Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/52**

Paper 5 Investigation (Core) **October/November 2024**

1 hour 10 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly, including sketches, to gain full marks for correct methods.
- In this paper you will be awarded marks for providing full reasons, examples and steps in your working to communicate your mathematics clearly and precisely.

INFORMATION

- The total mark for this paper is 36.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **8** pages. Any blank pages are indicated.

[Turn over

Answer **all** the questions.

INVESTIGATION REVERSE DIFFERENCES

This investigation looks at what happens when you reverse the digits of a number and then find the difference between the new number and the original number. This is called the *reverse difference*.

STEP 1 Write down a 2-digit number.
STEP 2 Reverse the digits of the number.
STEP 3 Find the **positive** difference between the two numbers.

Example 1			Example 2	
STEP 1	Write a number	52	STEP 1	13
STEP 2	Reverse the digits	25	STEP 2	31
STEP 3	Find the difference	$52 - 25 = 27$	STEP 3	$31 - 13 = 18$

1 (a) Complete the three steps for each 2-digit number in the table.

STEP 1	12	13	14	15	16	17	18
STEP 2	21	31	41	51			
STEP 3		18			45		63

[3]

(b) Complete this table of 2-digit numbers and their reverse differences.
Use **part (a)** and any patterns you notice to help you.

Number	Reverse difference	Number	Reverse difference	Number	Reverse difference	Number	Reverse difference
10	9	20	18	30	27	40	36
11		21	9	31	18	41	27
12		22		32	9	42	
13	18	23	9	33		43	
14		24		34		44	
15		25	27	35		45	
16	45	26	36	36		46	
17		27	45	37	36	47	
18	63	28	54	38	45	48	
19		29	63	39	54	49	45

[4]

(c) Find how many 2-digit numbers have a reverse difference of 0.

..... [2]

(d) (i) Complete the statement with the largest number possible.

The reverse difference is always a multiple of ..... [1]

(ii) The table in **part (b)** is extended to the right.
These two columns are part of the extended table.

Number	Reverse difference
A	
	9

What is the value of the 2-digit number *A*?

..... [2]

(iii) 64 has a reverse difference of 18.

Show how you can use 6 and 4 to work out the reverse difference without using the STEPs.

[1]

2 You can find reverse differences for 3-digit numbers using the same steps.

Example

STEP 1	Write a number	138
STEP 2	Reverse the digits	831
STEP 3	Find the difference	$831 - 138 = 693$

(a) Complete this table.
You may use any patterns you notice to help you.

Number	Reverse difference	Number	Reverse difference	Number	Reverse difference	Number	Reverse difference
100	99	110		120		130	99
101	0	111	0	121	0	131	0
102		112		122		132	99
103	198	113		123		133	
104	297	114		124		134	
105	396	115		125		135	
106		116		126		136	495
107		117		127		137	594
108	693	118		128		138	693
109	792	119		129		139	792

[3]

(b) Complete the statement with the largest number possible.

The reverse difference is always a multiple of ..... [1]

(c) A 3-digit number abc has first digit a, second digit b and third digit c.
In this part $a > c$.

So the number 601 has $a = 6$, $b = 0$ and $c = 1$.

(i) There is a relationship between $a - c$ and the reverse difference.

Investigate this relationship, giving three examples.
Write down this relationship.

..... [3]

(ii) Anna says that a is the hundreds digit, b is the tens digit and c is the units digit.
She says the value of abc is $100a + 10b + c$.

Anna writes the value of the reverse number cba. $100c + 10b + a$

She writes the difference between the two numbers. $(100a + 10b + c) - (100c + 10b + a)$

Continue Anna's working to show that the
reverse difference is $99(a - c)$.

[2]

(iii) A 3-digit number has $a = 8$ and a reverse difference of 594.

Find **three** possible 3-digit numbers.

..... [2]

3 Anna's working in **Question 2(c)(ii)** is for the 3-digit number abc.
Anna uses similar working for the 2-digit number ab where $a > b$.

Use Anna's working to show that your answer to **Question 1(d)(i)** is correct.

[5]

4 A 4-digit number $abcd$, where $a > d$, has a value of $1000a + 100b + 10c + d$.

(a) Find an expression, in terms of a, b, c and d, for the reverse difference.
Your answer should have four terms.

..... [3]

(b) A 4-digit number has first digit 7 and last digit 5.
Its reverse difference is 2178.

Find the connection between the middle two digits of the 4-digit number.

..... [4]

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