UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3620551787

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/05**

Paper 5 (Core) **October/November 2010**

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, highlighters, glue or correction fluid.
You may use a pencil for any diagrams or graphs.

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 **6** printed pages and **2** blank pages.

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UNIVERSITY *of* CAMBRIDGE
International Examinations

Answer **all** questions.

INVESTIGATION **THE FIBONACCI SEQUENCE**

The Fibonacci sequence is a sequence of numbers that is found in many real-life situations.

The Fibonacci sequence begins

1 1 2 3 5 …….

where, apart from the first two terms, each term is the sum of the previous two terms.

For example

1 + 1 = **2**, 1 + 2 = **3**, 2 + 3 = **5** and so on.

1 Complete the table for the first 15 Fibonacci numbers.
You must show your working.

Term position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fibonacci number	1	1	2	3	5	8	13	21	34	55	89	144	233		

2 **(a)** The table shows Fibonacci numbers that are multiples of 2.

Complete the table.

Term position	3		9	
Fibonacci number	2	8		

Notice that: 2 is the third term in the Fibonacci sequence, 8 is the sixth term in the Fibonacci sequence, and so on.
Every **third** term in the Fibonacci sequence is a **multiple of 2**.

(b) The next two tables show other patterns.

Complete the tables and the statements that follow.

(i)

Term position	4	8	12	
Fibonacci number	3			

3 is the .... term in the Fibonacci sequence.

Every .... term in the Fibonacci sequence is a multiple of 3.

(ii)

Term position				20
Fibonacci number	5	55		6765

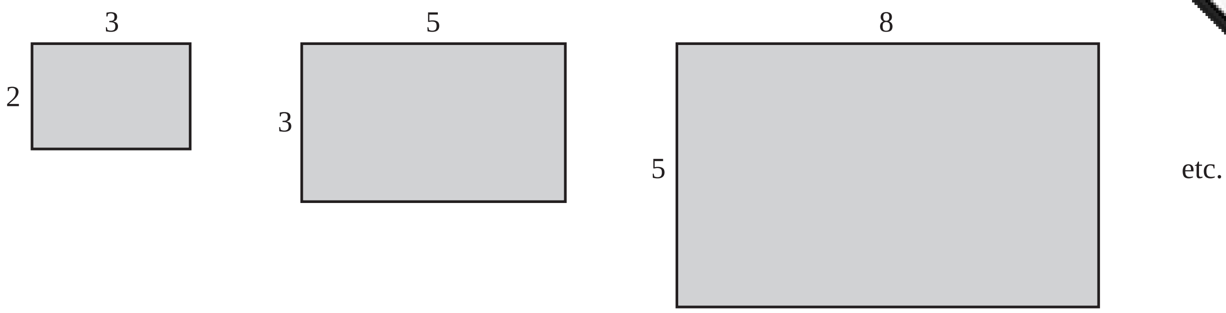
5 is the .... term in the Fibonacci sequence.

Every .... term in the Fibonacci sequence is a multiple of ....

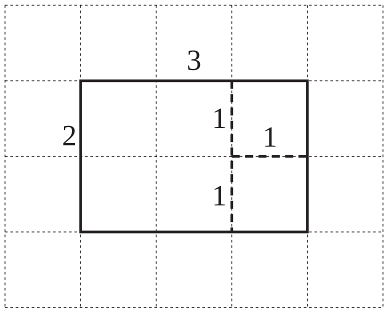
(c) Complete the following statement.

Every .... term in the Fibonacci sequence is a multiple of 8.

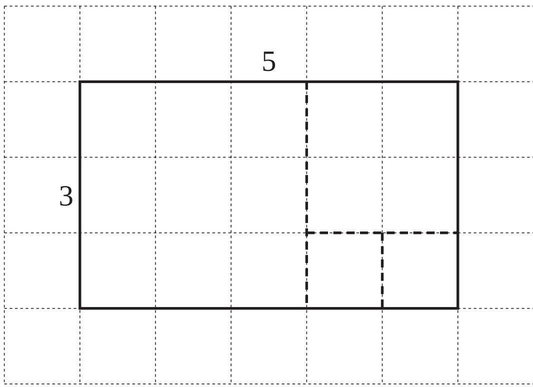
3 A Golden Rectangle is a rectangle with width and length that are **consecutive** Fibonacci num



When a Golden Rectangle is divided into the **least number** of squares, the length of the side of each square is a Fibonacci number.



