



Cambridge IGCSE™

CANDIDATE
NAME

For more information, contact the Office of the Vice President for Research and Economic Development at 515-294-6450 or research@iastate.edu.



CENTRE
NUMBER

Table 1. Summary of the main characteristics of the four groups of patients.

CANDIDATE
NUMBER



CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/51

Paper 5 Investigation (Core)

October/November 2025

1 hour 15 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 40.
- The number of marks for each question or part question is shown in brackets [].

This document has 8 pages.

INVESTIGATION SQUARE RINGS

In this investigation, you will work with the numbers along the inside edges of two squares drawn on a number grid of width 10.

The diagram shows a 10 by 10 grid with the numbers 1 to 100.

On the grid, a 4 by 4 square surrounds a 2 by 2 square.

The shaded area forms a 4 by 4 *square ring*.

A square ring is always one square thick.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The *ring value* is worked out in this way.

- step 1 Add the numbers along the inside edges of the large square to get L .
- step 2 Add the numbers along the inside edges of the small square to get S .
- step 3 Calculate $L - S$. This is the ring value.

Example

- step 1 $L = 3 + 4 + 5 + 6 + 16 + 26 + 36 + 35 + 34 + 33 + 23 + 13$
- step 2 $S = 14 + 15 + 25 + 24$
- step 3 Ring value = $L - S$

1 4 by 4 square rings

The example shows square ring 3.

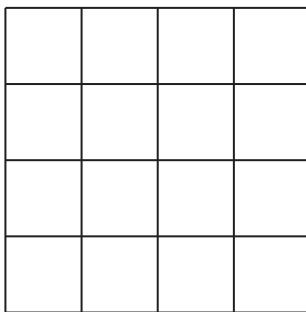
This is because 3 is the top left number in the ring.

(a) Work out the ring value for the square ring in the example.

..... [2]



(b) Work out the ring value for square ring 1, which has 1 in the top left corner.
You may use this grid to help you.



..... [3]

(c) Complete this table using **part (a)**, **part (b)** and any patterns you notice.

	Square ring (n)	L	S	Ring value $L - S$
part (b)	1			
	2	222	74	148
part (a)	3			
	4	246		164
	5		86	

[3]

(d) An expression for the ring value is $gn + 132$.

Find the value of g and write down the expression.

..... [2]

(e) Mina draws a 4 by 4 square ring on the 10 by 10 grid.
Mina's square ring has the largest possible ring value.

Find the ring value.

..... [3]



2 6 by 6 square rings

The grid continues downwards beyond the number 100.

A 6 by 6 square surrounds a 4 by 4 square.

The square ring has width 6.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

(a) Complete the working to find the ring value for square ring 1.

$$L = 1 + 2 + 3 + 4 + 5 + 6 + 16 + 26 + 36 + 46 + 56 + 55 + 54 + 53 + 52 + 51 + 41 + 31 + 21 + 11$$

$$= 570$$

$$S = 12 + 13 + 14 + 15 + 25 + 35 + 45 + 44 + 43 + 42 + 32 + 22$$

$$= \dots$$

$$\text{Ring value} = \dots$$

[2]

(b) Complete the table.

Square ring (n)	L	S	Ring value $L-S$
1	570		
2	590		236
3	610	366	
4	630		
5	650		260

[3]



(c) Find an expression, in terms of n , for the ring value.

..... [3]

(d) Explain why moving the square ring one square to the right increases the values in column L by 20.

.....

..... [1]

(e) Find the ring value for square ring 45.

..... [2]

(f) A square ring has a ring value of 1028.

Find the number in the bottom right square of this square ring.

..... [4]



3 w by w square rings

The width of a square ring is w .

For the square ring in **Question 1**, $w = 4$.

For the square ring in **Question 2**, $w = 6$.

For a w by w square ring, an expression for the ring value is $8n + kw - k$.

For an 8 by 8 square ring, an expression for the ring value is $8n + 308$.

Find the value of k .

Write down an expression, in terms of n and w , for the ring value of a w by w square ring.

$$k = \dots$$

expression for the ring value

[3]



4 (a) Square ring 71 has a ring value of 832.

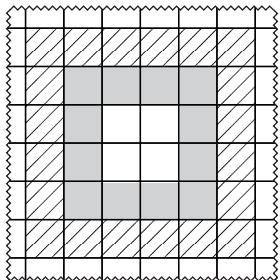
Find the width of this square ring.

..... [4]

Question 4(b) is printed on the next page.



(b) In the diagram, a 6 by 6 square ring surrounds a 4 by 4 square ring.



The 4 by 4 square ring has a ring value of 1300.

Find the difference between the ring values for these two square rings.

..... [5]

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.

