

Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

223909788

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/52

Paper 5 (Core) October/November 2016

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 to 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.



Answer all the questions.

INVESTIGATION RECTANGLES WITHIN RECTANGLES

This investigation looks for a method to find the number of rectangles when you draw horizontal and vertical lines inside a rectangle.

One horizontal line, AB , is draw	n inside a rectangle <i>PQRS</i> .	P	Q
The total number of rectangles i	s 3.	A	B
They are <i>PQBA</i> , <i>PQRS</i> and <i>ABB</i>	RS.		
		S	R
1 (a) Another line <i>CD</i> is dr	awn inside the rectangle <i>PQRS</i> .	P	Q
The total number of r	ectangles is now 6.	A	В
		C	D

Four of the 6 rectangles are PQBA, PQDC, PQRS and ABDC.

Complete the table to show the other two rectangles.

PQBA	PQDC	PQRS
ABDC		

(h)	Three horizontal lines,	AR	CD and EF	are drawn	inside the	rectangle	PORS
١	v,	i in ce nonzonai incs,	, ID,	, CD and LI	arc arawii	morac mc	icciangic.	ı ynı.



Complete the table to show all ten rectangles.

PQBA			PQRS
ABDC		ABRS	
	CDRS		

(c) Four horizontal lines are drawn inside the rectangle.

Find the total number of rectangles.

(d) Complete the table.

Number of horizontal lines inside the rectangle	0	1	2	3	4	5	6	7
Total number of rectangles		3	6	10				36

(e)	The numbers in the bottom row of the table in part (d) form a sequence.
	Write down the mathematical name of these numbers.
(f)	Ten horizontal lines are drawn inside the rectangle.
	Find the total number of rectangles.

The total number of re	ectangles i	s 3						
They are PABS, PQRS	and AQR	В.						
					S	В		
(a) Two vertical line	s are draw	n inside a	rectangle.					
Find the total nu	mber of re	ctangles.						
		S						
	1							
(b) Commission the teles	ne.							
(b) Complete the tab								
Number of vertical	0	1	2	3	4	5	6	7
Number of vertical ines inside a rectangle			2	3	4	5	6	7
Number of vertical ines inside a rectangle		3	2	3	4	5	6	7
Number of vertical ines inside a rectangle Total number of			2	3	4	5	6	7
Number of vertical ines inside a rectangle			2	3	4	5	6	7
Number of vertical ines inside a rectangle			2	3	4	5	6	7
Number of vertical ines inside a rectangle			2	3	4	5	6	7
Number of vertical			2	3	4	5	6	7
Number of vertical ines inside a rectangle			2	3	4	5	6	7
Number of vertical ines inside a rectangle Total number of rectangles	0	3						7
Number of vertical ines inside a rectangle	0	3						7

3	12 vertical	lines	are drawn	inside s	a rectangle
3	12 verticai	IIIICS (ait ulawii	IIISIUC (a rectangle.

Show that the total number of rectangles is given by the calculation $\frac{12^2 + 3 \times 12 + 2}{2}$.

4 (a) When n vertical lines are drawn inside a rectangle the total number of rectangles, T, is

$$T = \frac{1}{2}n^2 + an + b$$
, where a and b are constants.

Find the value of a and the value of b.

Use your answers to write down the formula for T.

a =

b =

 $T = \dots$

(b)	Use your formula in part (a) to show that when 7 vertical lines are drawn inside a rectangle, the number of rectangles is 36.
()	
(c)	Calculate how many vertical lines are drawn when there are 231 rectangles.
Who	en 30 horizontal lines are drawn inside a rectangle, find the total number of rectangles.

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