Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/51**

Paper 5 (Core) **May/June 2014**

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

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Answer **all** the questions.

INVESTIGATION **COUNTING FACTORS**

This investigation looks for a method to find how many factors a number has.

1 The five factors of 16 are: 1, 2, 4, 8, 16

Write down the five factors of 16 as powers of 2.
Three have been written down for you.

2^0 , 2^1 , ... , ... , 2^4

2 **(a)** Write down, in ascending order, the four factors of 27.
Two have been written down for you.

1 , ... , ... , 27

(b) Write down the four factors of 27 as powers of 3.

..... , ... , ... , ...

3 p is a **prime** number.

(a) Write down the six factors of p^5 as powers of p.
Two have been written down for you.

p^0 , ... , ... , ... , ... , p^5

(b) Write down, in terms of n, the number of factors of p^n.

.....

4 **(a)** 2 is a **prime** number and $128 = 2^7$.
Write down the number of factors of 128.

.....

(b) Work out each factor of 128 as an ordinary number.

.....

5 5 is a **prime** number.

(a) Write 125 as a power of 5.

.....

(b) Write down the number of factors of 125.

.....

6 **(a)** A number, which can be written as a power of 2, has exactly 14 factors.
Find this number.

.....

(b) Find another number that has exactly 14 factors.

.....

7 **(a)** 20 is **not** a prime number.
$20 = 2^2 \times 5^1$ where 2 and 5 are prime numbers.

Find all the factors of 20 by completing the table.

Powers of 5

Powers of 2		5^0	5^1
	2^0	$2^0 \times 5^0 = 1 \times 1 = 1$	$2^0 \times 5^1 =$ ..... $\times$ ..... $=$ .....
	2^1	$2^1 \times 5^0 = 2 \times 1 = 2$	$2^1 \times 5^1 =$ ..... $\times$ ..... $=$ .....
	2^2	$2^2 \times 5^0 =$ ..... $\times$ ..... $=$	$2^2 \times 5^1 = 4 \times 5 = 20$

(b) The table has 3 rows and 2 columns.
Describe how to find the number of factors of 20 from the number of rows and the number of columns.

(c) $784 = 2^4 \times 7^2$ where 2 and 7 are prime numbers.

(i) How many rows and how many columns would there be in the table for 784?

rows .....

columns .....

(ii) Work out the number of factors of 784. Do not write them out.

.....

8 **(a)** $1000 = 2^n \times 5^n$.
Find n.

.....

(b) Use the method of **question 7(c)** to find the number of factors of 1000.

.....

(c) Use the method of **part (a)** and **part (b)** to find the number of factors of 1 000 000.

.....

9 **(a)** $85 = 5 \times 17$ where 5 and 17 are prime numbers.
Use the method of **question 7(c)** to show why 85 has exactly 4 factors.

(b) Find all the numbers that are greater than 80 but smaller than 90 and have exactly 4 factors.

This list of prime numbers is useful in answering this question.
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41,
43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89

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