



Cambridge IGCSE™

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/52

Paper 5 Investigation (Core)

February/March 2022

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 **12** pages. Any blank pages are indicated.



Answer **all** the questions.

INVESTIGATION

DOT PATTERNS

This investigation looks at patterns in sequences of dots, and of dots and crosses.

1 This is a sequence of dot patterns.

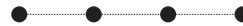
Pattern 1



Pattern 2



Pattern 3



(a) Draw Pattern 4.

[1]

(b) Complete the table.

Pattern number, n	1	2	3	4	5	6
Number of dots	2	3	4			

[1]

(c) How many dots are in Pattern 9?

..... [1]

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

..... [1]

(e) Find the number of the pattern that has 26 dots.

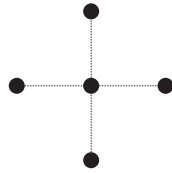
..... [2]

2 This is another sequence of dot patterns.

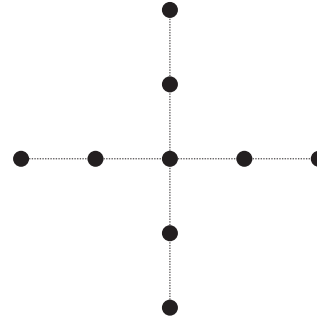
Pattern 1



Pattern 2



Pattern 3



(a) Complete the table.
You may use the grid below to help you.

Pattern number, n	1	2	3	4	5	6
Number of dots						21



[3]

(b) Find an expression, in terms of n , for the number of dots in Pattern n .

..... [2]

(c) Work out the number of dots in Pattern 40.

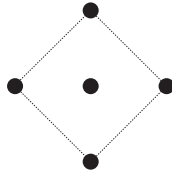
..... [2]

- 3 (a) Oliver draws this sequence of patterns called *centred squares*.

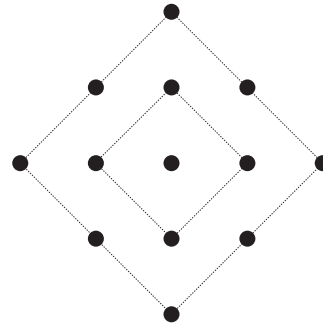
Pattern 1



Pattern 2

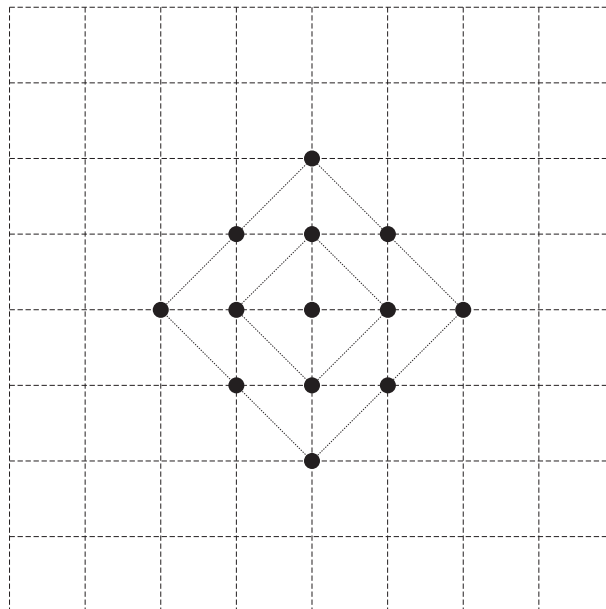


Pattern 3



- (i) Pattern 3 is drawn on the grid.

Complete the diagram to show Pattern 4.



[1]

(ii) Complete the table.

Pattern number, n	1	2	3	4	5
Number of dots	1	5	13		

[2]

(iii) Work out the number of dots in Pattern 6.

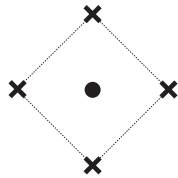
..... [2]

(b) Oliver draws the patterns of centred squares using dots and crosses.

