



# Wednesday 24 May 2017 - 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 barcodes.
- 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.

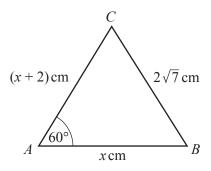
## **INFORMATION FOR CANDIDATES**

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.

## INSTRUCTIONS 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

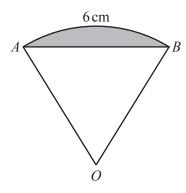


The diagram shows triangle ABC, with AB = x cm, AC = (x+2) cm,  $BC = 2\sqrt{7}$  cm and angle  $CAB = 60^{\circ}$ .

- (i) Find the value of x. [4]
- (ii) Find the area of triangle ABC, giving your answer in an exact form as simply as possible. [2]
- 2 (i) Use the trapezium rule, with 4 strips each of width 0.2, to find an estimate for  $\int_0^{0.8} \cos x dx$ , where x is in radians. Give your answer correct to 3 significant figures. [4]
  - (ii) Explain, with the aid of a sketch, why the value from part (i) is an under-estimate. [2]
- 3 (i) Find and simplify the first four terms in the expansion of  $\left(1 + \frac{1}{2}x\right)^8$  in ascending powers of x. [4]
  - (ii) Hence find the coefficient of  $y^2$  in the expansion of  $\left(1 + \frac{1}{2}(y + y^2)\right)^8$ . [2]
- 4 The gradient of a curve is given by  $\frac{dy}{dx} = 5x(\sqrt{x} 2)$  and the curve passes through the point (4, 11). Find the equation of the curve.

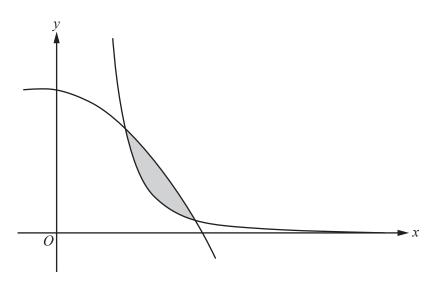
© OCR 2017 4722/01 Jun17

5



The diagram shows a sector AOB of a circle with centre O. The length of the arc AB is  $6 \,\mathrm{cm}$  and the area of the sector AOB is  $24 \,\mathrm{cm}^2$ . Find the area of the shaded segment enclosed by the arc AB and the chord AB, giving your answer correct to 3 significant figures.

6



The diagram shows parts of the curves  $y = 11 - x - 2x^2$  and  $y = \frac{8}{x^3}$ . The curves intersect at (1, 8) and (2, 1). Use integration to find the exact area of the shaded region enclosed between the two curves. [7]

- 7 (a) Use logarithms to solve the equation  $3^{x+1} = 2^{500}$ , giving your answer correct to 3 significant figures. [4]
  - (b) (i) Show that the equation  $\log_2(y+1) 1 = 2\log_2 x$  can be written in the form  $y = ax^2 + b$ , where a and b are integers. [4]
    - (ii) Hence solve the simultaneous equations

$$\log_2(y+1) - 1 = 2\log_2 x, \qquad \log_2(y-10x+14) = 0.$$
 [4]

- 8 (a) The seventh term of an arithmetic progression is equal to twice the fifth term. The sum of the first seven terms is 84. Find the first term. [5]
  - (b) The seventh term of a geometric progression is equal to twice the fifth term. The sum of the first seven terms is 254 and the terms are all positive. Find the first term, showing that it can be written in the form  $p+q\sqrt{r}$  where p, q and r are integers.

- 9 The cubic polynomial f(x) is defined by  $f(x) = 4x^3 + 9x 5$ .
  - (i) Show that (2x-1) is a factor of f(x) and hence express f(x) as the product of a linear factor and a quadratic factor.
  - (ii) (a) Show that the equation

$$4\sin 2\theta\cos 2\theta + \frac{5}{\cos 2\theta} = 13\tan 2\theta$$

can be expressed in the form

$$4\sin^{3}2\theta + 9\sin 2\theta - 5 = 0.$$
 [4]

[4]

**(b)** Hence solve the equation

$$4\sin 2\theta\cos 2\theta + \frac{5}{\cos 2\theta} = 13\tan 2\theta$$

for  $0 \le \theta \le 2\pi$ . Give each answer in an exact form.

**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.

© OCR 2017 4722/01 Jun17