

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

A2 GCE

4754/01B

MATHEMATICS (MEI)

**Applications of Advanced Mathematics
(C4) Paper B: Comprehension**

QUESTION PAPER

FRIDAY 18 JANUARY 2013: Afternoon

**DURATION: Up to 1 hour
plus your additional time allowance**

MODIFIED ENLARGED 18pt

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

Insert (inserted)

MEI Examination Formulae and Tables (MF2)

OTHER MATERIALS REQUIRED:

Scientific or graphical calculator

Rough paper

READ INSTRUCTIONS OVERLEAF

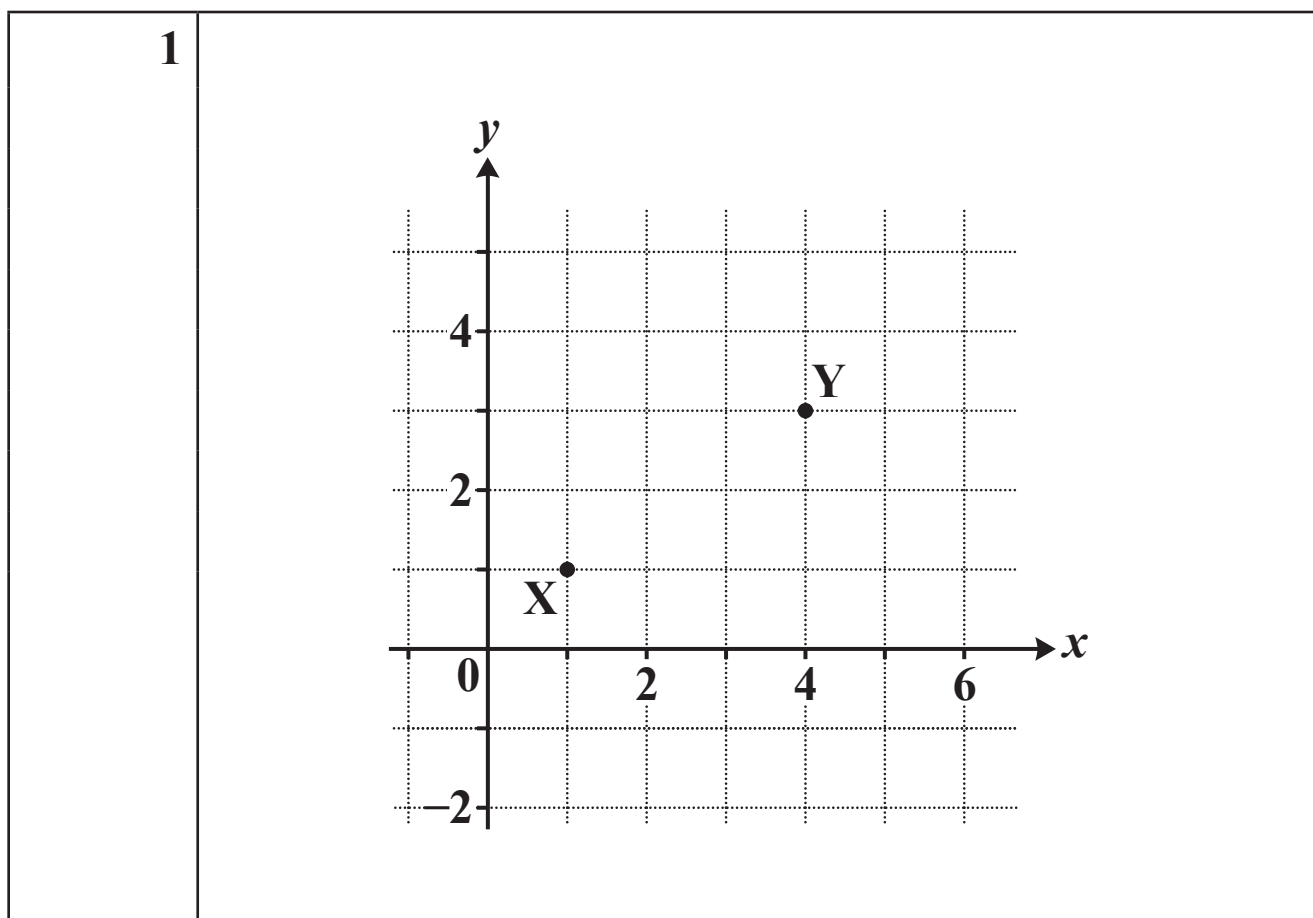
INSTRUCTIONS TO CANDIDATES

- **The insert will be found in the centre of this document.**
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**
- **The insert contains the text for use with the questions.**
- **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 FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- You may find it helpful to make notes and do some calculations as you read the passage.
- You are NOT required to hand in these notes with your question paper.
- 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 being used.
- The total number of marks for this paper is 18.

