Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

7695187803

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/52**

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 **7** printed pages and **1** blank page.

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Answer **all** the questions.

INVESTIGATION FRACTIONS WITHIN FRACTIONS

This investigation looks at sequences of fractions.

One way to form a sequence is by using fractions within fractions as shown below.

$$\frac{1}{1} \text{ then } \frac{1}{1+\frac{1}{1}} \text{ then } \frac{1}{1+\frac{1}{1+\frac{1}{1}}} \text{ then } \frac{1}{1+\frac{1}{1+\frac{1}{1+\frac{1}{1}}}} \text{ and so on.}$$

1 The first three terms of a sequence of fractions are $1, \frac{1}{2}, \frac{2}{3}$.

These terms are calculated in the following way.

$$\frac{1}{1} = 1$$

$$\frac{1}{1+\left(\frac{1}{1}\right)} = \frac{1}{1+1} = \frac{1}{2}$$

$$\frac{1}{1+\frac{1}{1+\frac{1}{1}}} = \frac{1}{1+\left(\frac{1}{2}\right)} = \frac{1}{\frac{3}{2}} = \frac{2}{3}$$

(a) (i) Fill in the box to complete the calculation of the 4th term.

$$\frac{1}{1+\frac{1}{1+\frac{1}{1+\frac{1}{1}}}} = \frac{1}{1+\frac{1}{1+\frac{1}{2}}} = \frac{1}{1+\frac{1}{\frac{3}{2}}}$$

$$= \boxed{} = \frac{1}{\frac{5}{3}}$$

$$= \frac{3}{5}$$

(ii) Show that the 5th term of this sequence of fractions is $\frac{5}{8}$.

$$\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\frac{1}{1}}}}} \quad =$$

(iii) Complete the table to show the first eight terms of this sequence of fractions.

$\frac{1}{1}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{5}{8}$		$\frac{13}{21}$	

(iv) Explain how you used a pattern to find the numerator and the denominator of the 8th term.

Numerator .....

Denominator .....

(b) The numbers 1, 1, 2, 3, 5, 8, 13, 21 are the first eight numbers in a sequence.

(i) Work out the next five terms of this sequence.

.....

(ii) Write down the 12th term of the sequence of fractions in **part (a)**.

.....

2 Here is a different sequence of fractions.

$$\frac{2}{1}\ ,\quad \frac{2}{1+2}\ ,\quad \frac{2}{1+\frac{2}{1+2}}\ ,\quad \frac{2}{1+\frac{2}{1+\frac{2}{1+2}}}\ ,\quad \ldots$$

(a) Calculate the 2nd and 3rd terms in this sequence of fractions.
Give your answers as single fractions.

The 1st and 4th terms are given.

$\frac{2}{1} = \frac{2}{1}$

$\frac{2}{1+2} =$ .....

$\frac{2}{1+\frac{2}{1+2}} =$ .....

$\frac{2}{1+\frac{2}{1+\frac{2}{1+2}}} = \frac{10}{11}$

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(b) Find the 5th term of this sequence.
Give your answer as a single fraction.

.....

(c) Describe the connection between the numerator of a fraction and the denominator of the previous fraction in the sequence.

(d) Describe the connection between the denominator of a fraction and the numerator and denominator of the previous fraction.

3 Here is a different sequence of fractions. The first three terms are 3, $\frac{3}{4}$, $\frac{12}{7}$.

(a) Calculate the 4th and 5th terms.
Give your answers as single fractions.

$\frac{3}{1}$ = $\frac{3}{1}$

$\frac{3}{1+\frac{3}{1}}$ = $\frac{3}{4}$

$\frac{3}{1+\frac{3}{1+3}}$ = $\frac{3}{1+\frac{3}{4}}$ = $\frac{12}{7}$

$\frac{3}{1+\frac{3}{1+\frac{3}{1+3}}}$ = $\frac{3}{1+\frac{12}{7}}$ = ...

$\frac{3}{1+\frac{3}{1+\frac{3}{1+\frac{3}{1+3}}}}$ = ...

(b) Explain how you can use a pattern to find the numerator and the denominator of the 5th term of this sequence.

Numerator .....

Denominator .....

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4 Here is a sequence in terms of n.

$$\frac{n}{1}\ ,\quad \frac{n}{1+n}\ ,\quad \frac{n}{1+\dfrac{n}{1+n}}\ ,\quad \frac{n}{1+\dfrac{n}{1+\dfrac{n}{1+n}}}\ ,\quad \ldots$$

Calculate the first four terms in this sequence when $n = 4$.
Give your answers as single fractions.

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