



Oxford Cambridge and RSA

Friday 14 June 2019 – Afternoon

A Level Mathematics B (MEI)

H640/03 Pure Mathematics and Comprehension

Printed Answer Booklet

Time allowed: 2 hours



You must have:

- Question Paper H640/03 (inserted)
- Insert (inserted)

You may use:

- a scientific or graphical calculator



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

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.
- 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.
- 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 **16** pages. The Question Paper consists of **8** pages.

Section A (60 marks)

1(a)	
1(b)	
1(c)	

2(a)	
2(b)	
3(a)	

3(b)	

4	

5

6(a)

6(b)

(answer space continued on next page)

6(b) (continued)	
6(c)	
7(a)	
7(b)	

8(b)	

9	

(answer space continued on next page)

10

11

(answer space continued on next page)

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.

12 Show that the equation of the line in Fig. C2 is $ry + hx = hr$, as given in line 24. [2]

12	

13 (a) (i) Show that the cross-sectional area in Fig. C3.2 is $\pi x(2r - x)$. [2]

(ii) Hence show that the cross-sectional area is $\frac{\pi r^2}{h^2}(h^2 - y^2)$, as given in line 37. [2]

(b) Verify that the formula $\frac{\pi r^2}{h^2}(h^2 - y^2)$ for the cross-sectional area is also valid for

(i) Fig. C3.1, [1]

(ii) Fig. C3.3. [1]

13(a)(i)	

13(a)(ii)	
13(b)(i)	
13(b)(ii)	

14 (a) Express $\lim_{\delta y \rightarrow 0} \sum_0^h (h^2 - y^2) \delta y$ as an integral. [1]

(b) Hence show that $V = \frac{2}{3} \pi r^2 h$, as given in line 41. [3]

14(a)	
14(b)	

15

15 A typical tube of toothpaste measures 5.4cm across the straight edge at the top and is 12cm high. It contains 75ml of toothpaste so it needs to have an internal volume of 75cm³.

Comment on the accuracy of the formula $V = \frac{2}{3}\pi r^2 h$, as given in line 41, for the volume in this case.

[3]

15	

