

The 2025 British Informatics Olympiad Marking Scheme

Instructions for setting the 2025 British Informatics Olympiad

Students should each have a computer with their chosen programming language installed.

They should also each have a calculator, pen and paper, and an empty USB stick (or other storage device) on which to back up their work and save their solution programs.

If possible, please disable any network to prevent students from communicating. Students should not use the internet during the contest except where required to access the on-line help for their language. Code written outside of the contest and AI code generation tools must *not* be used.

Please allow the students a few minutes to carefully read the rubric; during this time they must not turn over the page and look at the questions. Please also encourage the students to read the questions first before attempting any answers.

The 3 hour time limit should start once you allow them to turn the page and begin the exam.

Marking instructions

For each competitor you should have a set of programs and a written paper. The programs for parts 1(a), 2(a) and 3(a) are to be tested by running them with data specified in this marks scheme – you do not need to look at their program code. The written answers can also be marked as specified here, without needing any specialist knowledge.

The program names used by competitors should be clearly marked on their papers. Failure to do this, or to compile programs where necessary, should not prevent programs being marked, but deduct [2] marks for every such program. Programs produced by the competitors to help in the written questions may be used in selecting the BIO 2025 finalists.

If a student gets a negative number of marks on any question, score that question as a 0.

Programs written for 1(a), 2(a) and 3(a) are to be ‘black-box’ tested: you should run the program, enter the given data and verify the solution. For each of these tests the data to be entered is given in **bold text**. The output format is flexible (there is no penalty for extra spaces etc.), but the solutions must be correct for marks to be scored. Input and output may appear in different windows.

Note that, if a program does not complete a test in 1 second of processing time, it should be interrupted and the rest of that test ignored. The other questions should be marked from the competitors’ written answers.

All marks are given in square brackets by the test/answer they relate to. Answers not covered under the mark scheme should get no marks. In some cases details are given on how marks may be given for partial answers, as well as alternative answers which merit marks.

Accompanying this marks scheme are two forms to help you in grading the paper. The script cover sheet is designed to assist you with marking each student’s answers and the marks submission sheet is to list the marks for all students.

Please **submit all your marks to us electronically** using the form at
<https://www.olympiad.org.uk/2025/ms25-bio-submission.html>

Marks that are received after **20 January 2025** will not be considered for the final.

All programs and student scripts should be retained by you until at least 1 February as we may require them for moderation; you do *not* need to send us students’ programs unless requested. After this date, you are free to return scripts to the students and distribute copies of the BIO 2025 exam paper.

Finally, thank you very much for participating in BIO 2025.

Question 1(a) [25 marks available]

For each test of the program for 1(a) you need to type in a single integer. The output should be one, two or three integers which *can* be given in any order. The output must be correct for the marks to be scored.

Tests *must* terminate in 1 second to receive marks.

[1] 1031	1 101 929
[1] 1	1
[1] 55	55
[1] 12321	12321
[2] 10	1 9
[2] 894	6 888
[2] 10219	1221 8998
[2] 21802	10901 10901
[2] 987654	51015 936639
[2] 21	1 9 11
[2] 109812	22 989 108801
[2] 109988	88 10001 99899
[2] 219803	1 109901 109901

Additional marks are available for general program behaviour:

- [1] Program inputs one number.
- [1] For each test one, two or three numbers are output.
- [1] All tests terminate without crashing / hanging.

Question 1(b) [2 marks available]

It is necessary to list all of the following triplets of numbers to score [2]. They can be given in any order.

[2] 1 9 44
2 8 44
3 7 44
4 6 44
5 5 44

(**Supplementary:** So long as *no* incorrect triplets are given, if some of the solutions are missing, award [1] mark)

Question 1(c) [5 marks available]

[5] 266948

Question 2(a) [25 marks available]

There are 11 tests used to check 2(a). For each test you will need to type in three integers.

For each test you should see a pair of integers, which both need to be correct to score marks.

Tests *must* terminate in 1 second to receive marks.

[1] 3 5 5	2 1
[2] 1 100 200	1 0
[2] 2 1 1	1 1
[2] 2 7 23	1 0
[2] 4 8 94	3 3
[2] 6 213 1040	3 6
[2] 7 2025 7	7 6
[3] 8 19 22	4 10
[3] 9 510 4152	9 5
[3] 10 3548 872	9 15
[3] 10 4999 4999	5 8

Question 2(b) [2 marks available]

[2] RGR
RGG
GRR

Question 2(c) [3 marks available]

[3] 25 41

Question 2(d) [5 marks available]

[5] 20 17

Question 3(a) [25 marks available]

For each test for 3(a) you will need to enter two lines of integers; the first with a single integer and second containing between 1 and 4 integers. For each test you should see a single integer output.

