Oxford Cambridge and RSA

GCSE

Computer Science

J277/02: Computational thinking, algorithms and programming

General Certificate of Secondary Education

Mark Scheme for June 2023

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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MARKING INSTRUCTIONS

PREPARATION FOR MARKING
RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses.

   YOU MUST MARK 5 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the RM Assessor messaging system, or by email.

5. **Crossed Out Responses**
   Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

   Rubric Error Responses – Optional Questions
   Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

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Multiple Choice Question Responses
When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).
When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses
When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response**)
Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth **two or more marks**)
If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)
Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add a tick to confirm that the work has been seen.

7. Award No Response (NR) if:
    - there is nothing written in the answer space or no valid attempt at an answer (e.g. "I don't know")

Award Zero '0' if:

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- there is an attempt at an answer that is not worthy of credit (this includes text and symbols).

Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

8. The RM Assessor **comments box** is used by your team leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
If you have any questions or comments for your team leader, use the phone, the RM Assessor messaging system, or e-mail.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

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10. **Annotations**

Annotation	Meaning
	Omission mark
	Benefit of doubt (must be accompanied with a tick)
	Cross
	Follow through (must be accompanied with a tick)
	Not answered question
	Benefit of doubt not given
	Repeat
	Tick
	Too vague
	Blank pages, pages with no annotation, no attempt to answer the question, page seen on QER

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11. **Subject Specific Marking Instructions**

Mark scheme conventions:

- Each mark point is worth 1 mark unless stated otherwise
- Each mark point can only be awarded once
- A word/phrase that is underlined needs to be exact in the answer to award the mark point
- A word/phrase that is **bold** needs that concept to be in the answer (but can be given in multiple ways) to award the mark point
- 3 dots at the end of one mark point and at the start of the next mark point mean that the second mark point cannot be awarded without the first being awarded, unless the mark scheme states otherwise (for example a reasonable attempt with some inaccuracies)
- 3 dots at the start of a mark point, without 3 dots at the end of the mark point above, means the sentence carries on and there is no dependency
- Any text in brackets is not required to gain the mark point
- Single / means alternative word
- Double // means an alternative statement that is acceptable for the same mark point
- Enlarged font is used for visibility reasons only

Annotating scripts:

- Blank pages at the start of the script need SEEN annotation
- Any questions answered elsewhere (e.g. on the first blank pages, separately on the page) need to be linked within RM Assessor and annotated with ticks/crosses/SEEN as appropriate
- 1 tick for every mark awarded, if a question is given 3 marks there must be 3 ticks
- A BOD or FT annotation needs to be accompanied by a tick
- Any answers with no candidate response need a SEEN annotation and NR entered as the mark.
- Any questions where the candidate has not attempted the question e.g. answered 'don't know' need a SEEN annotation and NR entered as the mark.
- All questions must be annotated throughout the marking process.

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<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>1 mark per row

<table>
<tr><th>Statement</th><th>Low-level</th><th>High-level</th></tr>
<tr><td>The same language can be used on computers that use different hardware</td><td></td><td>✓</td></tr>
<tr><td>It allows the user to directly manipulate memory</td><td>✓</td><td></td></tr>
<tr><td>It allows the user to write English-like words</td><td></td><td>✓</td></tr>
<tr><td>It always needs to be translated into object code or machine code</td><td></td><td>✓</td></tr>
</table></td><td>4
(AO1 1b)</td><td>No mark if more than 1 tick for that row.

