

Wednesday 13 May 2015 - Morning

AS GCE MATHEMATICS

4721/01 Core Mathematics 1

QUESTION PAPER

Candidates answer on the Printed Answer Book.

OCR supplied materials:

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

Other materials required: None

Duration: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

These instructions are the same on the Printed Answer Book and the Question Paper.

- The Question Paper will be found inside the Printed Answer Book.
- Write your name, centre number and candidate number in the spaces provided on the Printed Answer Book. Please write clearly and in capital letters.
- Write your answer to each question in the space provided in the Printed Answer Book. 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.
- Do **not** write in the bar codes.
- 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.

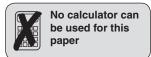
INFORMATION FOR CANDIDATES

This information is the same on the Printed Answer Book and the Question Paper.

- 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.
- The Printed Answer Book consists of **12** pages. The Question Paper consists of **4** pages. Any blank pages are indicated.

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.



- 2 (i) Sketch the curve $y = -\frac{1}{x}$. [2]
 - (ii) The curve $y = -\frac{1}{x}$ is translated by 2 units parallel to the x-axis in the positive direction. State the equation of the transformed curve. [2]
 - (iii) Describe a transformation that transforms the curve $y = -\frac{1}{x}$ to the curve $y = -\frac{1}{3x}$. [2]
- **3** Express each of the following in the form 5^k .
 - (i) 25^4 [1]

(ii)
$$\frac{1}{\sqrt[4]{5}}$$
 [2]

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

- 4 Solve the equation $x^{\frac{2}{3}} x^{\frac{1}{3}} 6 = 0.$ [5]
- 5 The points A and B have coordinates (2, 1) and (5, -3) respectively.
 - (i) Find the length of *AB*. [2]
 - (ii) Find an equation of the line through the mid-point of *AB* which is perpendicular to *AB*, giving your answer in the form ax + by + c = 0 where *a*, *b* and *c* are integers. [7]
- 6 Solve the simultaneous equations

$$2x + y - 5 = 0, \qquad x^2 - y^2 = 3.$$
 [5]

[4]

- 7 (a) Given that $f(x) = (x^2 + 3)(5 x)$, find f'(x).
 - (b) Find the gradient of the curve $y = x^{-\frac{1}{3}}$ at the point where x = -8. [4]

- 8 (i) Sketch the curve $y = 2x^2 x 3$, giving the coordinates of all points of intersection with the axes. [4]
 - (ii) Hence, or otherwise, solve the inequality $2x^2 x 3 > 0$. [2]
 - (iii) Given that the equation $2x^2 x 3 = k$ has no real roots, find the set of possible values of the constant k. [3]
- 9 The curve $y = 2x^3 ax^2 + 8x + 2$ passes through the point *B* where x = 4.
 - (i) Given that *B* is a stationary point of the curve, find the value of the constant *a*. [5]
 - (ii) Determine whether the stationary point *B* is a maximum point or a minimum point. [2]

[3]

- (iii) Find the x-coordinate of the other stationary point of the curve.
- 10 A circle with centre C has equation $x^2 + y^2 10x + 4y + 4 = 0$.
 - (i) Find the coordinates of *C* and the radius of the circle. [3]
 - (ii) Show that the tangent to the circle at the point P(8, 2) has equation 3x + 4y = 32. [5]
 - (iii) The circle meets the y-axis at Q and the tangent meets the y-axis at R. Find the area of triangle PQR. [4]

END OF QUESTION PAPER



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.