UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/06**

Paper 6 (Extended) **For Examination from 2010**

SPECIMEN PAPER

1 hour 30 minutes

Additional Materials: Answer Booklet/Paper
Graphics Calculator
Graph Paper (1 sheet)

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 **both** parts **A** and **B**.

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 of marks for this paper is 40.

This document consists of **4** printed pages.

Answer **both** parts A and B.

A INVESTIGATION UNIT FRACTIONS 25

A document called the Rhind Papyrus is nearly 4000 years old. It shows how the ancient Egyptians were able to break any fraction down into unit fractions. A unit fraction has a numerator of 1.

1 Add these unit fractions showing your working.

(a) $\frac{1}{8} + \frac{1}{6}$

(b) $\frac{1}{6} + \frac{1}{4}$

2 **(a)** Show that $\frac{1}{2} = \frac{1}{3} + \frac{1}{6}$

(b) Copy and complete $\frac{1}{3} = \frac{1}{4} +$

(c) Find similar expressions for $\frac{1}{4}$

and for $\frac{1}{5}$, $\frac{1}{6}$ and $\frac{1}{7}$.

(d) Break down $\frac{1}{99}$ into the sum of two different unit fractions.

(e) Break down $\frac{1}{n}$ into the sum of two different unit fractions.

3 **(a)** Show how your answer to question **2 (b)** allows you to break down $\frac{2}{3}$ as

$$\frac{2}{3} = \frac{1}{2} + \frac{1}{6}.$$

(b) Use the same method to break down the following into the sum of two unit fractions.

(i) $\frac{2}{5}$

(ii) $\frac{2}{7}$

(c) Similarly, break down these fractions into the sum of two unit fractions.

(i) $\frac{3}{8}$

(ii) $\frac{4}{11}$

4 On another Egyptian document there is a formula for breaking down any fraction of the form $\frac{a}{x \times y}$ into the sum of two unit fractions.

The formula shown for doing this is $\frac{a}{xy} = \frac{1}{kx} + \frac{1}{ky}$.

(a) Show that $k = \frac{x + y}{a}$.

(b) An example: Let $a = 4$ and $xy = 15$.
The formula gives $\frac{4}{15} = \frac{1}{6} + \frac{1}{10}$.

(i) Without using this formula show that $\frac{1}{6} + \frac{1}{10} = \frac{4}{15}$.

(ii) Which values were chosen for x and y in this example, and what is the corresponding value of k?

(iii) To break down $\frac{4}{15}$ in a different way other values for x and y can be chosen.
What are these other values?

What is then the corresponding value of k?
Write down how $\frac{4}{15}$ breaks down in this case.

5 Use the method of question **4** to break down $\frac{3}{20}$ into the sum of two unit fractions in as many ways as possible.

6 Use any method to answer the following.

(a) Break down 1 into the sum of three **different** unit fractions.

(b) Break down 1 into the sum of four **different** unit fractions in as many ways as possible.

[Turn over

B MODELLING STOPPING DISTANCE

The following data appears in an information sheet for motorists.
It shows the stopping distance in dry conditions.

The total stopping distance (D metres) is the sum of the distance travelled by the car before the motorist reacts (T metres) and the distance travelled by the car once the brakes have been applied (B metres).

Speed (S km/h)	0	20	40	60	80	100	120
Thinking distance (T metres)	0	6	12	18	24	30	40
Braking distance (B metres)	0	4	16	36	64	100	144
Total stopping distance (D metres)	0	10	28	54	88	130	180

1 Using graph paper, and on the same grid, plot points which show the information for both T and D against S.

2 **(a)** It is known that a linear model describes the thinking distance.
There is a misprint in the table. One value of T does not follow this model.
Which value is this? What should it be?

(b) Find the formula for T in terms of S for the linear model.

3 The braking distance (B) is known to vary as S^n.
Find n and the formula for B in terms of S.

4 **(a)** Write down the formula for D in terms of S.

(b) In towns the speed limit is 50 km/h.

(i) Use the equation of your model to find the total stopping distance at that speed.

(ii) To reduce serious injury the speed limit in some areas of towns is 30 km/h.
By what percentage does this reduce the total stopping distance?

5 **(a)** In **wet** conditions it is known that motorists travelling at 100 km/h take 180 metres to stop.
Use this information to change your model to give a formula for the total stopping distance, D, in terms of S in wet conditions.

(b) Which speed in wet conditions gives the same total stopping distance as 80 km/h in dry conditions?