

Wednesday 16 May 2012 – 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



MODIFIED LANGUAGE

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

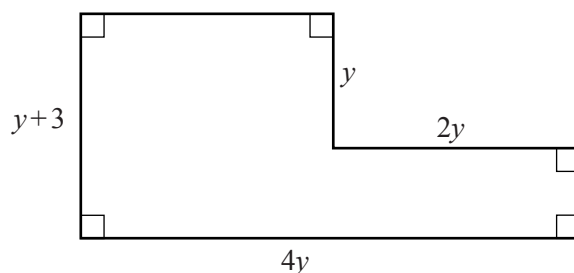
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No calculator can
be used for this
paper

- 1 Simplify $(x - 5)(x^2 + 3) - (x + 4)(x - 1)$. [3]
- 2 Express each of the following in the form 7^k :
- (i) $\sqrt[4]{7}$, [1]
- (ii) $\frac{1}{7\sqrt{7}}$, [2]
- (iii) $7^4 \times 49^{10}$. [2]
- 3 (i) Find the gradient of the line l which has equation $3x - 5y - 20 = 0$. [1]
- (ii) The line l crosses the x -axis at P and the y -axis at Q . Find the coordinates of the mid-point of PQ . [4]
- 4 (i) Express $2x^2 - 20x + 49$ in the form $p(x - q)^2 + r$. [4]
- (ii) State the coordinates of the vertex of the curve $y = 2x^2 - 20x + 49$. [2]
- 5 (i) Sketch the curve $y = \sqrt{x}$. [2]
- (ii) Describe the transformation that transforms the curve $y = \sqrt{x}$ to the curve $y = \sqrt{x - 4}$. [2]
- (iii) The curve $y = \sqrt{x}$ is stretched by a scale factor of 5 parallel to the x -axis. State the equation of the transformed curve. [2]
- 6 Find the equation of the normal to the curve $y = \frac{6}{x^2} - 5$ at the point on the curve where $x = 2$. Give your answer in the form $ax + by + c = 0$, where a , b and c are integers. [7]
- 7 Solve the equation $x - 6x^{\frac{1}{2}} + 2 = 0$, giving your answers in the form $p \pm q\sqrt{r}$, where p , q and r are integers. [6]
- 8 (i) Find the coordinates of the stationary point on the curve $y = x^4 + 32x$. [5]
- (ii) Determine whether this stationary point is a maximum or a minimum. [2]
- (iii) For what values of x does $x^4 + 32x$ increase as x increases? [1]

- 9 (i) A rectangular tile has length $4x$ cm and width $(x + 3)$ cm. The area of the rectangle is less than 112 cm^2 . By writing down and solving an inequality, determine the set of possible values of x . [6]
- (ii) A second rectangular tile of length $4y$ cm and width $(y + 3)$ cm has a rectangle of length $2y$ cm and width y cm removed from one corner as shown in the diagram.



Given that the perimeter of this tile is between 20 cm and 54 cm, determine the set of possible values of y . [5]

- 10 A circle has equation $(x - 5)^2 + (y + 2)^2 = 25$.
- (i) Find the coordinates of the centre C and the length of the diameter. [3]
- (ii) Find the equation of the line which passes through C and the point $P(7, 2)$. [4]
- (iii) Calculate the length of CP and hence determine whether P lies inside or outside the circle. [3]
- (iv) Determine algebraically whether the line with equation $y = 2x$ meets the circle. [5]

THERE ARE NO QUESTIONS WRITTEN ON THIS PAGE



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