The diagram above shows the 2 by 3 Golden Rectangle.
The least number of squares it can be divided into is three.
These squares have sides 1, 1 and 2.

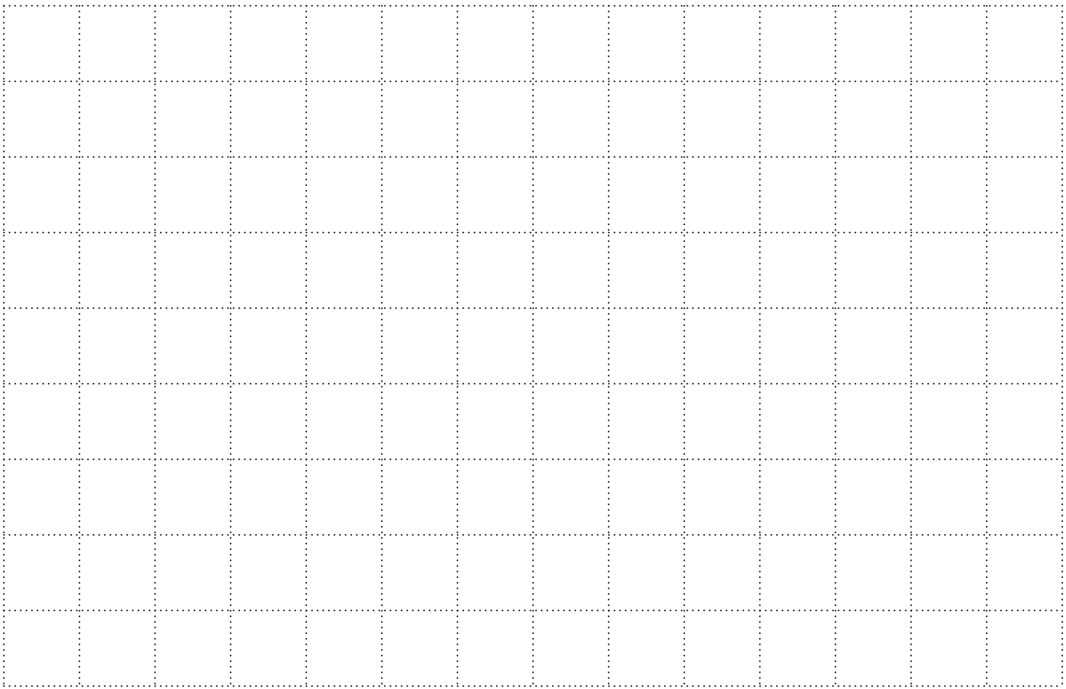


The diagram above shows the 3 by 5 Golden Rectangle.
The least number of squares it can be divided into is four.
These squares have sides 1, 1, 2 and 3.

For ...iner's

(a) On the grid below, draw the 5 by 8 Golden Rectangle.
Show how this can be divided into the least number of squares.
These squares have sides 1, 1, 2, 3 and 5.

(b) On the grid below, draw the 8 by 13 Golden Rectangle.
Show how this can be divided into the least number of squares.



(c) (i) Complete the table to show the least number of squares in each of the Golden Rectangles.

Size of rectangle	1 by 1	1 by 2	2 by 3	3 by 5	5 by 8	8 by 13
Least number of squares	1			4		

(ii) Write down the least number of squares there are in the 21 by 34 Golden Rectangle.

....

(iii) When the least number of squares is 11, write down the width and the length of this Golden Rectangle.

.... and ....

(d) When the width and the length of a Golden Rectangle are the $(n-1)$th and the nth terms of the Fibonacci sequence, write down the least number of squares in terms of n.

....

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