Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6611381144

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/51**

Paper 5 (Core) **May/June 2017**

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 **8** printed pages.

© UCLES 2017

CAMBRIDGE International Examinations

Answer **all** the questions.

INVESTIGATION **VIRUS**

This investigation looks at the way a virus spreads in plants in a field.

1 In a field there are a large number of plants in a straight line.
The diagram shows the plants near the middle of the field.

• • • • • • • •

On Day 1, one of the plants is infected with a virus (V).

• • • V • • • •

On Day 2, that plant is dead (D) and the virus infects the plants next to it.

• • V D V • • •

This continues from day to day so this is the pattern on Day 3.

• V D D D V • •

The diagram shows that the virus infects two more plants on day 3.
So the total number of plants that are infected or dead is five.

(a) Draw the pattern for Day 4.

• • • • • • • • • • • •

(b) Complete this table.

Day (n)	Total number of plants that are infected or dead (t)
1	1
2	3
3	5
4	
5	

© UCLES 2017

(c) What is the name of the numbers in the t column in **part (b)**?

.....

(d) Find the total number of plants that are infected or dead on Day 9.

.....

(e) Find a formula for t in terms of n.

.....

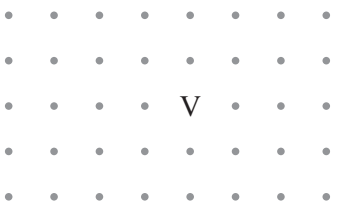
(f) On which day are there a total of 97 plants that are infected or dead?

.....

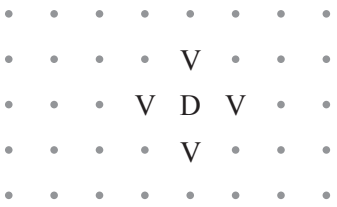
© UCLES 2017

[Turn over

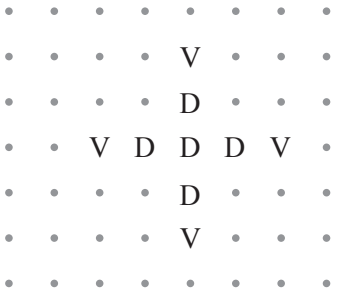
2 In another field there are a large number of plants in equally spaced rows and columns.
The diagram shows the plants near the middle of the field.
One of the plants is infected with the virus (V).



On Day 2, that plant is dead (D) and the virus infects the plants next to it.
These plants form a cross.

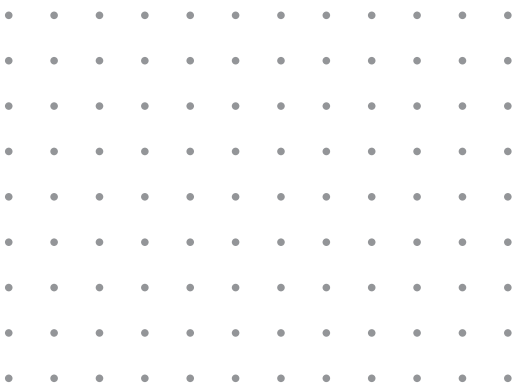


On Day 3, the virus spreads along the arms of the cross.



This continues from day to day.

(a) Draw the pattern for Day 4.



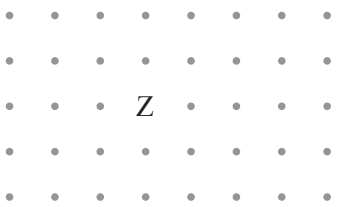
(b) Complete this table.

Day (n)	Total number of plants that are infected or dead (t)
1	1
2	5
3	9
4	
5	

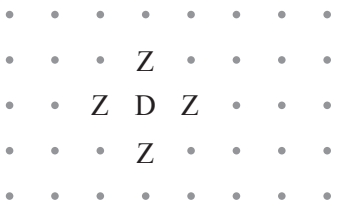
(c) Find a formula for t in terms of n.

.....