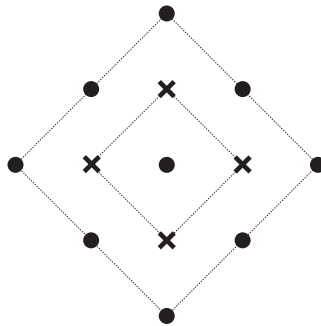
Pattern 1



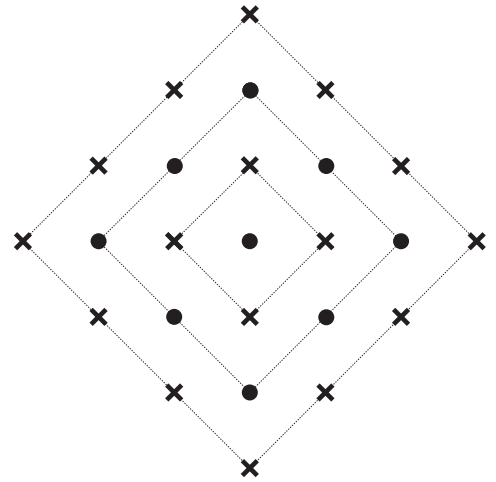
Pattern 2



Pattern 3

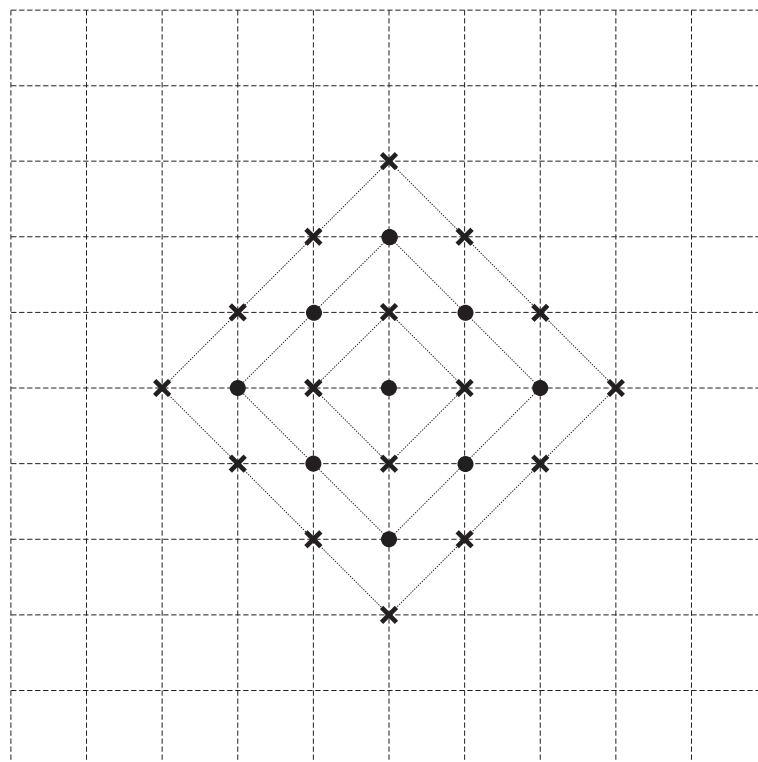


Pattern 4



(i) Pattern 4 is drawn on the grid.

Complete the diagram to show Pattern 5.



[1]

(ii) Complete the table.

Pattern number, n	Number of dots	Number of crosses	Total number of dots and crosses
1	1	0	1
2	1	4	5
3	9	4	13
4		16	
5			
6			

[3]

(iii) Complete the table.

Pattern number, n	Number of dots	Number of crosses	Total number of dots and crosses
1	$1 = 1^2$	$0 = 0^2$	$1^2 + 0^2 = 1$
2	$1 = 1^2$	$4 = 2^2$	$2^2 + 1^2 = 5$
3	$9 = 3^2$	$4 = 2^2$	$3^2 + 2^2 = 13$
4		$16 =$	
5			
6			

[2]

(iv) Complete the formula for the total number of dots and crosses, T , in Pattern n .

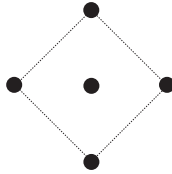
$$T = \dots\dots\dots [2]$$

4 Sophia draws the patterns of centred squares using dots and crosses in a different way.

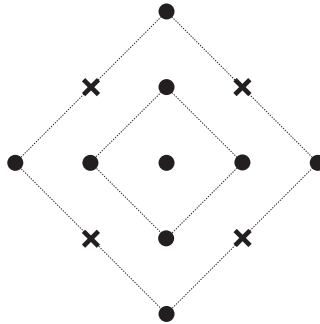
Pattern 1



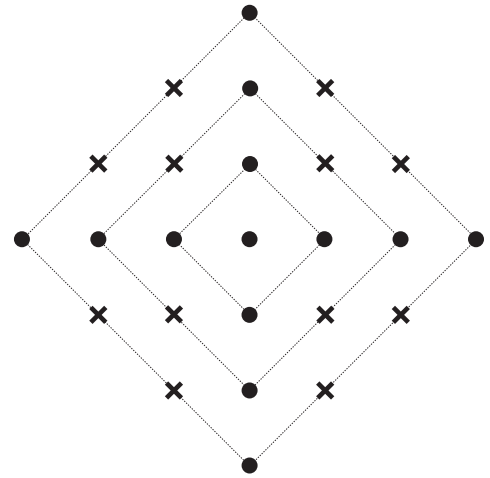
Pattern 2



Pattern 3



Pattern 4



(a) Complete the table.

Pattern number, n	Number of dots	Number of crosses	Total number of dots and crosses
1	1	0	1
2	5	0	5
3	9	4	13
4	13		25
5			

[2]

(b) Complete the table.

Pattern number, n	Number of dots	Number of crosses	Total number of dots and crosses
1	1	$0 = 4 \times 0$	$1 + 4 \times 0 = 1$
2	5	$0 = 4 \times 0$	$5 + 4 \times 0 = 5$
3	9	$4 = 4 \times 1$	$9 + 4 \times 1 = 13$
4	13	$12 = 4 \times (1 + 2)$	$13 + 4 \times (1 + 2) = 25$
5		$= 4 \times (1 + 2 + \quad)$	$+ \quad =$
6			

[3]

(c) (i) In Sophia's patterns, Pattern k has 112 **crosses**.

Find the value of k .

$k = \dots\dots\dots$ [3]

(ii) Work out the total number of dots and crosses in Pattern k .

$\dots\dots\dots$ [2]

BLANK PAGE

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.