

Monday 19 May 2014 – 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 guestions.
- 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.

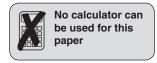
INFORMATION FOR CANDIDATES

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.





1	Express $5x^2 + 10x + 2$ in the form	$p(x+q)^2 + r$, where p, q and r are integers.	[4]
_		p (** : 4)	1 - 1

2 Express each of the following in the form $k\sqrt{3}$, where k is an integer.

(i)
$$\frac{6}{\sqrt{3}}$$

(ii)
$$10\sqrt{3} - 6\sqrt{27}$$

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

- 3 Find the real roots of the equation $4x^4 + 3x^2 1 = 0$. [5]
- 4 The curve y = f(x) passes through the point P with coordinates (2, 5).
 - (i) State the coordinates of the point corresponding to P on the curve y = f(x) + 2. [1]
 - (ii) State the coordinates of the point corresponding to P on the curve y = f(2x). [1]
 - (iii) Describe the transformation that transforms the curve y = f(x) to the curve y = f(x+4). [2]
- 5 Solve the following inequalities.

(i)
$$5 < 6x + 3 < 14$$

(ii)
$$x(3x-13) \ge 10$$

6 Given that $y = 6x^3 + \frac{4}{\sqrt{x}} + 5x$, find

(i)
$$\frac{dy}{dx}$$
, [4]

(ii)
$$\frac{\mathrm{d}^2 y}{\mathrm{d}x^2}$$
. [2]

7 A is the point (5, 7) and B is the point (-1, -5).

- (i) Find the coordinates of the mid-point of the line segment AB. [2]
- (ii) Find an equation of the line through A that is perpendicular to the line segment AB, giving your answer in the form ax + by + c = 0 where a, b and c are integers. [5]

© OCR 2014 4721/01 Jun14

- 8 A curve has equation $y = 3x^3 7x + \frac{2}{x}$.
 - (i) Verify that the curve has a stationary point when x = 1. [5]
 - (ii) Determine the nature of this stationary point. [2]
 - (iii) The tangent to the curve at this stationary point meets the y-axis at the point Q. Find the coordinates of Q.
- 9 A circle with centre C has equation $(x-2)^2 + (y+5)^2 = 25$.
 - (i) Show that no part of the circle lies above the *x*-axis. [3]
 - (ii) The point P has coordinates (6, k) and lies inside the circle. Find the set of possible values of k. [5]
 - (iii) Prove that the line 2y = x does not meet the circle. [4]
- 10 A curve has equation $y = (x+2)^2(2x-3)$.
 - (i) Sketch the curve, giving the coordinates of all points of intersection with the axes. [3]
 - (ii) Find an equation of the tangent to the curve at the point where x = -1. Give your answer in the form ax + by + c = 0.

END OF QUESTION PAPER

© OCR 2014 4721/01 Jun14



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.

© OCR 2014 4721/01 Jun14