

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Thursday 19 June 2025 – Afternoon

A Level Mathematics B (MEI)

H640/03 Pure Mathematics and Comprehension

Printed Answer Booklet

**Time allowed: 2 hours
plus your additional time allowance**

YOU MUST HAVE:

**Question Paper H640/03 (with this document)
the Insert (with this document)
a scientific or graphical calculator**

Please write clearly in black ink.

Centre number

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Candidate number

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First name(s) _____

Last name _____

READ INSTRUCTIONS OVERLEAF



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.

ADVICE

Read each question carefully before you start your answer.

SECTION A (60 marks)

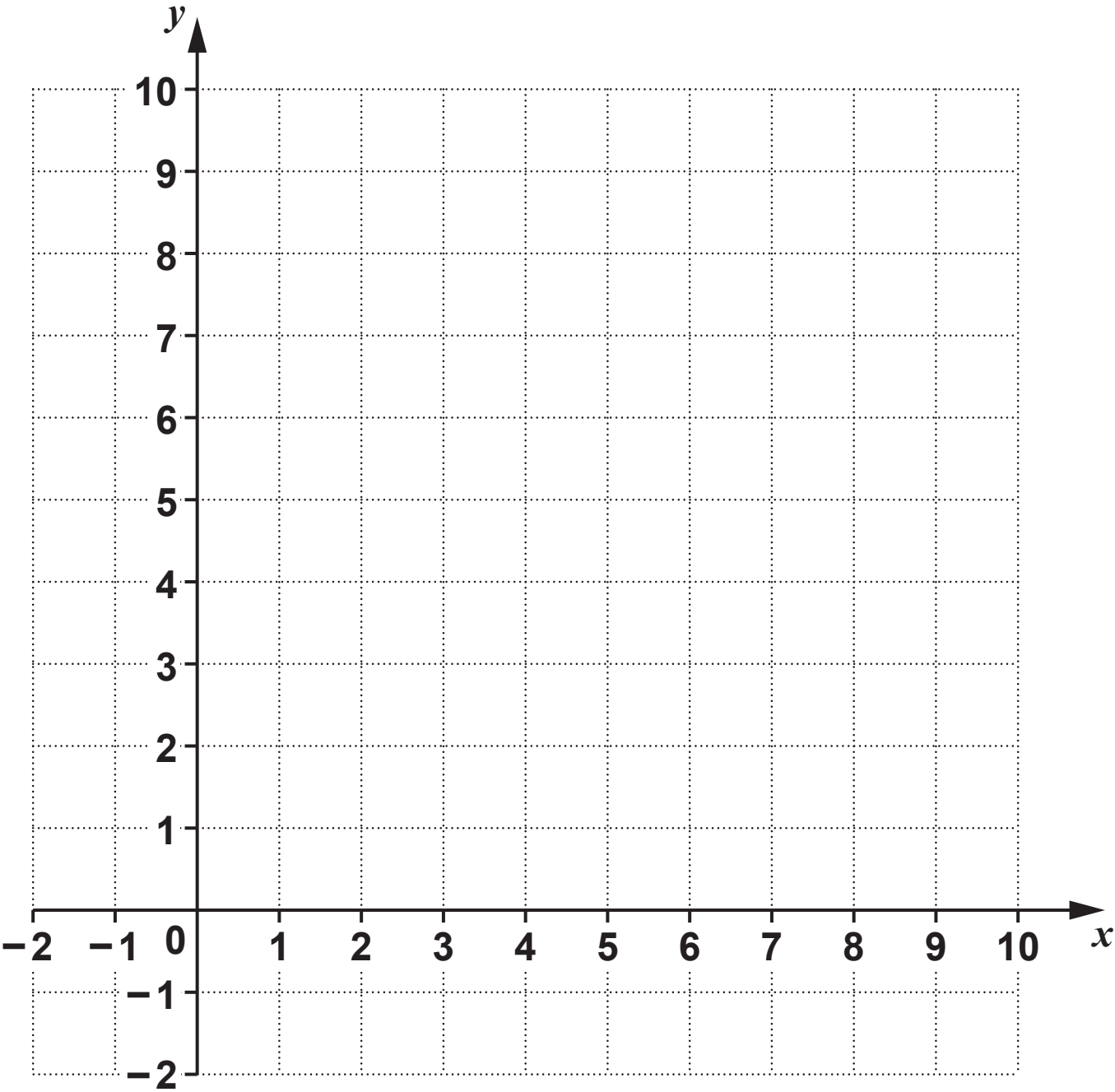
1(a)

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

1(b)

[illegible]

3(a)



[illegible]

[illegible]

[illegible]

