



Cambridge IGCSE™

CANDIDATE
NAME

CENTRE
NUMBER

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

CANDIDATE
NUMBER

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/52

Paper 5 Investigation (Core)

February/March 2024

1 hour 10 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly, including sketches, to gain full marks for correct methods.
- In this paper you will be awarded marks for providing full reasons, examples and steps in your working to communicate your mathematics clearly and precisely.

INFORMATION

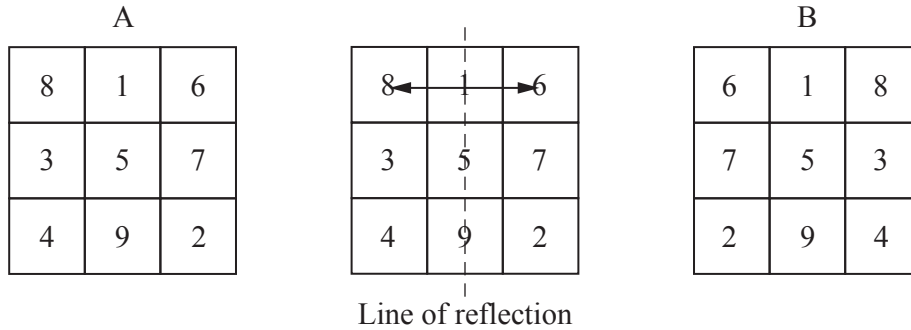
- The total mark for this paper is 36.
- The number of marks for each question or part question is shown in brackets [].

This document has **8** pages.



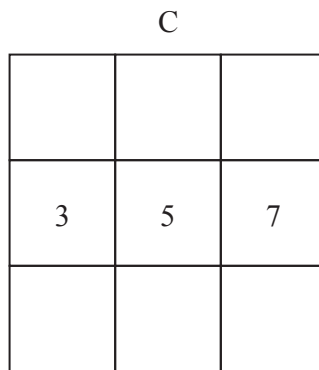
- 2 A and B are two magic squares using the integers 1 to 9. More magic squares can be made using reflection.

B is made by reflecting the position of each integer using a vertical line of reflection. The line of reflection goes through the middle column of A. The numbers move from the square in A to the reflected square in B.



- (a) Draw a horizontal line of reflection through the middle row of magic square A.

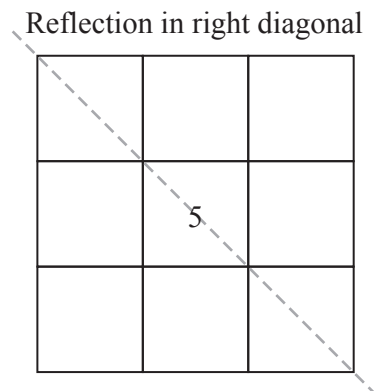
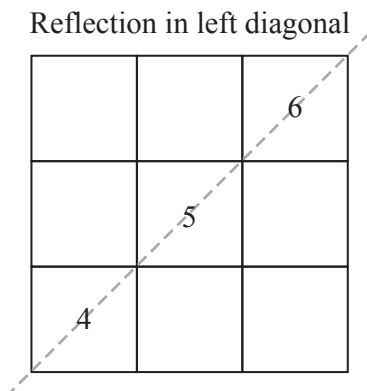
Complete the new magic square C using the horizontal line of reflection.



[1]

- (b) Two different magic squares can be made by reflection in the left and right diagonal lines drawn on A.

Complete these magic squares.



[2]

3 (a) (i) Calculate the total of the integers 1 to 9.

..... [1]

(ii) A 3 by 3 magic square uses the integers 1 to 9.

Complete the following statements to find the line total for this magic square.

The total of the integers in all three rows =

The line total = \div = [2]

(b) In all of the magic squares using the integers 1 to 9 the integer in the middle square is the same.

(i) Write down the integers 1 to 9.

..... [1]

(ii) What is the connection between the middle integer of the integers 1 to 9 and the magic square?

.....
 [1]

(iii) Explain how to use the middle integer of the integers 1 to 9 to find the line total of a 3 by 3 magic square.

..... [1]

4 A 3 by 3 magic square is made using the even integers from 2 to 18.

(a) (i) Find the middle integer of these integers.

..... [2]

(ii) Use your answer to **Question 3(b)(iii)** to find the line total for this magic square.

..... [1]

(iii) Use your answers to **part (i)** and **part (ii)** to help you complete the magic square below.

| | | |
|----|--|----|
| 16 | | 12 |
| | | |
| | | |

[2]

(b) Use your answer to **part (a)(iii)** and a reflection to make another 3 by 3 magic square.

| | | |
|--|--|--|
| | | |
| | | |
| | | |

[1]

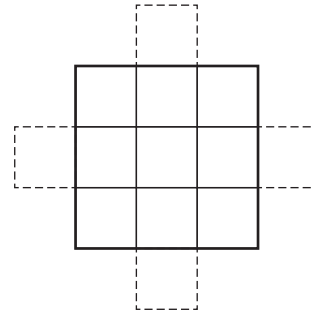
5 This is a method to make a 3 by 3 magic square.