Allow other indications of choice (e.g. cross) as long as clear.</td></tr>
<tr><td>1</td><td>(b)</td><td></td><td><u>total</u> = num1 + num2</td><td>1
(AO3 2b)</td><td>Allow other logically valid responses that result in total storing the correct value. Accept other suitable assignment operators (e.g. ←)

e.g.
total = sum(num1, num2)

total = num2 + num1

x = num1 + num2
total = x

Ignore any values given to the variable. Ignore capitalisation and minor misspelling. Ignore superfluous code that does not affect outcome.</td></tr>
</table>

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Question			Answer	Mark	Guidance
1	(c)	(i)	`print(12 ^ 2)`	1 (AO2 1a)	Accept ** or other sensible operator that indicates raising to a power. If pseudocode operator given, must be a single word/symbol (e.g. `pow`), not containing spaces.
1	(c)	(ii)	`if number MOD 2 == 0 then`	1 (AO2 1a)	Accept **%** or other sensible operator that indicates modulus If pseudocode operator given, must be a single word/symbol (e.g. `modulo`), not containing spaces.
1	(c)	(iii)	`difference = measurement1 - measurement2`	1 (AO2 1a)	Accept other sensible operator that indicates subtraction. If a pseudocode operator given, must be a single word/symbol (e.g. `minus`), not containing spaces.

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<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr>
<td>1</td><td>(d)</td><td></td>
<td>1 mark each:
• Start is set to 3 on line 01 and 3 is output on line 03.
• 2, 1 and 0 are output on next 3 iterations with start updated to 2, 1, 0, -1 on correct line numbers.
• Finished is output on line 06

<table>
<tr><th>Line</th><th>start</th><th>Output</th><th></th></tr>
<tr><td>01</td><td>3</td><td></td><td rowspan="2">BP1</td></tr>
<tr><td>03</td><td></td><td>3</td></tr>
<tr><td>04</td><td>2</td><td></td><td rowspan="8">BP2</td></tr>
<tr><td>03</td><td></td><td>2</td></tr>
<tr><td>04</td><td>1</td><td></td></tr>
<tr><td>03</td><td></td><td>1</td></tr>
<tr><td>04</td><td>0</td><td></td></tr>
<tr><td>03</td><td></td><td>0</td></tr>
<tr><td>04</td><td>-1</td><td></td></tr>
<tr><td>06</td><td></td><td>Finished</td><td>BP3</td></tr>
</table>
</td>
<td>3
(AO3 2c)</td>
<td>Ignore lines 02 and 05 in answer unless these change or output any values.

Candidate may repeat start value when unchanged, this is acceptable.

Penalise incorrect or missing line numbers or additional output once only then FT. This includes where variable change and output appear on the same line.

-1 must not be output for BP2

Penalise missing or incorrect output once only for BP1 and FT for missing or incorrect output for BP2.

Finished may be with or without quotes. Ignore case or minor spelling error.

Max 2 marks if any incorrect output or changes to <code>start</code>.

Do not accept calculated values of start (e.g. <code>3-1</code>)</td>
</tr>
</table>

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Question			Answer	Mark	Guidance
2	(a)		1 mark each: Syntax error • Error in the rules/grammar (of the program language). • Program does **not** (fully) **run / translate / execute / start** (BOD) Logic error • Produces incorrect / unexpected **result/output** • Program **runs/does not crash**	**2** (AO1 1a)	Question asks for a definition. Examples may strengthen the response but are not acceptable by themselves. Do not allow “error/problem in the code, does not work / does not do what designed/intended to do” for either, this applies to both. “Error in the syntax” or “error in the logic” are NE even with examples

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Question			Answer	Mark	Guidance
2	(b)		Line number • 02 Correction • `for scoreCount = 0 to scores.length - 1` Line number • 03 Correction • `total = scores[scoreCount] + total` • `total = total + scores[scoreCount]` • `total += scores[scoreCount]`	**4** (AO3 2c)	1 mark for each line number correctly identified. 1 mark for each correction. Correction must match line number. If wrong line number, do not mark correction. If no line number, mark correction only. Do not penalise if response removes `-1` from `scores.length` as long as it starts at 0. Do not penalise potential off by 1 errors for looping (Python). Do not penalise case or minor spelling errors as long as intention is clear. Allow description of change that would be made (e.g. “change 1 to 0”) First correction is fixing indexing error so element 0 is included. This could be done on line 03 e.g. `scores[scoreCount-1].` Second correction is fixing addition of total. If both errors fixed on line 03, full marks should be given. e.g. **`total = total + scores[scoreCount-1]`**

