Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5174399737

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/52**

Paper 5 (Core) **May/June 2018**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
You must show all relevant working to gain full marks for correct methods, including sketches.
In this paper you will also be assessed on your ability to provide full reasons and communicate your mathematics clearly and precisely.
At the end of the examination, fasten all your work securely together.
The total number of marks for this paper is 24.

This document consists of **7** printed pages and **1** blank page.

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[Turn over

Answer **all** the questions.

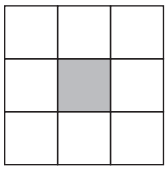
INVESTIGATION **TILE PATTERNS**

This investigation looks at the number of grey tiles and the number of white tiles in a sequence of square patterns.

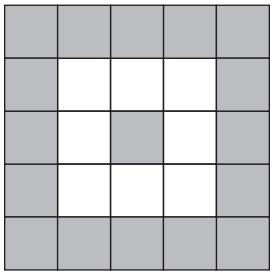
All the tiles are the same size and each is a square.
The grey tiles and white tiles make borders around a single grey tile.
The single grey tile is the first grey border.



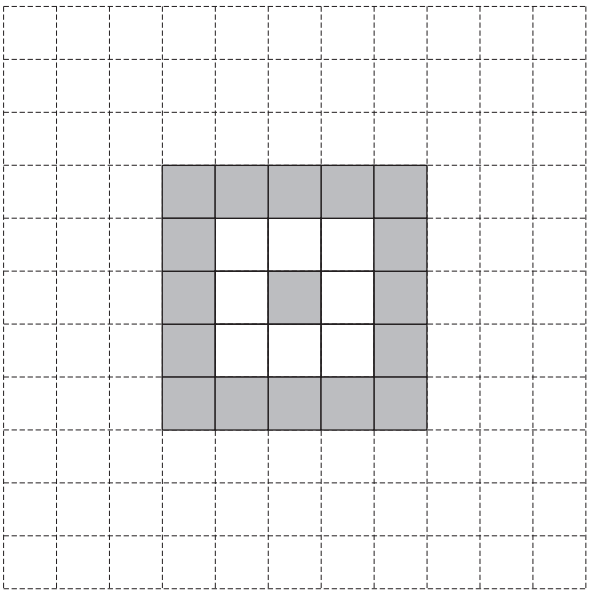
The first white border is 8 white tiles surrounding the grey tile.



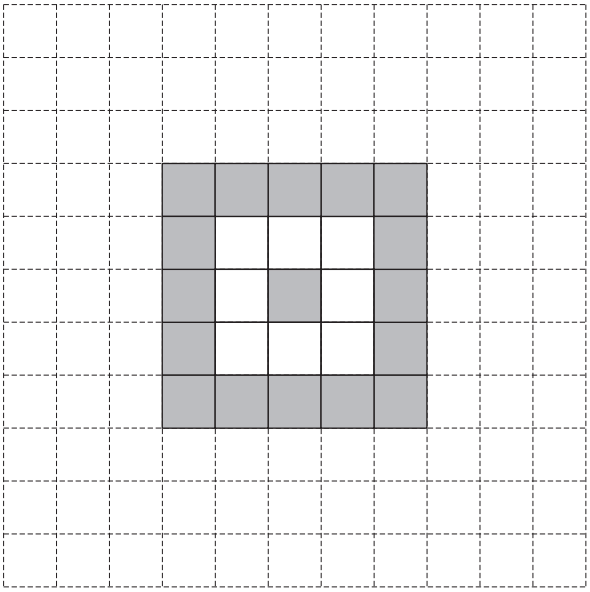
The second grey border is 16 grey tiles surrounding the 8 white tiles.



1 **(a)** On this grid, complete the diagram to show the second white border.



(b) On this grid, complete the diagram to show the third grey border.



2 This question looks at the patterns that finish with a **white** border.

Pattern finishes with	Number of white tiles in border	Total number of white tiles in pattern
1st white border	8	8
2nd white border		32
3rd white border		72
4th white border		128

(a) Complete the table.

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(b) The values in the last column are the first four terms of a sequence.

(i) Write each term as a multiple of 8.

$8 = 8 \times$ .....

$32 = 8 \times$ .....

$72 = 8 \times$ .....

$128 = 8 \times$ .....

(ii) The numbers that are multiplied by 8 also form a sequence.

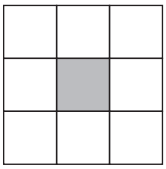
Write down the name for this sequence of numbers.

.....

(iii) Write down an expression, in terms of n, for the total number of **white** tiles in the pattern that finishes with the nth white border.

.....

(c) Here is the pattern that finishes with the first white border.



There are 3 white tiles along one side.

(i) Complete the table.

Pattern finishes with	Number of white tiles along one side
1st white border	3
2nd white border	
3rd white border	
4th white border	

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(ii) The numbers of white tiles along one side form a sequence.

Find an expression, in terms of n, for the number of white tiles along one side of the pattern that finishes with the nth white border.

.....

(iii) Use your answer to **part(c)(ii)** to write down an expression, in terms of n, for the **total** number of **all** tiles in the pattern that finishes with the nth white border.

.....

(d) Use your answers to **part (c)(iii)** and **part (b)(iii)** to show that an expression for the total number of **grey** tiles in the pattern that finishes with the nth white border is

$$8n^2 - 8n + 1.$$

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3 A workman uses the method of **question 2** to cover a square floor completely with tiles.
The first tile is grey and the final border is white.

(a) The square floor measures 5.7 m by 5.7 m. Each tile measures 30 cm by 30 cm.

(i) Work out the number of tiles along one side of the floor.

.....

(ii) Use your result from **question 2(c)(ii)** to show that this is the 5th white border.

(iii) Work out the number of white tiles and the number of grey tiles that the workman needs to cover the floor completely.

number of white tiles = ...

number of grey tiles = ...

(iv) Tiles are sold in packs of 20 white tiles and packs of 20 grey tiles.

Find the number of packs of white tiles and the number of packs of grey tiles that the workman needs.

number of packs of white tiles = ...

number of packs of grey tiles = ...

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(b) The workman tiles a different square floor.
He uses the same method of tiling, starting with a grey tile.
He buys enough packs of 20 grey tiles and packs of 20 white tiles to cover the floor completely.

Explain why the workman will have some grey tiles left over, whatever the size of the square floor.

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