

Monday 14 January 2013 – Morning

AS GCE MATHEMATICS

4721 Core Mathematics 1

QUESTION PAPER

Candidates answer on the Printed Answer Book.

OCR supplied materials:

- Printed Answer book 4721
- List of Formulae (MF1)

Other materials required:

None

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. 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 **not** permitted to use a 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.

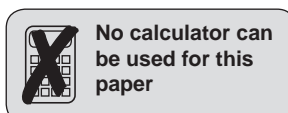
INFORMATION FOR CANDIDATES

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 (i) Solve the equation $x^2 - 6x - 2 = 0$, giving your answers in simplified surd form. [3]
- (ii) Find the gradient of the curve $y = x^2 - 6x - 2$ at the point where $x = -5$. [2]
- 2 Solve the equations
- (i) $3^n = 1$, [1]
- (ii) $t^{-3} = 64$, [2]
- (iii) $(8p^6)^{\frac{1}{3}} = 8$. [3]
- 3 (i) Sketch the curve $y = (1 + x)(2 - x)(3 + x)$, giving the coordinates of all points of intersection with the axes. [3]
- (ii) Describe the transformation that transforms the curve $y = (1 + x)(2 - x)(3 + x)$ to the curve $y = (1 - x)(2 + x)(3 - x)$. [2]
- 4 (i) Solve the simultaneous equations
- $$y = 2x^2 - 3x - 5, \quad 10x + 2y + 11 = 0. \quad [5]$$
- (ii) What can you deduce from the answer to part (i) about the curve $y = 2x^2 - 3x - 5$ and the line $10x + 2y + 11 = 0$? [1]
- 5 (i) Simplify $(x + 4)(5x - 3) - 3(x - 2)^2$. [3]
- (ii) The coefficient of x^2 in the expansion of
- $$(x + 3)(x + k)(2x - 5)$$
- is -3 . Find the value of the constant k . [3]

- 6 (i) The line joining the points $(-2, 7)$ and $(-4, p)$ has gradient 4. Find the value of p . [3]
- (ii) The line segment joining the points $(-2, 7)$ and $(6, q)$ has mid-point $(m, 5)$. Find m and q . [3]
- (iii) The line segment joining the points $(-2, 7)$ and $(d, 3)$ has length $2\sqrt{13}$. Find the two possible values of d . [4]
- 7 Find $\frac{dy}{dx}$ in each of the following cases:
- (i) $y = \frac{(3x)^2 \times x^4}{x}$, [3]
- (ii) $y = \sqrt[3]{x}$, [3]
- (iii) $y = \frac{1}{2x^3}$. [2]
- 8 The quadratic equation $kx^2 + (3k - 1)x - 4 = 0$ has no real roots. Find the set of possible values of k . [7]
- 9 A circle with centre C has equation $x^2 + y^2 - 2x + 10y - 19 = 0$.
- (i) Find the coordinates of C and the radius of the circle. [3]
- (ii) Verify that the point $(7, -2)$ lies on the circumference of the circle. [1]
- (iii) Find the equation of the tangent to the circle at the point $(7, -2)$, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. [5]
- 10 Find the coordinates of the points on the curve $y = \frac{1}{3}x^3 + \frac{9}{x}$ at which the tangent is parallel to the line $y = 8x + 3$. [10]

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE



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