

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**A2 GCE**

**4754/01B**

**MATHEMATICS (MEI)**

**Applications of Advanced  
Mathematics (C4)**

**Paper B: Comprehension**

**QUESTION PAPER**

**FRIDAY 24 JUNE 2016 – Morning**

**DURATION: Up to 1 hour  
plus your additional time allowance**

**MODIFIED ENLARGED**

<b>Candidate forename</b>		<b>Candidate surname</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**Candidates answer on the Question Paper.**

**OCR SUPPLIED MATERIALS:**

**Insert**

**Diagram Booklet**

**OTHER MATERIALS REQUIRED:**

**Scientific or graphical calculator**

**READ INSTRUCTIONS OVERLEAF**



## **INSTRUCTIONS TO CANDIDATES**

**Write your name, centre number and candidate number in the boxes on the first page. 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).**

**The Insert contains the text for use with the questions.**

**The diagrams are provided in a separate booklet.**

**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.**

**Any blank pages are indicated.**

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	

**2 In lines 84 to 86, 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]**

<b>2</b>	

**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]**

<b>3 (i)</b>	

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]

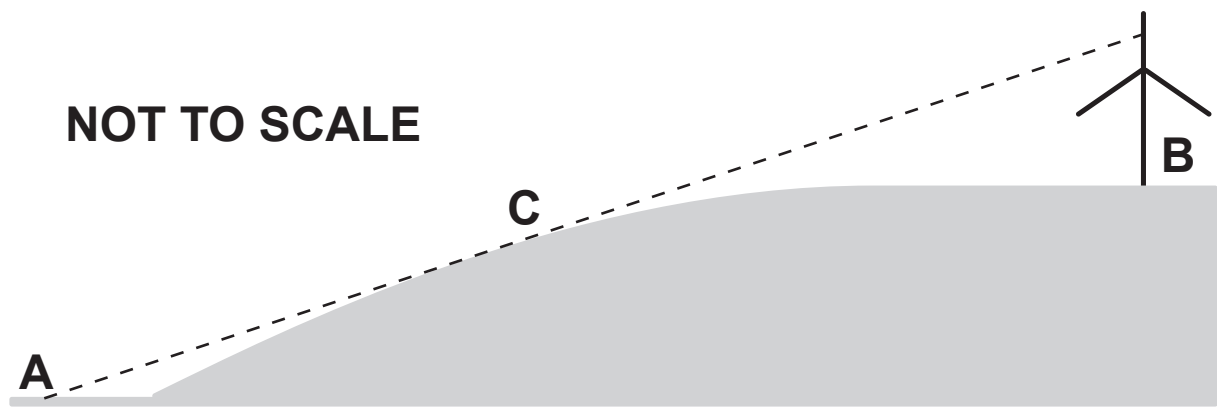
3(ii)	

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]

<b>3 (iii)</b>	

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- 4 The diagram above illustrates the situation in Fig. 5 in the diagram booklet.

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.

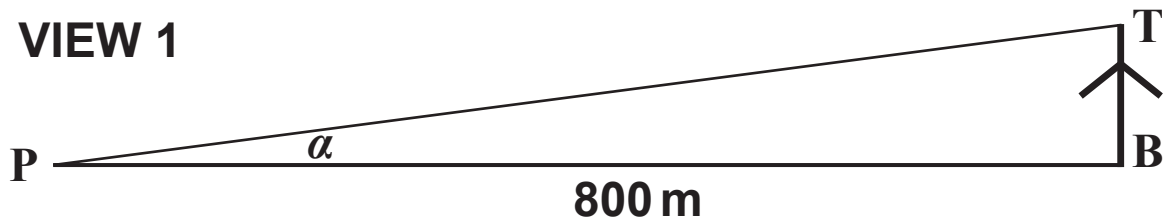
The observer's line of vision is a tangent to the hill at C. The horizontal distance from A to C is 140 m.

Find the height of C above A. [4]

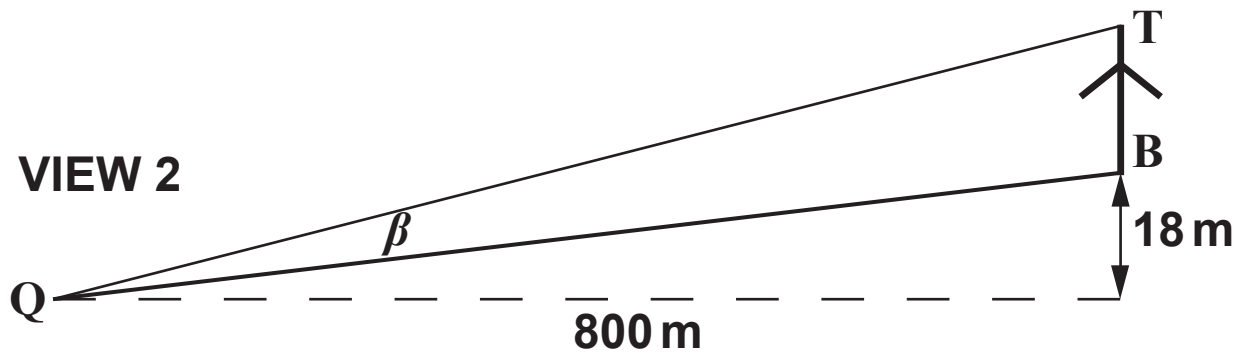
4	

**NOT TO SCALE**

**VIEW 1**



**VIEW 2**



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

Both  $P$  and  $Q$  are a horizontal distance of  $800\text{ m}$  from the turbine.

$P$  is at the same height as the base,  $B$ , of the turbine.  
 $Q$  is  $18\text{ m}$  below the level of  $B$ .

The angle of elevation from  $P$  is  $\alpha$ ; the angle  $TQB$  is  $\beta$ .

Show that the angles  $\alpha$  and  $\beta$ , in degrees, are the same to 2 significant figures. [3]

5	

**6 In lines 176 and 177, 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]**

<b>6</b>	

**END OF QUESTION PAPER**

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