



Oxford Cambridge and RSA

Tuesday 21 June 2022 – 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 (inside this document)
- the Insert (inside this document)
- 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

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided in the **Printed Answer Booklet**. If you need extra space use the lined pages at the end of the Printed Answer Booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- Give your final answers to a degree of accuracy that is appropriate to the context.

INFORMATION

- This document has **20** pages.

ADVICE

- Read each question carefully before you start your answer.

Section A (60 marks)

1	
2(a)	
2(b)(i)	
2(b)(ii)	

5(a)	

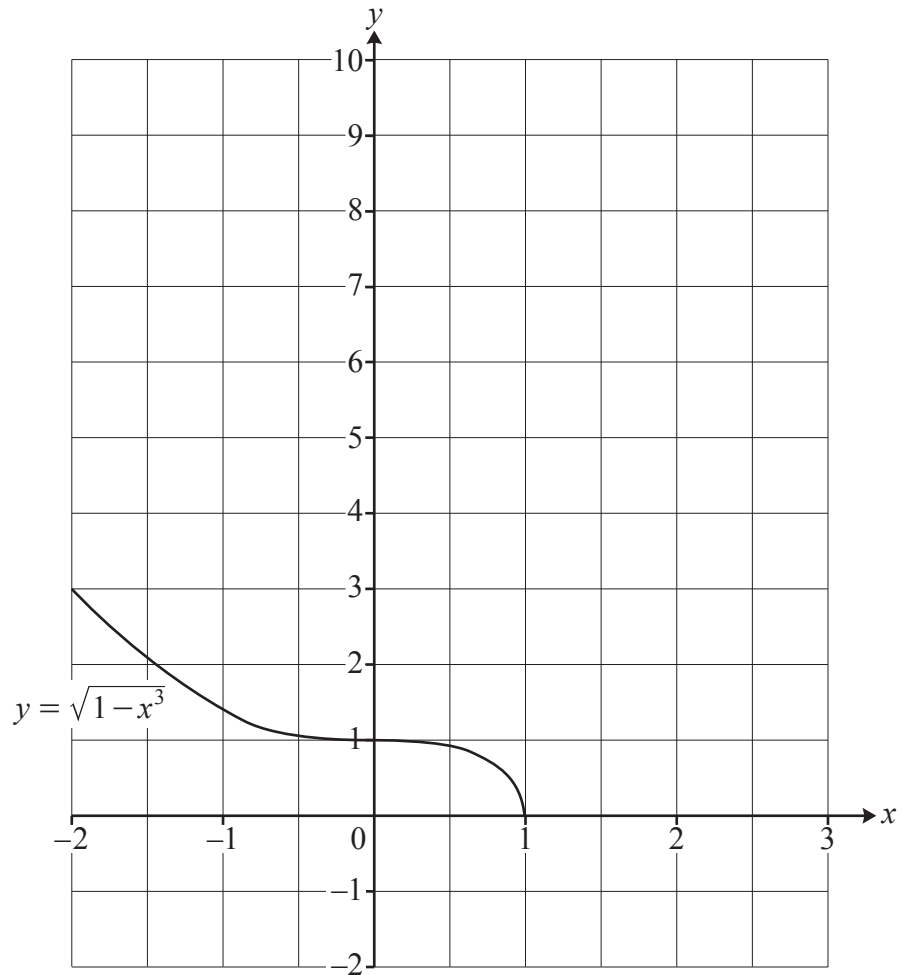
DO NOT WRITE IN THIS SPACE

5(b)	
6(a)	

7(a)	
7(b)	
7(c)	

7(d)

7(e)



7(f)

(answer space continued on next page)

8(d)	(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.

9 Show that $y = x$ has the same gradient as $y = \sin x$ when $x = 0$, as stated in line 5. **[2]**

9	

10 In this question you must show detailed reasoning.

Fig. C2.2 indicates that the curve $y = \frac{4x(\pi - x)}{\pi^2} - \sin x$ has a stationary point near $x = 3$.

- Verify that the x -coordinate of this stationary point is between 2.6 and 2.7.
- Show that this stationary point is a maximum turning point.

[5]

10	

- 11 Show that, for the angle 45° , the formula $\sin \theta \approx \frac{4\theta(180-\theta)}{40500-\theta(180-\theta)}$ given in line 28 gives the same approximation for the sine of the angle as the formula $\sin x \approx \frac{16x(\pi-x)}{5\pi^2-4x(\pi-x)}$ given in line 23. [3]

11	

12 (a) Show that $\cos x = \sin\left(x + \frac{\pi}{2}\right)$. [2]

(b) Hence show that $\sin x \approx \frac{16x(\pi-x)}{5\pi^2-4x(\pi-x)}$ gives the approximation $\cos x \approx \frac{\pi^2-4x^2}{\pi^2+x^2}$, as stated in line 31. [3]

12(a)	
12(b)	
(answer space continued on next page)	