- 1 On the grid below mark all three possible positions of the point P with integer coordinates for which $t(P, X) = 4$ and $t(P, Y) = 3$. [3]

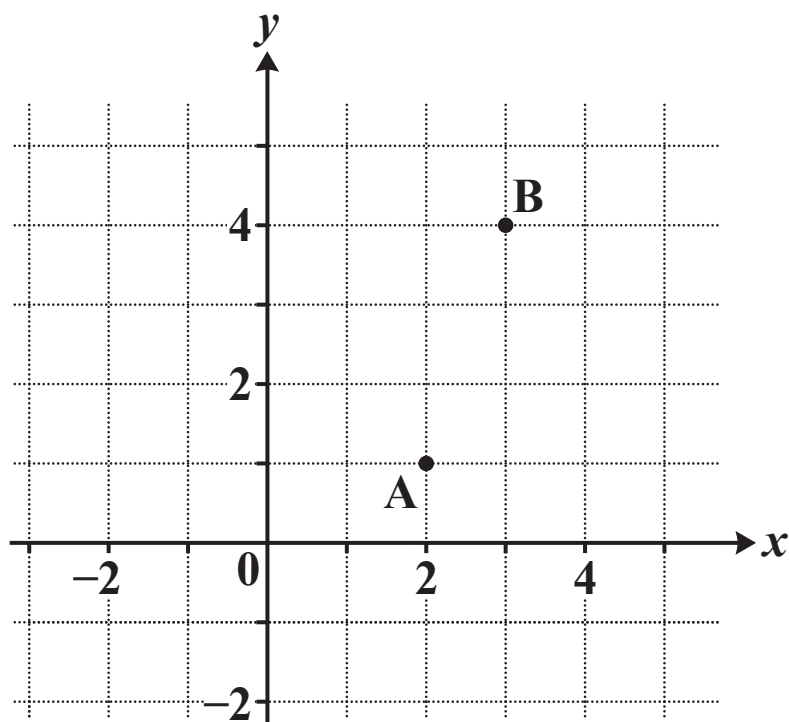


- 2 This question is concerned with generalised taxicab geometry.**

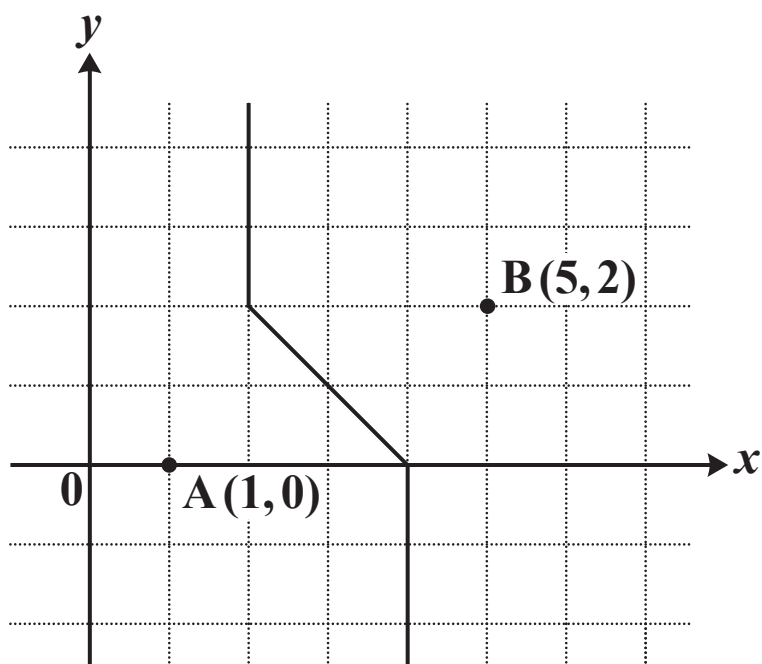
On the grid below, show the locus of a point P where $t(P,A) = t(P,B)$.

[3]

