



Thursday 22 May 2014 – Morning

AS GCE MATHEMATICS

4722/01 Core Mathematics 2

QUESTION PAPER

Candidates answer on the Printed Answer Book.

OCR supplied materials:

- Printed Answer Book 4722/01
- List of Formulae (MF1)

Other materials required:

- Scientific or graphical calculator

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 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

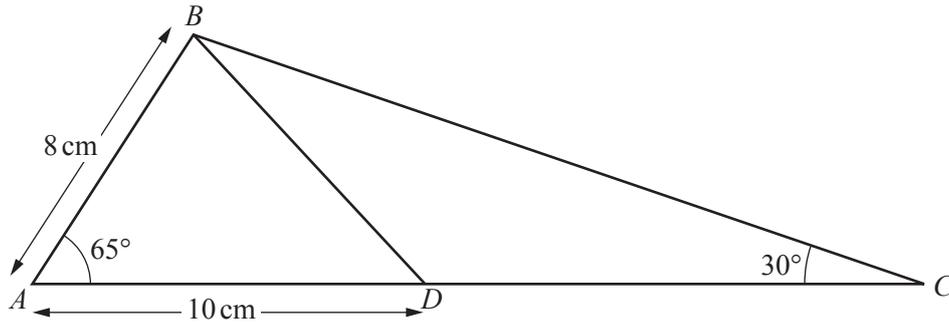
This information is the same on the Printed Answer Book and the Question Paper.

- 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 recycled. Please contact OCR Copyright should you wish to re-use this document.

1



The diagram shows triangle ABC , with $AB = 8$ cm, angle $BAC = 65^\circ$ and angle $BCA = 30^\circ$. The point D is on AC such that $AD = 10$ cm.

(i) Find the area of triangle ABD . [2]

(ii) Find the length of BD . [2]

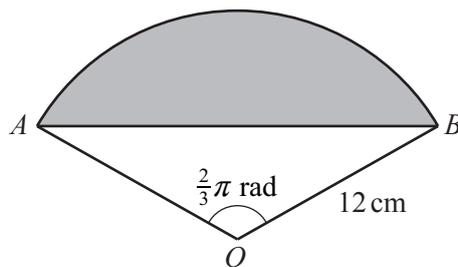
(iii) Find the length of BC . [2]

2 A sequence u_1, u_2, u_3, \dots is defined by $u_n = 3n - 1$, for $n \geq 1$.

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

(ii) Find $\sum_{n=1}^{40} u_n$. [3]

3



The diagram shows a sector OAB of a circle, centre O and radius 12 cm. The angle AOB is $\frac{2}{3}\pi$ radians.

(i) Find the exact length of the arc AB . [2]

(ii) Find the exact area of the shaded segment enclosed by the arc AB and the chord AB . [5]

- 4 (i) Show that the equation

$$\sin x - \cos x = \frac{6 \cos x}{\tan x}$$

can be expressed in the form

$$\tan^2 x - \tan x - 6 = 0. \quad [2]$$

- (ii) Hence solve the equation $\sin x - \cos x = \frac{6 \cos x}{\tan x}$ for $0^\circ \leq x \leq 360^\circ$. [4]

- 5 Solve the equation $2^{4x-1} = 3^{5-2x}$, giving your answer in the form $x = \frac{\log_{10} a}{\log_{10} b}$. [6]

- 6 (i) Find the binomial expansion of $\left(x^3 + \frac{2}{x^2}\right)^4$, simplifying the terms. [5]

- (ii) Hence find $\int \left(x^3 + \frac{2}{x^2}\right)^4 dx$. [4]

- 7 The cubic polynomial $f(x)$ is defined by $f(x) = 12 - 22x + 9x^2 - x^3$.

- (i) Find the remainder when $f(x)$ is divided by $(x + 2)$. [2]

- (ii) Show that $(3 - x)$ is a factor of $f(x)$. [1]

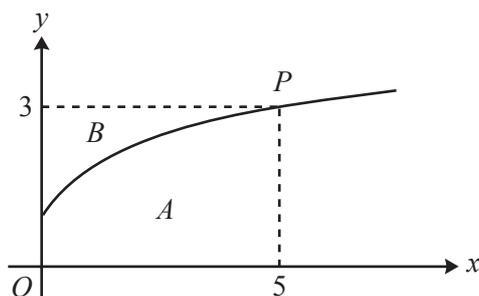
- (iii) Express $f(x)$ as the product of a linear factor and a quadratic factor. [3]

- (iv) Hence solve the equation $f(x) = 0$, giving each root in simplified surd form where appropriate. [3]

- 8 (a) The first term of a geometric progression is 50 and the common ratio is 0.8. Use logarithms to find the smallest value of k such that the value of the k th term is less than 0.15. [4]

- (b) In a different geometric progression, the second term is -3 and the sum to infinity is 4. Show that there is only one possible value of the common ratio and hence find the first term. [8]

Question 9 begins on page 4.



The diagram shows part of the curve $y = -3 + 2\sqrt{x+4}$. The point $P(5, 3)$ lies on the curve. Region A is bounded by the curve, the x -axis, the y -axis and the line $x = 5$. Region B is bounded by the curve, the y -axis and the line $y = 3$.

- (i) Use the trapezium rule, with 2 strips each of width 2.5, to find an approximate value for the area of region A , giving your answer correct to 3 significant figures. [3]
- (ii) Use your answer to part (i) to deduce an approximate value for the area of region B . [2]
- (iii) By first writing the equation of the curve in the form $x = f(y)$, use integration to show that the exact area of region B is $\frac{14}{3}$. [7]

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.