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Question			Answer	Mark	Guidance
3	(a)		1 mark each • stores/holds **data/value/name/`names[pos]`** • …so (value) can be changed / swapped / moved / overwritten / inserted • …without being lost. • will be assigned to `names[pos-1]`	**2** (AO2 1b)	Do not allow answers that clearly refer storing the <u>position / index</u> (or any other out of context data) for BP1; it is the name itself that is being stored, not the position. If unclear, allow BOD. e.g. do not allow "holds the values of the index / holds value for position of the name". Allow FT for subsequent points.
3	(b)		1 mark • **do not know** how many iterations / swaps needed • **do not know** (at run time) how many times the value will **change positions** • **do not know** how many times a condition-controlled loop will need to **run** / **execute** 1 mark • condition controlled loops run while/until a condition **is true** / **is false** / until a condition **is met** • repeats while value in [pos-1] is larger than value in [pos] // while (further) swap needed • will swap value until in **correct position** // will swap whilst in **incorrect position**	**2** (AO2 1b	Max 1 from each section, 2 marks total. Do not allow "while names are in the wrong order". BP4 must have reference to <u>checking</u> a condition / condition being met, not just having a condition.

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Question			Answer	Mark	Guidance
			• More efficient than / does not need to iterate as many times as **count controlled / for loop**		
3	**(c)**	**(i)**	1 mark each for insertion and bubble sort, max 2 Insertion sort: • inserts/moves values into **correct position** • inserts value **once** (then in correct position) • stops when end of array reached // completes in one **pass** through the array • moves items down the array / left • start of array becomes sorted first • creates a sorted array **within** an array // has a sorted/unsorted **partition / section / list** • starts on 2nd value • more efficient/faster than bubble sort • … because fewer iterations / comparisons (on average) • … when data more scrambled Bubble sort : • compares/swaps **pairs** of values • value is **repeatedly** moved/swapped (until in correct position) • repeats if a swap has been made // needs multiple passes	**2** (AO1 1b)	Answer must reference both bubble sort and insertion sort for 2 marks except if efficiency mark plus expansion given. Allow reference to big O for efficiency discussion. Only award efficiency once. Only award fewer iterations once Do not accept “completes in one iteration” for insertion sort. Accept list / data / values / etc for array. “when data more scrambled” only makes sense when discussing efficiency/speed, do not give marks for saying that either can handle data that is more scrambled (they both can sort data however it is arranged). Do not accept “bubble/insertion sort does not” for 2nd mark.

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Question			Answer	Mark	Guidance
			• will complete a final iteration once sorted (to check for no swaps needed) • moves items up the array • end of array becomes sorted first • moves/bubbles the highest value to the top • less efficient/slower than insertion sort (on large sets of values) • … more iterations / comparisons (on average) • … when data more scrambled		
3	**(c)**	**(ii)**	1 mark each to max 2 e.g. • Both produce a sorted list / array • Both work in place / without duplicating data / without using divide and conquer • Both need a temporary variable • Both swap values • Both use loops / iteration / repeats • Both loops are nested / inside each other • Both (may) need multiple passes • Both use selection • Both work with an array / list data structure • Both work from left to right • Both build up **sorted list** one item at a time (after every pass) • Both compare (pairs of) **values** • Both (typically) **less efficient / slower** than merge sort (or other sorting algorithms)	**2** (AO1 1b)	Allow reference to both sorting / putting items into order for BP1. "Allows sorting of numbers and strings" meets BP1 Allow answers relating to not needing additional memory as BP2. Allow "breaking into smaller lists" as divide and conquer for BP2. If answer is a statement (e.g. "uses loops"), assume candidate is talking about both algorithms doing this.