2



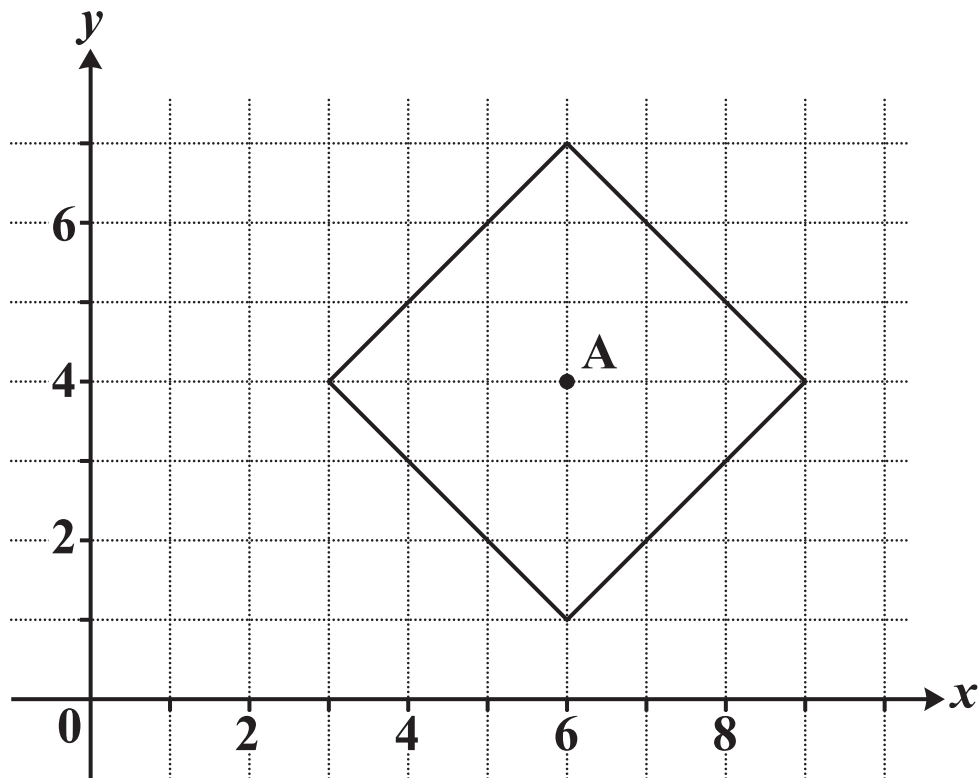
- 3 (i) Describe the following locus of a point P, using the notation $t(P,A)$ and $t(P,B)$ as appropriate.



[1]

3 (i)	

- (ii) Describe the following locus of a point P, using the notation $t(P, A)$ as appropriate.



[1]

3 (ii)	

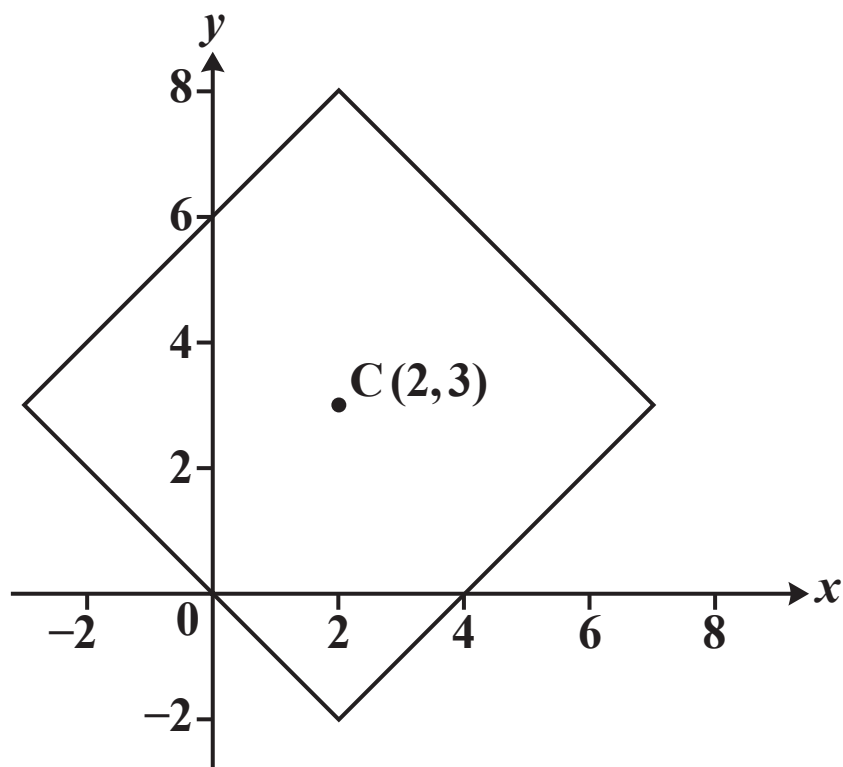
4 Referring to Fig. 5, or otherwise, find the value of $n(4,4)$. [2]

4	

5 In lines 85 and 86 it says there are 35 minimum distance routes from A $(0,0)$ to B $(4,3)$. Determine how many of these routes pass through the point with coordinates $(3,2)$, explaining your reasoning. [2]

