

**Thursday 13 June 2013 – Morning**

**A2 GCE MATHEMATICS (MEI)**

**4754/01B** Applications of Advanced Mathematics (C4) Paper B: Comprehension  
**QUESTION PAPER**

Candidates answer on the Question Paper.

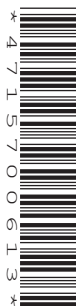
**OCR supplied materials:**

- Insert (inserted)
- MEI Examination Formulae and Tables (MF2)

**Other materials required:**

- Scientific or graphical calculator
- Rough paper

**Duration:** Up to 1 hour



Candidate forename						Candidate surname					
Centre number						Candidate number					

**INSTRUCTIONS TO CANDIDATES**

- The Insert will be found in the centre of this document.
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- 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.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.
- The Insert contains the text for use with the questions.
- You are permitted to use a scientific or graphical calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.

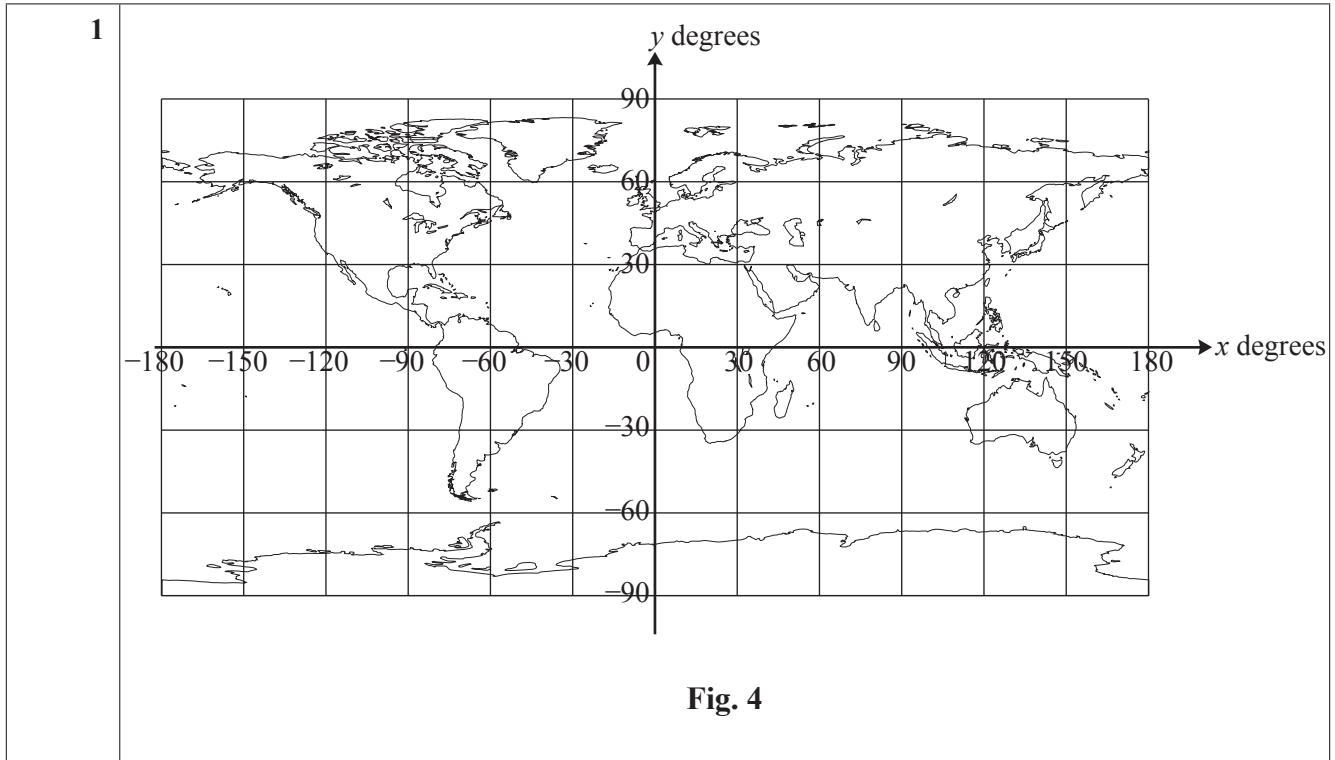
**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- You may find it helpful to make notes and to do some calculations as you read the passage.
- You are **not** required to hand in these notes with your 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 **18**.
- This document consists of **8** pages. Any blank pages are indicated.