Example

This uses the integers 1 to 9.

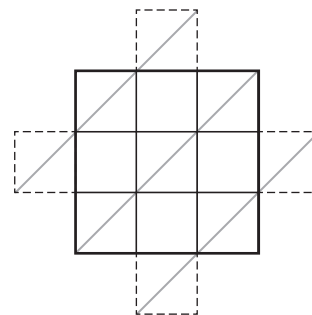
Step 1

Add one square to each edge to make a cross shape.



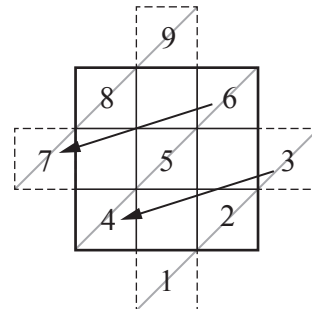
Step 2

Draw three diagonals on the grid. Each one goes through three squares.



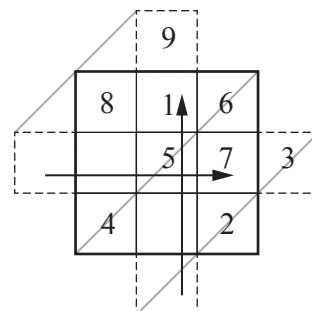
Step 3

Write the smallest integer in the bottom square. Write the other integers along the diagonals in order, as shown.



Step 4

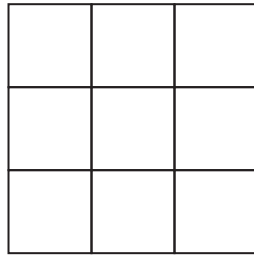
Move the integers from the outside squares to the empty squares inside and opposite.



Completed magic square

| | | |
|---|---|---|
| 8 | 1 | 6 |
| 3 | 5 | 7 |
| 4 | 9 | 2 |

- (a) (i) Use the method to make a 3 by 3 magic square using the integers 15 to 23.



[4]

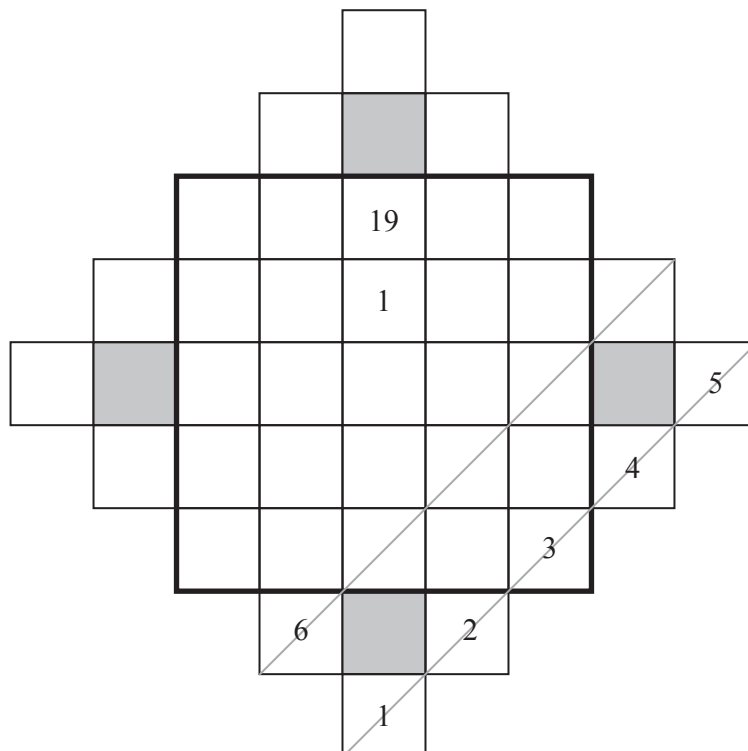
- (ii) Work out the line total.

..... [1]

- (b) (i) You can use a similar method to make a 5 by 5 magic square using the integers 1 to 25. Two of the diagonals through 5 squares have been drawn. The first six integers have been placed on the correct diagonals.

Complete the 5 by 5 magic square.

The integers 1, 3 and 19 have been put in their final positions to help you. Do **not** put integers in the shaded squares.



[5]

- (ii) Complete this statement.

The line total is = × middle integer. [2]

Question 6 is printed on the next page.

- 6 Different 3 by 3 magic squares are made using the first nine terms of a sequence.
 The first term of the sequence is 2.
 The n th term of the sequence is $3n - 1$.

Find four of these magic squares.

Use the method of **Question 5** and reflection to help you.

| | | |
|--|--|--|
| | | |
| | | |
| | | |

| | | |
|--|--|--|
| | | |
| | | |
| | | |

| | | |
|--|--|--|
| | | |
| | | |
| | | |

| | | |
|--|--|--|
| | | |
| | | |
| | | |

| | | |
|--|--|--|
| | | |
| | | |
| | | |

| | | |
|--|--|--|
| | | |
| | | |
| | | |

[4]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.