

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
A LEVEL
H640/03
MATHEMATICS B (MEI)
Pure Mathematics and Comprehension
Printed Answer Booklet**

**FRIDAY 15 JUNE 2018: Afternoon
TIME ALLOWED: 2 hours
plus your additional time allowance
MODIFIED ENLARGED 24pt**

First name						Last name					
Centre number						Candidate number					

**YOU MUST HAVE:
Question Paper H640/03
Insert**

**YOU MAY USE:
a scientific or graphical calculator**

READ INSTRUCTIONS OVERLEAF



INSTRUCTIONS

Use black ink. HB pencil may be used for graphs and diagrams only.

Complete the boxes provided on the Printed Answer Booklet with your name, centre number and candidate number.

Answer ALL the questions.

WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED IN THE PRINTED ANSWER BOOKLET. If additional space is required, you should use the lined page(s) at the end of this booklet or suitable paper provided by the centre. The question number(s) must be clearly shown.

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

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 used. You should communicate your method with correct reasoning.

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SECTION A (60 marks)

1	
	2

[illegible]

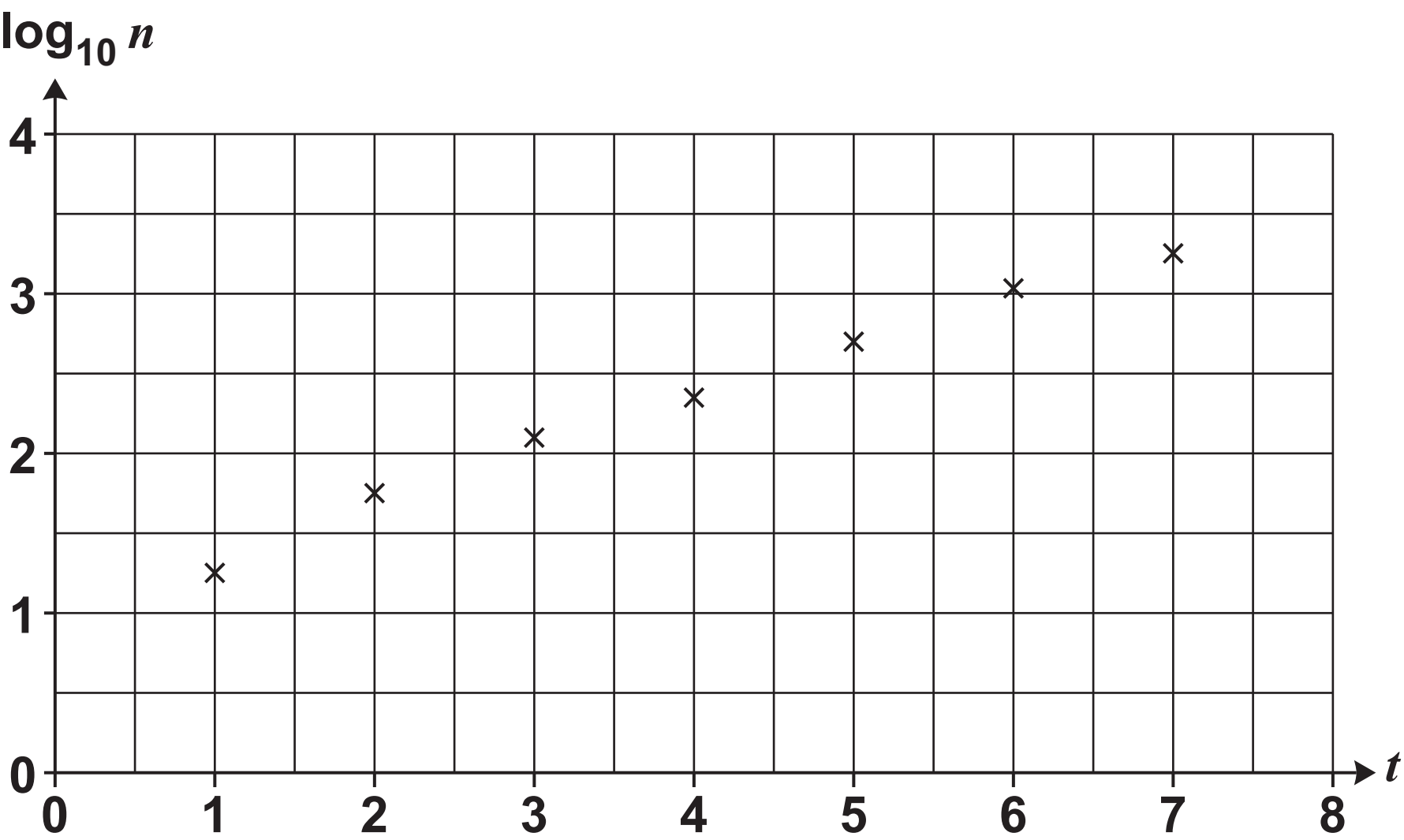
4(i)	
(answer space continued on next page)	