- 1 The diagram is a copy of Fig. 4.

R is a place with latitude  $45^\circ$  north and longitude  $60^\circ$  west. Show the position of R on the diagram.

M is the sub-solar point. It is on the Greenwich meridian and the declination of the sun is  $+20^\circ$ . Show the position of M on the diagram. [2]



- 2 Use Fig. 8 to estimate the difference in the length of daylight between places with latitudes of  $30^\circ$  south and  $60^\circ$  south on the day for which the graph applies. [3]

<b>2</b>	

3 The graph is a copy of Fig. 6.

The article says that it shows the terminator in the cases where the sun has declination  $10^\circ$  north,  $1^\circ$  north,  $5^\circ$  south and  $15^\circ$  south.

Identify which curve (A, B, C or D) relates to which declination.

[2]

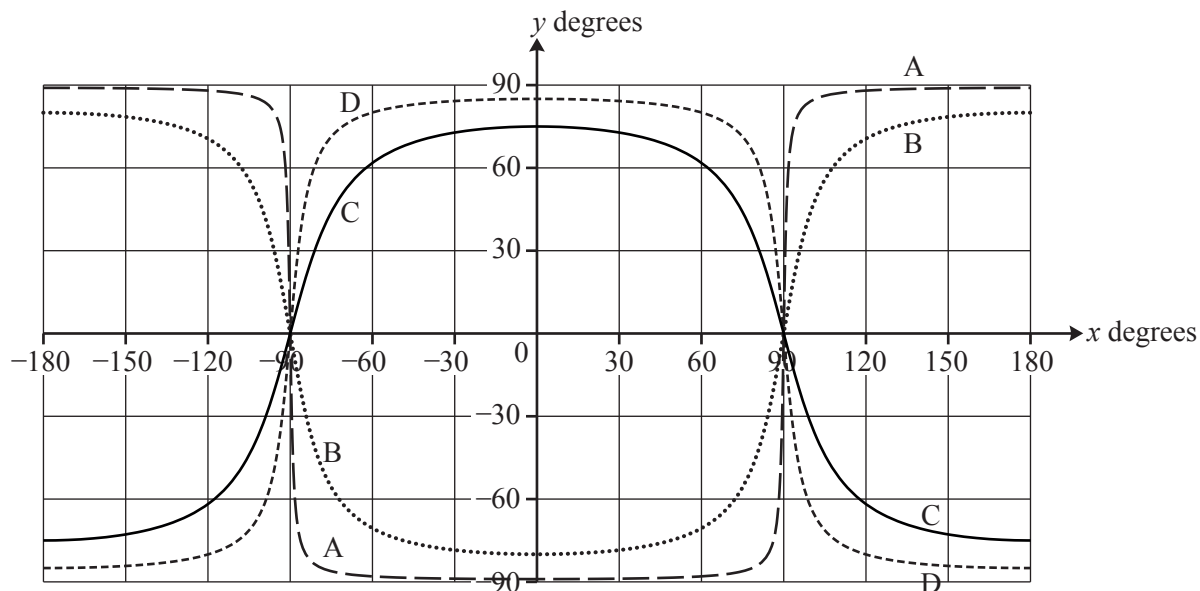


Fig. 6

3	10° north:
	1° north:
	5° south:
	15° south:

4 In lines 94 and 95 the article says

“Fig. 8 shows you that at latitude  $60^\circ$  north the terminator passes approximately through time +9 hours and -9 hours so that there are about 18 hours of daylight.”

Use Equation (4) to check the accuracy of the figure of 18 hours.

[4]

4	

5 (i) Use Equation (3) to calculate the declination of the sun on February 2nd. [3]

(ii) The town of Boston, in Lincolnshire, has latitude  $53^\circ$  north and longitude  $0^\circ$ .

Calculate the time of sunset in Boston on February 2nd.

Give your answer in hours and minutes using the 24-hour clock. [4]

5 (i)	
5 (ii)	

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