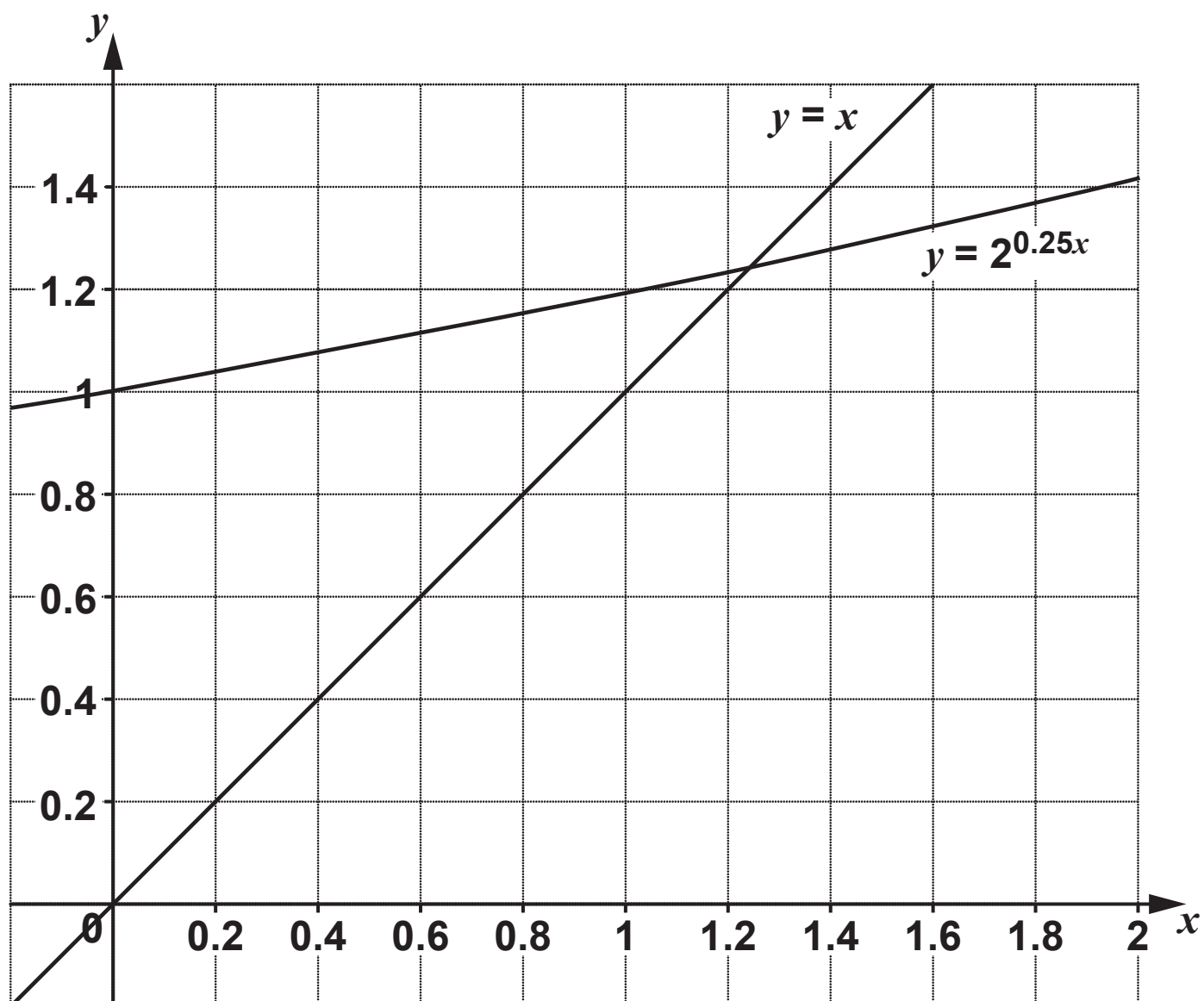
BLANK PAGE

5(a)

5(b)

[illegible]

5(d)



5(e)

5(f)

6(a)

6(b)

7(a)

7(b)

7(c)(i)

7(c)(ii)

[illegible]

8(a)

8(b)

8(c)

[illegible]

[illegible]

11(b)

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 (a) Show that for the point on the curve where

$$x = 0, \frac{3a - x}{a + x} \geq 0, \text{ as given in line 18. [1]}$$

(b) Use the equation of the curve given in line 14 to show that for all points on the curve where

$$x \neq 0, \frac{3a - x}{a + x} \geq 0 \text{ as given in line 18. [1]}$$

(c) Show that it follows that $3a - x \geq 0$ and $a + x > 0$, as given in line 18, for values of $a > 0$. [3]

(d) Hence find, in terms of a where $a > 0$, the range of values of x for points on the curve $y^2 = \frac{x^2(3a - x)}{a + x}$. [1]

(e) Find the equation of the asymptote to the curve. [1]

12(a)

12(b)

[illegible]

12(d)

