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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/53**

Paper 5 Investigation (Core) **October/November 2025**

1 hour 15 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 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **8** pages.

[Turn over

INVESTIGATION ODD SETS

In this investigation, you will look at calculations made from an odd number of connected integers.

Use these steps.

STEP 1 Write down an odd number of integers that increase by the same positive integer each time.

STEP 2 Multiply the first and last integers.

STEP 3 Square the middle integer.

Example

This is a set of 3 integers that increase by 1 each time.

STEP 1 3, 4, 5

STEP 2 $3 \times 5 = 15$

STEP 3 $4^2 = 16$

1 **(a)** Complete this table.

STEP 1	STEP 2			STEP 3		
	Calculation		Answer	Calculation		Answer
1, 2, 3	1×3	=	3	2^2	=	
5, 6, 7	5×7	=			=	36
8, 9, 10	×	=	80	9^2	=	
14, 15, 16	×	=			=	225

[3]

(b) Write down the connection between the answer to STEP 2 and the answer to STEP 3.

The answer to STEP 2 ..... [1]

(c) In a set of 3 integers that increase by 1 each time:

- one of the integers in the calculation for STEP 2 is 23
- the answer to STEP 3 is 484.

Find the 3 integers.

..... , ... , ... [2]

2 In this question, a set of 3 integers increase by 2 each time.

(a) **(i)** Complete this set of 3 integers.

7, ..., ... [1]

(ii) Work out the answers to STEP 2 and STEP 3.

STEP 2 .....

STEP 3 .....
[2]

(b) Make up 3 more sets of 3 integers that increase by 2 each time.

Investigate the connection between the answers to STEP 2 and STEP 3.
Write down this connection.

Connection ..... [5]

3 In this question, a set of 3 positive integers increase by 3 each time.

(a) Complete the table.

STEP 1	STEP 2			STEP 3		
1, 4, 7	1×7	=	7	4^2	=	
3, 6, 9	3×9	=	27		=	36
10, 13, 16	×	=	160	13^2	=	
	×	=	315		=	324

[4]

(b) Write down the connection between the answer to STEP 2 and the answer to STEP 3.

The answer to STEP 2 ..... [1]

4 Complete this table for sets of 3 connected integers.
Use your answers to **Question 1(b)**, **Question 2(b)** and **Question 3(b)** and any patterns you notice to help you.

Increase between integers each time	Answer to STEP 3 − Answer to STEP 2
1	
2	
3	
4	
5	
k	

[2]

5 For a set of 3 connected integers:

- the answer to STEP 3 − the answer to STEP 2 is 225
- the integers can be positive and negative
- the integers increase by the same positive integer, k, each time
- the answer to STEP 2 is −125.

Find 2 different sets of 3 integers for which this is true.

..... , ... , ... and ..... , ... , ... [4]

6 The first of a set of 3 integers is 10.
The integers increase by k each time.
Expressions for the integers are

$$10, \quad 10+k, \quad 10+2k.$$

Complete this working to show that your expression in the last cell in **Question 4** is true.

STEP 3 $(10+k)(10+k) =$

STEP 2 $10(10+2k) =$

[4]

7 There are now 5 integers in a set.

The first integer is still 10.
The integers still increase by k each time.

(a) Write an expression for the last integer in the set.
Give your answer in its simplest form.

$10, \quad 10+k, \quad 10+2k, \quad 10+3k, \quad .....$ [1]

(b) Show that an expression for the answer to STEP 3 − STEP 2 is now $4k^2$.

[3]

(c) Show that the expression in **part (b)** is true for this set of 5 integers.

6, 10, 14, 18, 22

[3]

Question 7(d) is printed on the next page.

(d) The integer at one end of a set is 41.
There are 5 integers in the set.
The answer to STEP 3 − the answer to STEP 2 is 144.

Find both possible sets of 5 integers.

.....

.....
[4]