

**ADVANCED SUBSIDIARY GCE  
MATHEMATICS (MEI)**

Introduction to Advanced Mathematics (C1)

**4751**

**QUESTION PAPER**

Candidates answer on the Printed Answer Book

**OCR Supplied Materials:**

- Printed Answer Book 4751
- MEI Examination Formulae and Tables (MF2)

**Other Materials Required:**

None

**Monday 24 May 2010  
Afternoon**

**Duration:** 1 hour 30 minutes

**INSTRUCTIONS TO CANDIDATES**

These instructions are the same on the Printed Answer Book and the Question Paper.

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the spaces provided on the Printed Answer Book.
- **The questions are on the inserted Question Paper.**
- **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. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- You are **not** permitted to use a calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.

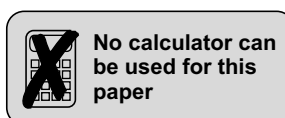
**INFORMATION FOR CANDIDATES**

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 advised that an answer may receive **no marks** unless you show sufficient detail of the working to indicate that a correct method is being used.
- 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**

- Do not send this Question Paper for marking; it should be retained in the centre or destroyed.



## Section A (36 marks)

- 1 Find the equation of the line which is parallel to  $y = 3x + 1$  and which passes through the point with coordinates  $(4, 5)$ . [3]
- 2 (i) Simplify  $(5a^2b)^3 \times 2b^4$ . [2]  
(ii) Evaluate  $(\frac{1}{16})^{-1}$ . [1]  
(iii) Evaluate  $(16)^{\frac{3}{2}}$ . [2]
- 3 Make  $y$  the subject of the formula  $a = \frac{\sqrt{y} - 5}{c}$ . [3]
- 4 Solve the following inequalities.  
(i)  $2(1 - x) > 6x + 5$  [3]  
(ii)  $(2x - 1)(x + 4) < 0$  [2]
- 5 (i) Express  $\sqrt{48} + \sqrt{27}$  in the form  $a\sqrt{3}$ . [2]  
(ii) Simplify  $\frac{5\sqrt{2}}{3 - \sqrt{2}}$ . Give your answer in the form  $\frac{b + c\sqrt{2}}{d}$ . [3]
- 6 You are given that
- the coefficient of  $x^3$  in the expansion of  $(5 + 2x^2)(x^3 + kx + m)$  is 29,
  - when  $x^3 + kx + m$  is divided by  $(x - 3)$ , the remainder is 59.
- Find the values of  $k$  and  $m$ . [5]
- 7 Expand  $(1 + \frac{1}{2}x)^4$ , simplifying the coefficients. [4]
- 8 Express  $5x^2 + 20x + 6$  in the form  $a(x + b)^2 + c$ . [4]
- 9 Show that the following statement is false.  
$$x - 5 = 0 \Leftrightarrow x^2 = 25$$
 [2]

## Section B (36 marks)

- 10 (i) Solve, by factorising, the equation  $2x^2 - x - 3 = 0$ . [3]
- (ii) Sketch the graph of  $y = 2x^2 - x - 3$ . [3]
- (iii) Show that the equation  $x^2 - 5x + 10 = 0$  has no real roots. [2]
- (iv) Find the  $x$ -coordinates of the points of intersection of the graphs of  $y = 2x^2 - x - 3$  and  $y = x^2 - 5x + 10$ . Give your answer in the form  $a \pm \sqrt{b}$ . [4]

11

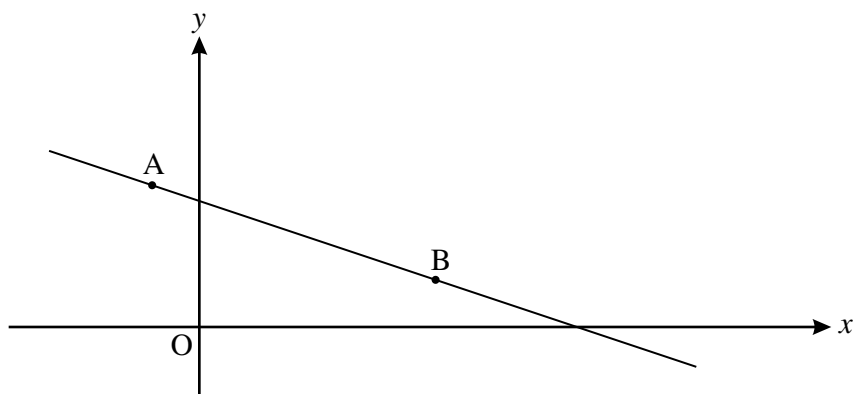


Fig. 11

Fig. 11 shows the line through the points A  $(-1, 3)$  and B  $(5, 1)$ .

- (i) Find the equation of the line through A and B. [3]
- (ii) Show that the area of the triangle bounded by the axes and the line through A and B is  $\frac{32}{3}$  square units. [2]
- (iii) Show that the equation of the perpendicular bisector of AB is  $y = 3x - 4$ . [3]
- (iv) A circle passing through A and B has its centre on the line  $x = 3$ . Find the centre of the circle and hence find the radius and equation of the circle. [4]
- 12 You are given that  $f(x) = x^3 + 6x^2 - x - 30$ .
- (i) Use the factor theorem to find a root of  $f(x) = 0$  and hence factorise  $f(x)$  completely. [6]
- (ii) Sketch the graph of  $y = f(x)$ . [3]
- (iii) The graph of  $y = f(x)$  is translated by  $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ .

Show that the equation of the translated graph may be written as

$$y = x^3 + 3x^2 - 10x - 24. \quad [3]$$