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Friday 24 June 2016 – 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

Duration: Up to 1 hourCandidate
forenameCandidate
surname

Centre number

Candidate number

INSTRUCTIONS TO CANDIDATES

- The Insert will be found inside 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 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.

2

- 1 The blades of a wind turbine sweep out a circle of diameter 90 m. The turbine's blade tip height is 149.5 m.

Calculate the hub height of this turbine.

[1]

1	

3

- 2 In lines 46 and 47, the article says
'So someone at the point of observation would not see the bottom 12 m of the turbine.'

Explain how the figure of 12 m was obtained.

[2]

2	

- 3** A wind turbine with a blade tip height of 125 m is seen from a distance of 623 m. The ground is level and horizontal so that the whole of the turbine can be seen.

- (i)** Calculate the angle of elevation of the tip of a blade when it is pointing vertically upwards.
You should assume that the viewer's eye is at the same height as the base of the turbine. **[1]**

The wind turbine is shown on a photomontage; the viewing distance is stated to be 51.4 cm.

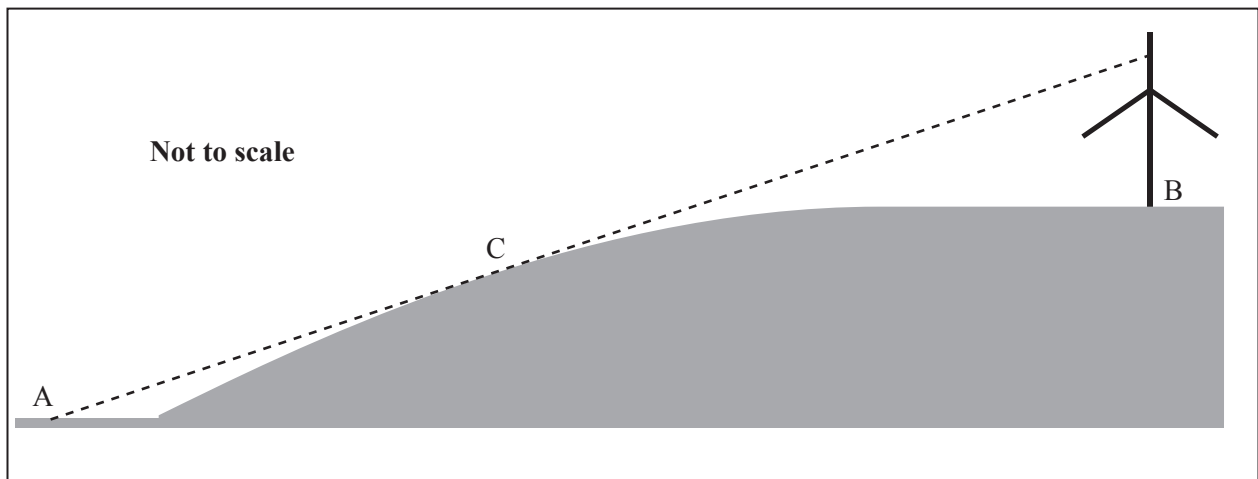
- (ii)** Calculate the height that the turbine would have on the photomontage if it were seen with the same angle of elevation as that in part **(i)**. **[1]**

The image of the wind turbine is 7.3 cm high when the photomontage is printed on A4 paper.

- (iii)** Show that when the photomontage is printed on A3 paper, the height of the wind turbine is consistent with the angle of elevation found in part **(i)**. **[2]**

3 (i)	
3 (ii)	

3 (iii)	



- 4 The diagram illustrates the situation in Fig. 5 of the article.

The blade tip height of the wind turbine is 99.5 m.

The base, B, of the turbine is 120 m higher than A and at a horizontal distance of 320 m from A.

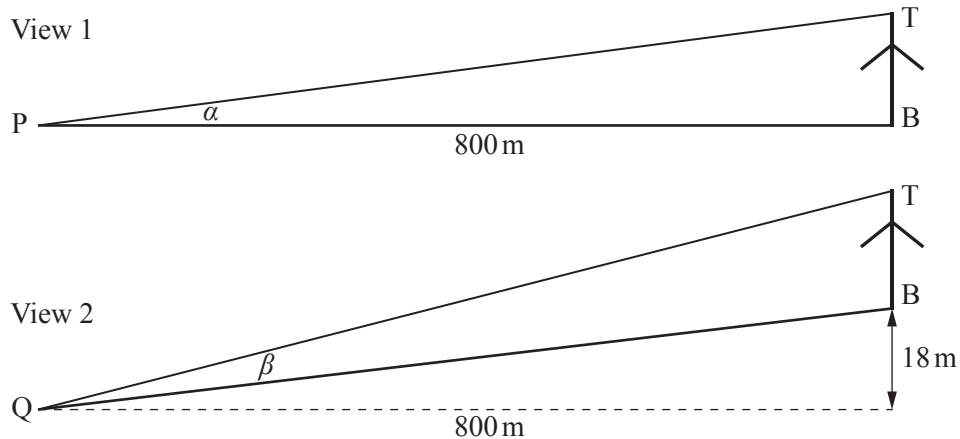
An observer at A can see the top 20 m of a blade when it is pointing vertically upwards, as in the diagram.

The observer's line of vision is a tangent to the hill at C. The horizontal distance from A to C is 140 m.

Find the height of C above A.

[4]

4	

Not to scale

- 5 In the diagram, the wind turbine BT is observed from two different positions P and Q. The blade tip height of the turbine is 72 m.

Both P and Q are a horizontal distance of 800 m from the turbine.

P is at the same height as the base, B, of the turbine. Q is 18 m below the level of B.

The angle of elevation from P is α ; the angle TQB is β .

Show that the angles α and β , in degrees, are the same to 2 significant figures.

[3]**5**

6 In line 96, the article says

‘As a result of the study, it was recommended that a focal length of 75 mm should be used.’

Make a reasoned estimate of the percentages of participants in Stirling University’s study who would have thought the photomontages made the wind turbines appear ‘Too large’, ‘About right’ and ‘Too small’ if a lens of focal length 75 mm had been used. You must state your assumptions clearly. [4]

6	

END OF QUESTION PAPER

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