

# 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.

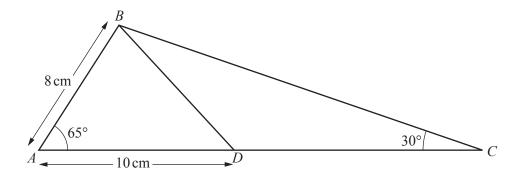
### INFORMATION FOR CANDIDATES

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

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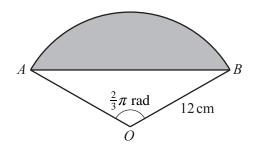


The diagram shows triangle *ABC*, with AB = 8 cm, angle  $BAC = 65^{\circ}$  and angle  $BCA = 30^{\circ}$ . The point *D* is on *AC* such that AD = 10 cm.

- (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  $n \ge 1$ .
  - (i) Find the values of  $u_1, u_2$  and  $u_3$ . [2]

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

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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 <i>AB</i> .	[2]
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(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

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

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

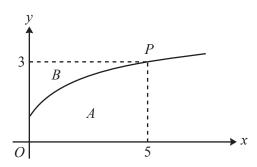
(ii) Hence find 
$$\int \left(x^3 + \frac{2}{x^2}\right)^4 dx$$
. [4]

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

[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 kth 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.



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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**



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