

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**AS GCE**  
**4721**  
**MATHEMATICS**  
**Core Mathematics 1**

**WEDNESDAY 16 MAY 2012: Morning**  
**DURATION: 1 hour 30 minutes**  
**plus your additional time allowance**

**MODIFIED ENLARGED**

**Candidates answer on the Printed Answer Book or any suitable paper provided by the centre. The Printed Answer Book may be enlarged by the centre.**

**OCR SUPPLIED MATERIALS:**

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

**OTHER MATERIALS REQUIRED:**

**None**

**READ INSTRUCTIONS OVERLEAF**

## **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.**
- **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.

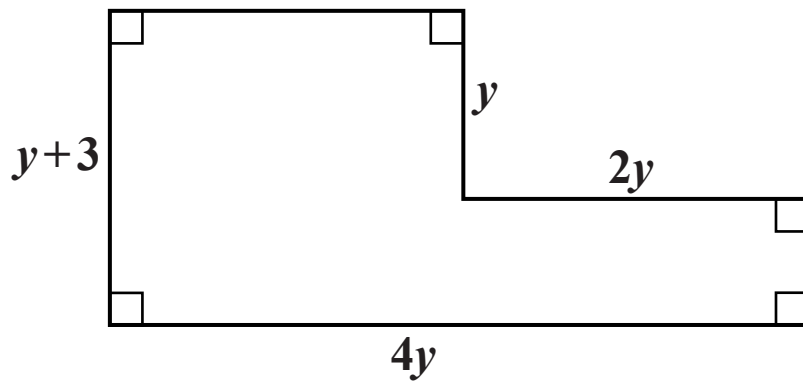
## **INSTRUCTION TO EXAMS OFFICER/INVIGILATOR**

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- 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  $112 \text{ cm}^2$ . 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 following 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]**

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