch the curve $y = \frac{2}{x^2}$. [2]
- (ii) The curve $y = \frac{2}{x^2}$ is translated by 5 units in the negative x -direction. Find the equation of the curve after it has been translated. [2]
- (iii) Describe a transformation that transforms the curve $y = \frac{2}{x^2}$ to the curve $y = \frac{1}{x^2}$. [2]
- 6 A circle C has equation $x^2 + y^2 + 8y - 24 = 0$.
- (i) Find the centre and radius of the circle. [3]
- (ii) The point $A(2, 2)$ lies on the circumference of C . Given that AB is a diameter of the circle, find the coordinates of B . [2]
- 7 Solve the inequalities
- (i) $3 - 8x > 4$, [2]
- (ii) $(2x - 4)(x - 3) \leq 12$. [5]
- 8 A is the point $(-2, 6)$ and B is the point $(3, -8)$. The line l is perpendicular to the line $x - 3y + 15 = 0$ and passes through the mid-point of AB . Find the equation of l , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. [7]

- 9 (i) Sketch the curve $y = 2x^2 - x - 6$, giving the coordinates of all points of intersection with the axes. [5]
- (ii) Find the set of values of x for which $2x^2 - x - 6$ is a decreasing function. [3]
- (iii) The line $y = 4$ meets the curve $y = 2x^2 - x - 6$ at the points P and Q . Calculate the distance PQ . [4]
- 10 The curve $y = (1 - x)(x^2 + 4x + k)$ has a stationary point when $x = -3$.
- (i) Find the value of the constant k . [7]
- (ii) Determine whether the stationary point is a maximum or minimum point. [2]
- (iii) Given that $y = 9x - 9$ is the equation of the tangent to the curve at the point A , find the coordinates of A . [5]

BLANK PAGE

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