4(i)	(continued)
4(ii)	
4(iii)	

4(iv)	
5(i)	

5(ii)

Fig. 5



5(iii)	
5(iv)	
6	
	(answer space continued on next page)

6	(continued)
	7
(answer space continued on next page)	

7	(continued)

8(i)	

8(ii)	
	9(i)
(answer space continued on next page)	

9(i)	(continued)
9(ii)	
10(i)	
(answer space continued on next page)	

10(i)	(continued)
	10(ii)
(answer space continued on next page)	

10(ii)	(continued)

SECTION B (15 marks)

The questions in this section refer to the article on the Insert. You should read the article before attempting the questions.

11 Line 11 states that $\frac{a + b}{2} \geq \sqrt{ab}$ for $a, b \geq 0$. Explain why the result cannot be extended to apply in each of the following cases.

(i) One of the numbers a and b is positive and the other is negative. [1]

(ii) Both numbers a and b are negative. [1]

11(i)	
11(ii)	
(answer space continued on next page)	

11(ii)	(continued)

12 Lines 7 and 8 outline the stages in a proof that $\frac{a + b}{2} \geq \sqrt{ab}$. Starting from $(a - b)^2 \geq 0$, give a detailed proof of the inequality of arithmetic and geometric means. [3]

12	
	(answer space continued on next page)

12	(continued)

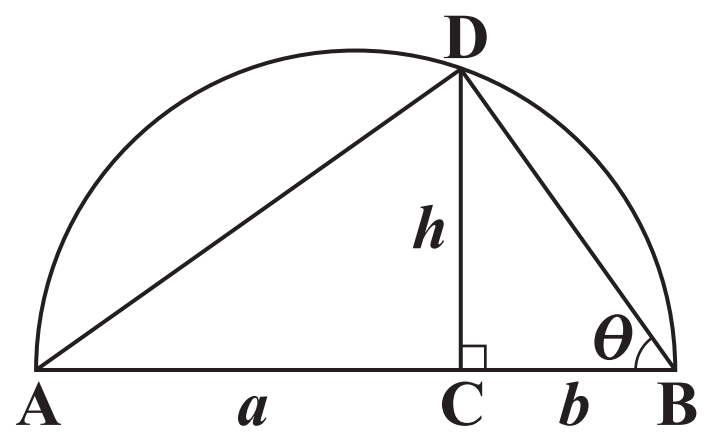
13 Consider a geometric sequence in which all the terms are positive real numbers. Show that, for any three consecutive terms of this sequence, the middle one is the geometric mean of the other two. [3]

13	
	(answer space continued on next page)

13	(continued)

14 (i) In Fig. C1.3, angle $CBD = \theta$. Show that angle CDA is also θ , as given in line 34. [2]

Fig. C1.3



(ii) Prove that $h = \sqrt{ab}$, as given in line 36. [2]

14(i)	
	(answer space continued on next page)

14(i)	(continued)
14(ii)	
	(answer space continued on next page)

14(ii)	(continued)

15 It is given in lines 47–49 that the square has the smallest perimeter of all rectangles with the same area. Using this fact, prove by contradiction that among rectangles of a given perimeter, $4L$, the square with side L has the largest area. [3]

15	
	(answer space continued on next page)

15	(continued)

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).



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