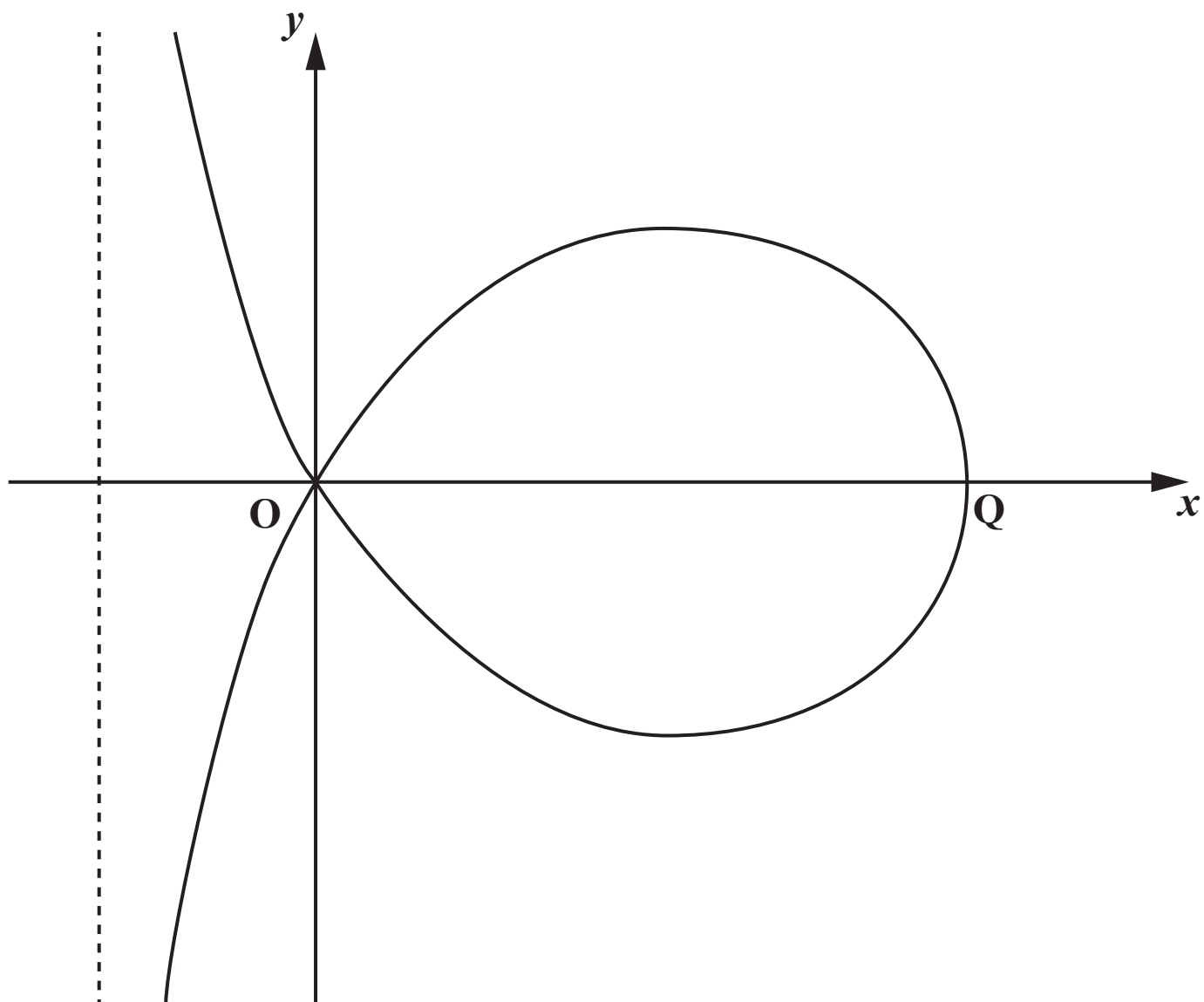
12(e)

for A and B , to show that $\tan 3\theta = \frac{t(3-t^2)}{1-3t^2}$, where $t = \tan \theta$, as given in lines 39 and 40. [3]

[illegible]

- 14 (a) Draw and label a suitable triangle on the diagram in the Printed Answer Booklet to show that $\tan \theta = \frac{y}{x}$, as given in line 47. [1]
- (b) Subtract $x = \frac{a(3 - t^2)}{1 + t^2}$ from $3a$ to show that $3a - x = \frac{4at^2}{1 + t^2}$. [1]
- (c) Find an expression, in terms of a and t , for $a + x$. [1]
- (d) Hence, or otherwise, show that the parametric equations given in lines 46 and 49 are equivalent to $y^2 = \frac{x^2(3a - x)}{a + x}$, as claimed in lines 14 and 52. [2]

14(a)



14(b)

14(c)

14(d)

[illegible]

EXTRA ANSWER SPACE

If you need extra space use these lined pages. You must write the question numbers clearly in the margin.

[illegible]

