



**ADVANCED SUBSIDIARY GCE
MATHEMATICS**

Core Mathematics 2

4722

QUESTION PAPER

Candidates answer on the printed answer book.

OCR supplied materials:

- Printed answer book 4722
- List of Formulae (MF1)

Other materials required:

- Scientific or graphical calculator

Friday 14 January 2011

Afternoon

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 in the centre of 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. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- You are permitted to use a scientific or graphical 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 destroyed.

2

1 (i) Find and simplify the first three terms, in ascending powers of x , in the binomial expansion of $(1 + 2x)^7$. [3]

(ii) Hence find the coefficient of x^2 in the expansion of $(2 - 5x)(1 + 2x)^7$. [3]

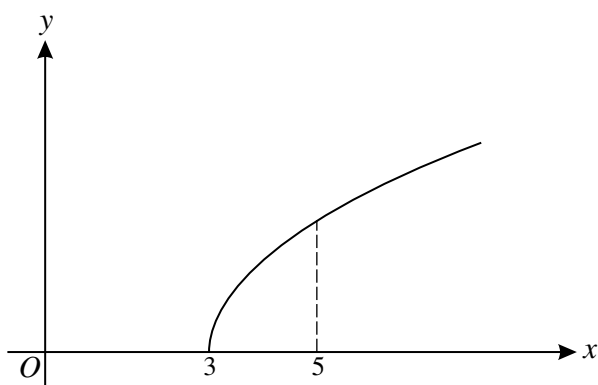
2 A sequence S has terms u_1, u_2, u_3, \dots defined by $u_n = 3n + 2$ for $n \geq 1$.

(i) Write down the values of u_1, u_2 and u_3 . [2]

(ii) State what type of sequence S is. [1]

(iii) Find $\sum_{n=101}^{200} u_n$. [3]

3



The diagram shows the curve $y = \sqrt{x - 3}$.

(i) Use the trapezium rule, with 4 strips each of width 0.5, to find an approximate value for the area of the region bounded by the curve, the x -axis and the line $x = 5$. Give your answer correct to 3 significant figures. [4]

(ii) State, with a reason, whether this approximation is an underestimate or an overestimate. [2]

4 (a) Use logarithms to solve the equation $5^{x-1} = 120$, giving your answer correct to 3 significant figures. [4]

(b) Solve the equation $\log_2 x + 2 \log_2 3 = \log_2(x + 5)$. [4]

5 In a geometric progression, the sum to infinity is four times the first term.

(i) Show that the common ratio is $\frac{3}{4}$. [3]

(ii) Given that the third term is 9, find the first term. [3]

(iii) Find the sum of the first twenty terms. [2]

3

6 (a) Find $\int \frac{x^3 + 3x^{\frac{1}{2}}}{x} dx$. [4]

(b) (i) Find, in terms of a , the value of $\int_2^a 6x^{-4} dx$, where a is a constant greater than 2. [3]

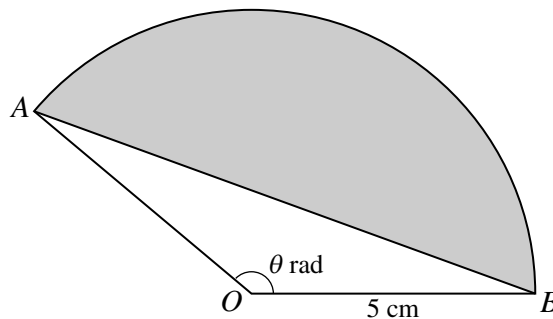
(ii) Deduce the value of $\int_2^{\infty} 6x^{-4} dx$. [1]

7 Solve each of the following equations for $0^\circ \leq x \leq 180^\circ$.

(i) $3 \tan 2x = 1$ [3]

(ii) $3 \cos^2 x + 2 \sin x - 3 = 0$ [5]

8



The diagram shows a sector AOB of a circle with centre O and radius 5 cm. Angle AOB is θ radians. The area of triangle AOB is 8 cm^2 .

(i) Given that the angle θ is obtuse, find θ . [3]

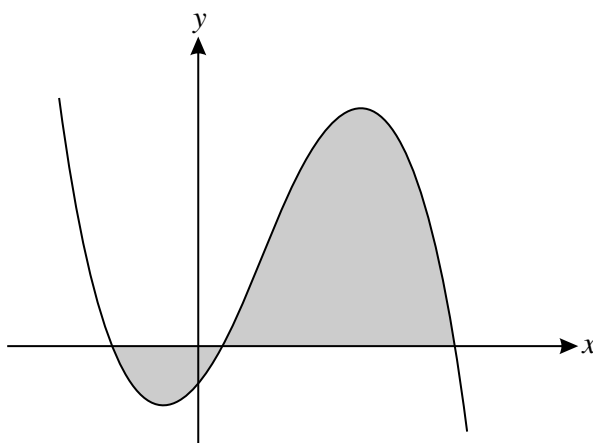
The shaded segment in the diagram is bounded by the chord AB and the arc AB .

(ii) Find the area of the segment, giving your answer correct to 3 significant figures. [3]

(iii) Find the perimeter of the segment, giving your answer correct to 3 significant figures. [4]

[Question 9 is printed overleaf.]

9



The diagram shows the curve $y = f(x)$, where $f(x) = -4x^3 + 9x^2 + 10x - 3$.

- (i) Verify that the curve crosses the x -axis at $(3, 0)$ and hence state a factor of $f(x)$. [2]
- (ii) Express $f(x)$ as the product of a linear factor and a quadratic factor. [3]
- (iii) Hence find the other two points of intersection of the curve with the x -axis. [2]
- (iv) The region enclosed by the curve and the x -axis is shaded in the diagram. Use integration to find the total area of this region. [5]

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.



**ADVANCED SUBSIDIARY GCE
MATHEMATICS**

Core Mathematics 2

4722

PRINTED ANSWER BOOK

Candidates answer on this printed answer book.

OCR supplied materials:

- Question paper 4722 (inserted)
- List of Formulae (MF1)

Other materials required:

- Scientific or graphical calculator

**Friday 14 January 2011
Afternoon**

Duration: 1 hour 30 minutes



Candidate forename		Candidate surname	
-----------------------	--	----------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

INSTRUCTIONS TO CANDIDATES

These instructions are the same on the printed answer book and the question paper.

- The question paper will be found in the centre of 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. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- You are permitted to use a scientific or graphical 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.

1 (i)	
1 (ii)	

2 (i)	
2 (ii)	
2 (iii)	

3 (i)	
	3 (ii)

4 (a)	
4 (b)	

5 (i)	
5 (ii)	
5 (iii)	

6 (a)	
6 (b) (i)	
6 (b) (ii)	

7 (i)	
7 (ii)	

8 (i)	
8 (ii)	

8 (iii)	

9 (i)	
9 (ii)	
9 (iii)	

9 (iv)	



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.