



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 clea	rly in bl	ack ink.	Do no	ot writ	e in the barcodes.		
Centre number					Candidate number		
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.

2 Section A (60 marks)

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

3(a)	
3 (b)	

4

4	

5 (a)	

DO NOT WRITE IN THIS SPACE

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5(b)	
6(a)	

6(b)	

7(a)	
7(b)	
7(c)	
7(0)	

7(d)	
7(e)	y 10 †
	10
	9
	8-
	7-
	6-
	5-
	3
	$y = \sqrt{1 - x^3}$
	-2 -1 0 1 2 3 x
7(f)	
	(answer space continued on next page

7 (f)	(continued)

8(a)	
8(b)	
	Coordinates of A:
	Coordinates of B:
	Coordinates of C:
	Coordinates of D:

8(d)	

8(d)	(continued)		
	Section B (15 marks)		
The ques attemptir	stions in this section refer to the article on the Insert. You should read the article ng the questions.	before	
9 Show	w that $y = x$ has the same gradient as $y = \sin x$ when $x = 0$, as stated in line 5.	[2]	
9			

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[5]

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.

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	
	line 23.	[3]

11	

[2]

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

(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 sta	ted
	in line 31.	, ,			[3]

12(a)	
12(b)	
	(angree angle continued or rest ress)
	(answer space continued on next page)

12(b)	(continued)

18 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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