There are no marks for incorrect answers, and tests *must* terminate in 1 second to receive marks.

- | | | |
|-----|--|------|
| [1] | 2
1 1 | 7 |
| [2] | 1
1 | 3 |
| [2] | 2
2 4 | 9 |
| [2] | 2
1 3 | 11 |
| [2] | 3
100 100 100 | 16 |
| [2] | 3
7 14 14 | 24 |
| [2] | 3
16 32 128 | 45 |
| [2] | 3
10 11 12 | 89 |
| [2] | 3
43 401 4757 | 101 |
| [2] | 4
1 1 1 1 | 35 |
| [2] | 4
1 2 4 8 | 133 |
| [2] | 4
5 41 83 137 | 891 |
| [2] | 4
1483 1801 3407 4999 | 1781 |

Question 3(b) [2 marks available]

It is necessary to list all of the following numbers to score [2]. They can be given in any order.

- [2] 0.0
0.5
0.75
1.0
1.25
1.5
2.0
2.5
3.0

Question 3(c) [6 marks available]

- [2] 17 (2 fuses)
[4] 163 (3 fuses)

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2025 British Informatics Olympiad Script Cover Sheet

Please use this sheet, with reference to the marks scheme, to assist you with marking each student's script. As it summarises the solutions to many questions, **do not distribute or show this sheet to any contestant before 31 January 2025.**

Name of Student:

Age:

School Year:

<i>input</i>	1031	1	55	12321	10	894	10219	21802	987654	21	109812	109988	219803
1(a)	(1)	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
<i>output</i>	1 101	929	1	55	12321	1 9	6 888	1221	8998	10901 10901	51015 936639	1 9 11	88 10001 99899

TOTAL
1(a)

Inputs data?
Valid output?
Exits okay?

See Mark
Scheme

1(b)
Ans:
266948

1(c)
Ans:
(5)

<i>input</i>	3	5	1	100	200	2	1	1	2	7	23	4	8	6	213	1040	7	2025	8	19	22	9	510	10	3548	872	10	4999	4999
2(a)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	
<i>output</i>	2	1	1	0	1	1	1	1	0	3	3	3	3	3	6	3	6	7	6	4	10	9	5	9	15	5	8	10	15

TOTAL
2(a)

2(b)
Ans:
RGR
RGG
GRR

2(c)
Ans:
25 41

2(d)
Ans:
20 17

<i>input</i>	2	1	1	2	4	2	1	3	3	100	100	100	3	14	14	3	16	32	128	3	10	11	12		
3(a)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	
<i>output</i>	7	3	9	11	16	16	24	24	45	89															

<i>input</i>	3	43	401	4757	4	1	1	1	1	4	1	2	4	8	4	5	41	83	137	4	1483	1801	3407	4999	
3(a)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	
<i>output</i>	101		35		133		891		1781																

TOTAL
3(a)

3(b)
See Mark
Scheme

3(c)
Ans:
17, 163
(2)+(4)

Deduct [2] marks for every part (a) program name that is not clearly marked on the script, or where the student has failed to compile the program for languages that require compiling.

Marked By:

TOTAL Q1	TOTAL Q2	TOTAL Q3
(32)	(35)	(33)

British Informatics Olympiad

2025 British Informatics Olympiad Marks Submission Sheet

Please use BLOCK CAPITALS

This sheet is provided for your convenience and records.

Please submit all your marks to us electronically using the form at
<https://www.olympiad.org.uk/2025/ms25-bio-submission.html>

Please retain all student programs and scripts until 1 February.

Marks that are received after **20 January 2025** will not be considered for the final.

Please fill in details of the school/college and each pupil's name. There is room for 10 entrants in the marks submission table, so duplicate this page if more space is required. It would also be very helpful for us to know what hardware, operating system and programming language(s) each entrant used; please list the different combinations you used in the computer summary table.

School / College: _____

Date exam taken: _____

Name of marker: _____

Date exam marked: _____

Name of Entrant	Marks for each section (maximum in brackets)										Total (100) +	PC/ Lang ‡	School Year §	Age	M/F
	1a (25)	1b (2)	1c (5)	2a (25)	2b (2)	2c (3)	2d (5)	3a (25)	3b (2)	3c (6)					

† Write N/S (no submission) in this column if the student produced no answers.

‡ Give the number of the machine and language type in the computer / language type table below

§ Please indicate the type of enumeration used, e.g. year band / curriculum level: _____

Type Number	Hardware e.g. PC / Mac	Processor e.g. Intel Core i7 (2.6 Ghz)	Operating System e.g. Mac OS X 15.1.1	Programming Language e.g. Visual C++
1				
2				
3				
4				