OCR
Oxford Cambridge and RSA

A Level Mathematics B (MEI)

H640/03 Pure Mathematics and Comprehension

Printed Answer Booklet

Friday 15 June 2018 – Afternoon

Time allowed: 2 hours

7070271129

You must have:
- Question Paper H640/03 (inserted)
- Insert (inserted)

You may use:
- a scientific or graphical calculator

H64003

First name									
Last name									
Centre number						Candidate number				

INSTRUCTIONS
- The Question Paper and Insert will be found inside the Printed Answer Booklet.
- 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. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.
- 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.
- The Printed Answer Booklet consists of **20** pages. The Question Paper consists of **8** pages.

DC (NH/SW) 173035/4 **R**

Section A (60 marks)

1	
2	
3	

4(i)

4(ii)

4(iii)	
4(iv)	
5(i)	

5(ii)

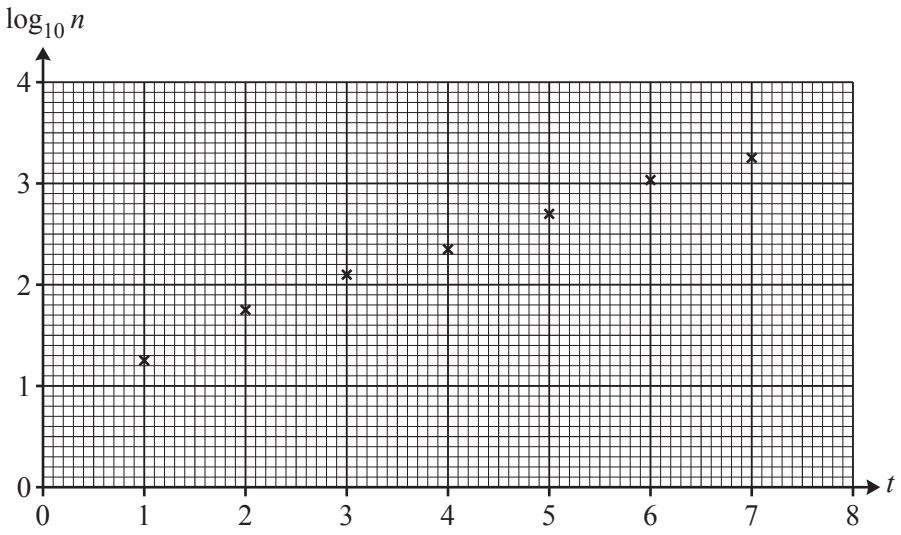

Fig. 5

5(iii)

5(iv)	
6	

7

8(i)

8(ii)

(answer space continued on next page)

8(ii)	**(continued)**
9(i)	
9(ii)	

10(i)	

10(ii)	

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 8 states that $\frac{a+b}{2} \geqslant \sqrt{ab}$ for a, $b \geqslant 0$. 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)	

12 Lines 5 and 6 outline the stages in a proof that $\frac{a+b}{2} \geqslant \sqrt{ab}$. Starting from $(a-b)^2 \geqslant 0$, give a detailed proof of the inequality of arithmetic and geometric means. **[3]**

12

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

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14 (i) In Fig. C1.3, angle CBD = θ. Show that angle CDA is also θ, as given in line 23. **[2]**

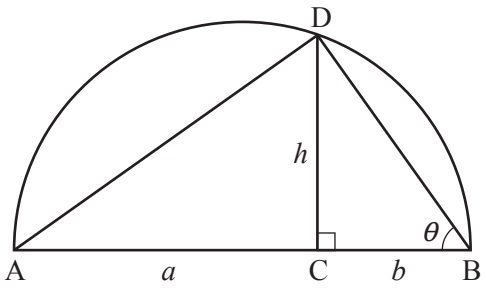

Fig. C1.3

(ii) Prove that $h = \sqrt{ab}$, as given in line 24. **[2]**

14(i)

14(ii)

15 It is given in lines 31–32 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

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).