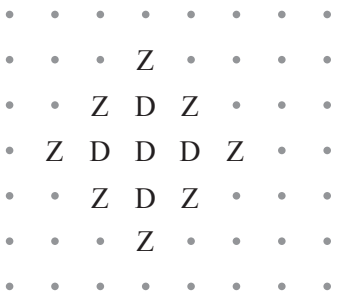
3 In another field, one of the plants is infected with a different virus (Z).
This virus affects **all** the plants next to it.



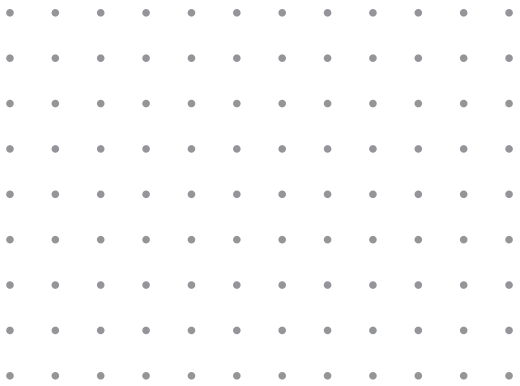
On Day 2 that plant is dead (D) and the plants next to it are infected.



On Day 3 there are 5 dead plants and 8 infected plants.



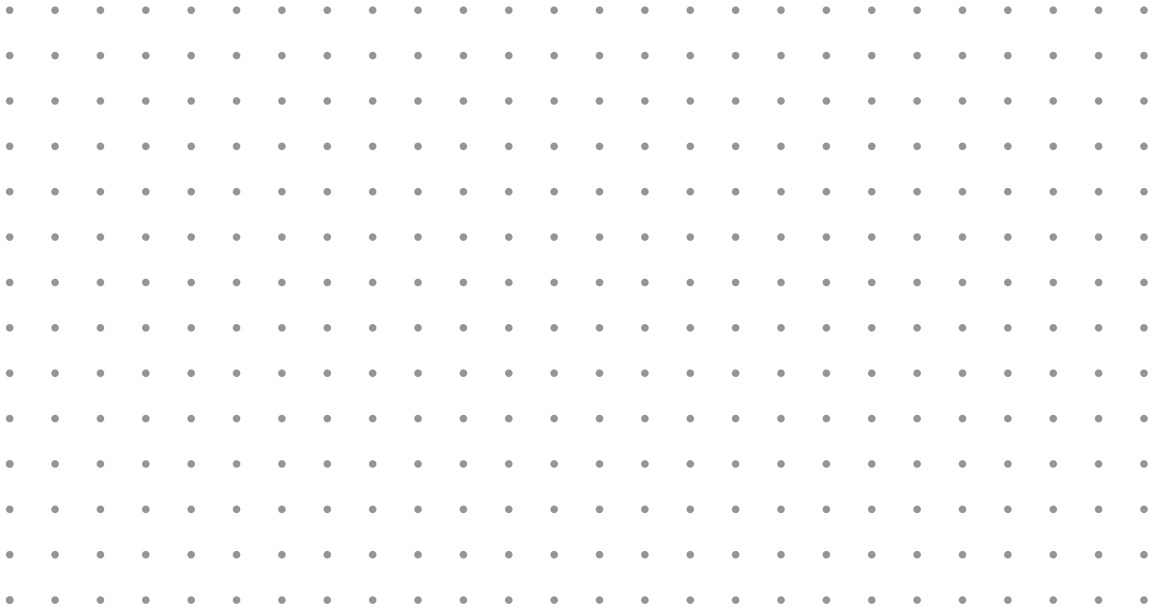
(a) Draw the pattern for Day 4.



(b) Complete this table to show the number of **infected** plants each day.

Day (n)	Number of infected plants (p)
1	1
2	4
3	8
4	
5	

You may use this grid to help you.



© UCLES 2017

(c) Work out a formula for the number of infected plants (p) in terms of the day (n) for $n \geqslant 2$.

.....

(d) Complete this table to show the total number of infected or dead plants each day.

Day (n)	Total number of infected or dead plants (t)
1	1
2	5
3	13
4	
5	

(e) The formula for t in terms of n is $t = 2n^2 + bn + c$.

Find the value of b and the value of c.

b = ...

c = ...

Question 3(f) is printed on the next page.

(f) Show that your formula works when $n = 6$.

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 International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

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

© UCLES 2017