5	

6 Fig. 7 is reproduced below.

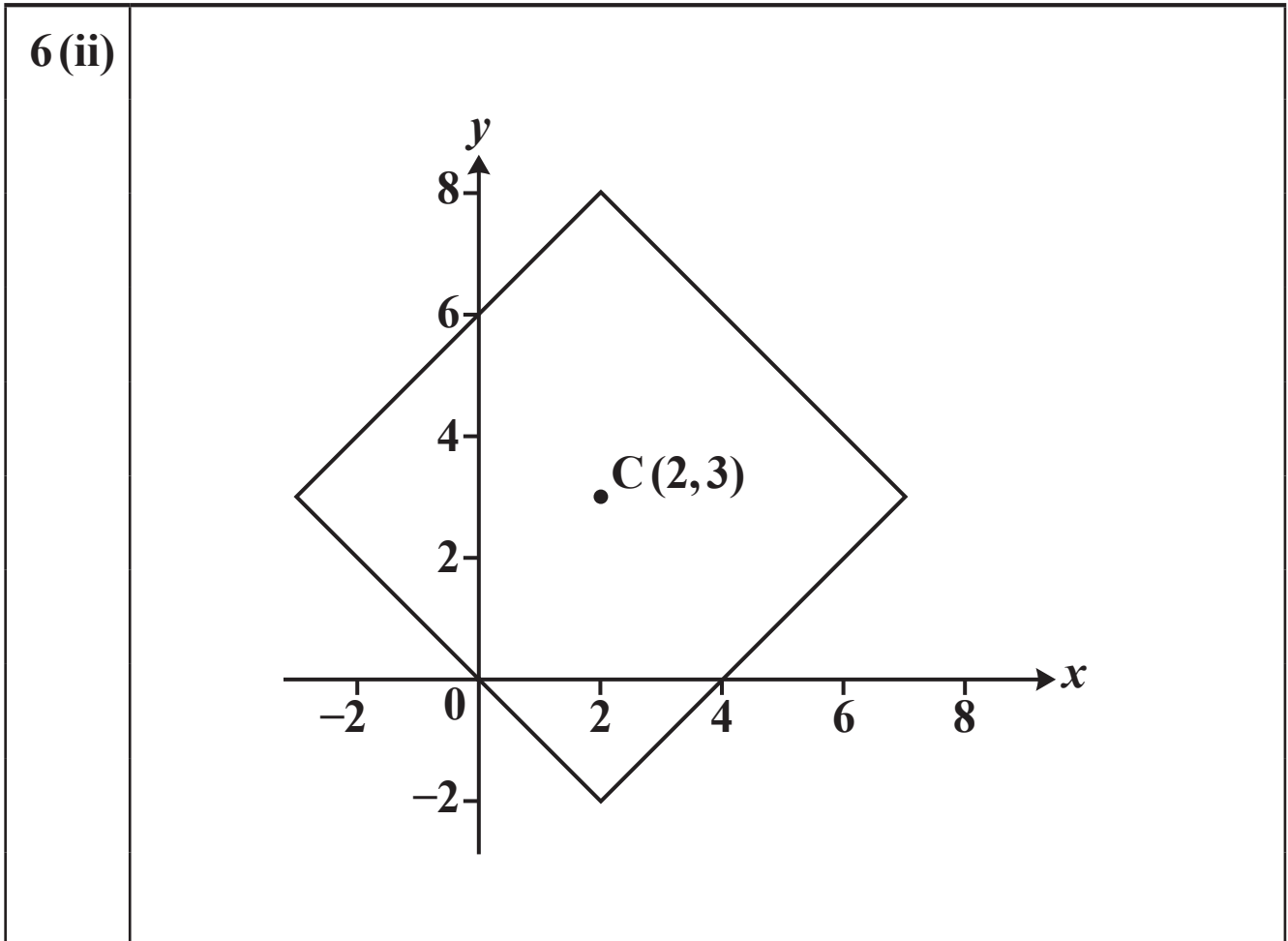


- (i) Two points on this locus have x -coordinate -0.7 .
Write down the coordinates of each of these points. [2]

6(i)	

- (ii) In lines 121 to 124 it says “adding a second taxicab circle with centre $(2,0)$ and radius 2 shows that in generalised taxicab geometry two different circles can have an infinite number of points in common!”

On the copy of Fig. 7 given below, draw the taxicab circle with centre $(2,0)$ and radius 2. [1]



- 7** In lines 37 to 39 it says that “if the Pythagorean distance between two points A and B is $d(A, B)$ then the taxicab distance satisfies the inequalities $d(A, B) \leq t(A, B) \leq \sqrt{2} \times d(A, B)$.”

This question is about using this result in generalised taxicab geometry.

- (i)** Given that A is the point $(0, 0)$, describe all possible positions of B for which $d(A, B) = t(A, B)$. **[1]**

7(i)	

- (ii)** Given that A is the point $(0, 0)$, describe all possible positions of B for which $t(A, B) = \sqrt{2} \times d(A, B)$. **[2]**

7(ii)	

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