



Thursday 22 May 2014 – Morning

AS GCE MATHEMATICS

4722/01 Core Mathematics 2

QUESTION PAPER

Candidates answer on the Printed Answer Book.

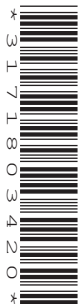
OCR supplied materials:

- 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

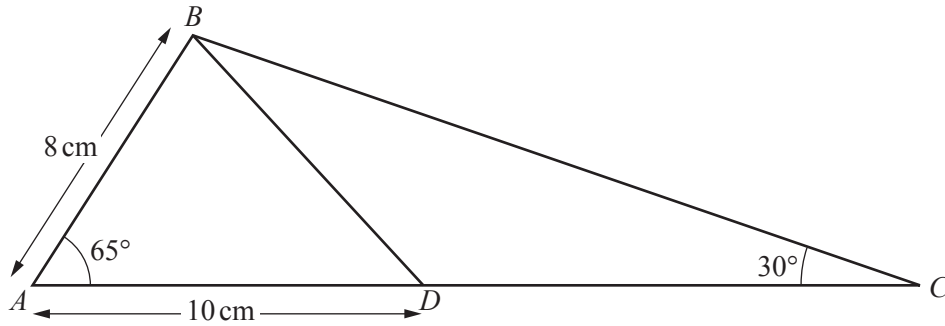
This information is the same on the Printed Answer Book and the Question Paper.

- 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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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]

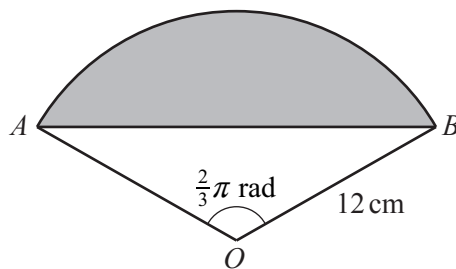
(iii) Find the length of BC . [2]

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]

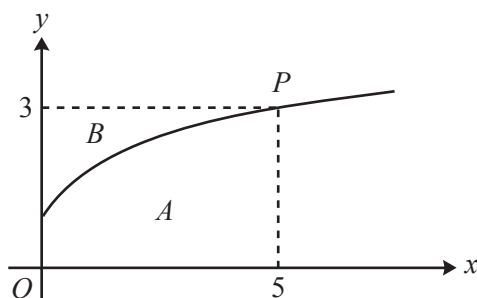
- (iii) Express $f(x)$ as the product of a linear factor and a quadratic factor. [3]

- (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



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