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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/52**

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.

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INVESTIGATION SQUARE PATTERNS

In this investigation you will look at the number of lines used to draw square patterns.

| is a vertical line and —— is a horizontal line.

1 This is Pattern 1.



There are 2 vertical lines.

There are 2 horizontal lines.

There are 4 lines in total.

This is Pattern 2.



There are 3 vertical lines.

There are 4 horizontal lines.

There are 7 lines in total.

(a) This is Pattern 3.



Complete these statements for Pattern 3.

There are ..... vertical lines.

There are ..... horizontal lines.

There are ..... lines in total.

[1]

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(b) (i) Draw Pattern 4.

[1]

(ii) Complete these statements for Pattern 4.

There are ..... vertical lines.

There are ..... horizontal lines.

There are ..... lines in total.

[1]

(c) Complete the table.
Use your answers to **part (a)**, **part (b)(ii)** and any patterns you notice.

	Pattern number (n)	Number of vertical lines	Number of horizontal lines	Total number of lines
	1	2	2	4
	2	3	4	7
part (a)	3			
part (b)(ii)	4			
	5			

[2]

(d) (i) Write down an expression, in terms of n, for the number of vertical lines in Pattern n.

..... [1]

(ii) A pattern has 48 vertical lines.

Find the pattern number.

..... [1]

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(e) (i) Work out how many horizontal lines are in Pattern 8.

..... [2]

(ii) Find an expression, in terms of n, for the number of horizontal lines in Pattern n.

..... [1]

(iii) A pattern has 60 horizontal lines.

Find the pattern number.

..... [2]

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(f) **(i)** Write down the term-to-term rule to continue the sequence of the total number of lines.

..... [1]

(ii) Use your answers from **part (d)(i)** and **part (e)(ii)** to find an expression, in terms of n, for the total number of lines in Pattern n.
Give your answer in its simplest form.

..... [2]

(g) The total number of lines in a pattern is 754.

Work out the number of **horizontal** lines in this pattern.

..... [4]

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2 The square patterns in **Question 1** make towers of squares.

This is Tower 1.

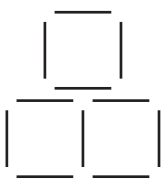


There are 2 vertical lines.

There are 2 horizontal lines.

There are 4 lines in total.

This is Tower 2.

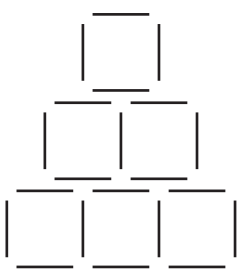


There are 5 vertical lines.

There are 6 horizontal lines.

There are 11 lines in total.

(a) This is Tower 3.



Complete these statements for Tower 3.

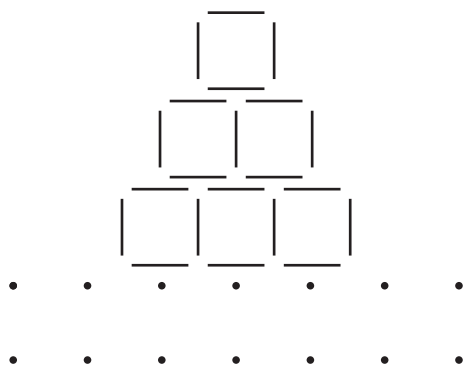
There are ..... vertical lines.

There are ..... horizontal lines.

There are ..... lines in total.

[2]

(b) Complete Tower 4.



[1]

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(c) Complete the table.
Use your answers to **part (a)**, **part (b)** and any patterns you notice.

	Tower number (t)	Number of vertical lines	Number of horizontal lines	Total number of lines
	1	2	2	4
	2	5	6	11
part (a)	3			
part (b)	4			
	5			

[4]

(d) Find an expression, in terms of t, for the number of **horizontal** lines in Tower t.

..... [3]

(e) Explain how to use the total number of lines in Tower 5 to find the total number of lines in Tower 6.

..... [2]

(f) This is an expression for the total number of lines in Tower t.

$$0.5t(3t+5)$$

Show that this expression gives the correct total number of lines when $t = 6$.

[3]

Questions 2(g) and 2(h) are printed on the next page.

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(g) Find an expression for the number of vertical lines in Tower t.
Use your answer from **part (d)** and the expression from **part (f)**.
Give your answer in its simplest form.

..... [3]

(h) Ali makes a tower with 77 vertical lines.

Find the total number of lines in the bottom row of squares in this tower.

..... [3]

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