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Question			Answer	Mark	Guidance
			• Both inefficient / slow for **larger / unsorted** lists **//** efficient for **small** / (nearly) **sorted** lists • Both start by comparing first two values		

4	**(a)**		1 mark each, max 2 if not fully correct circuit. • NOT B • AND gate with A / C as one **direct** input… • …Second AND gate with other (unused) A / C as **direct** input **and** output of previous stage as other input Fully correct circuit is any of : • Q = (A AND NOT B) AND C • Q = A AND (NOT B AND C) • Q = (A AND C) AND NOT B See examples below :	**3** (AO3 2a)	Shapes of logic gates must be correct. NOT gate must include circle for inversion. No other gates should include circle. AND gates must have two different inputs, NOT gate must have one input. All gates must have one output. Correct system will always have **NOT B** and two other AND gates correctly joined. Accept alternative systems that produce the correct output. Accept (BOD) three input AND gate for BP2 and BP3 if used correctly. OK if inputs/outputs not joined up to A/B/C/Q as long as intention clear. If lines cross on diagram, give BOD. If (A AND C) AND NOT B drawn, allow NOT B as first input for BP3.

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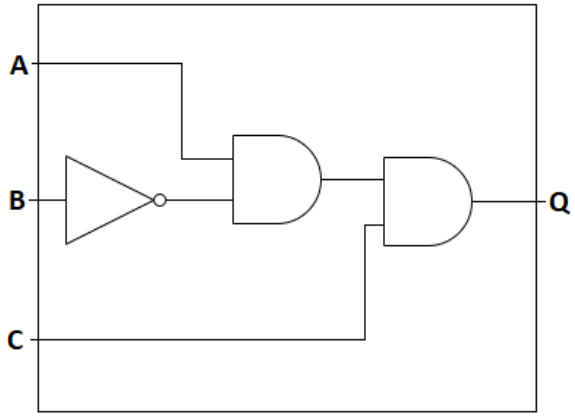
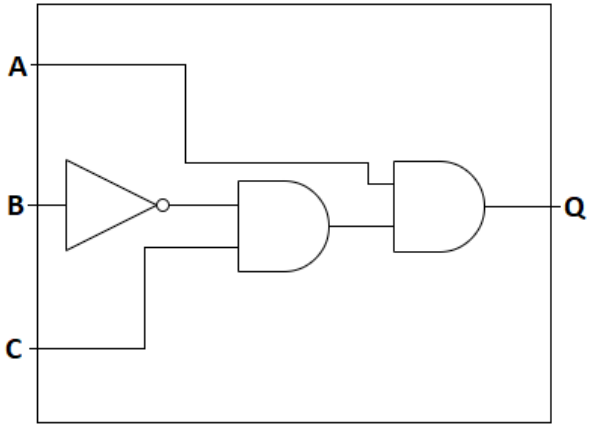
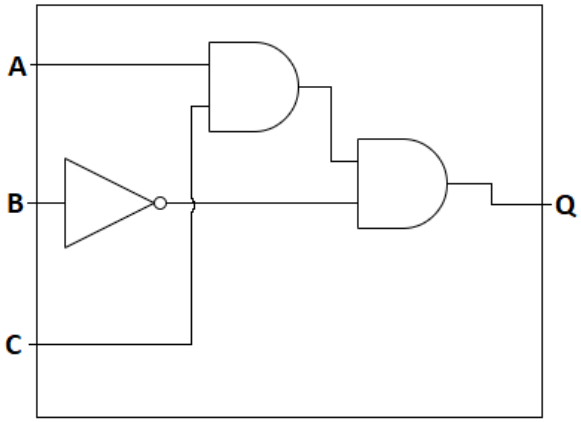


Q = (A AND NOT B) AND C



A AND (NOT B AND C)



(A AND C) AND NOT B

	(b)		1 mark each • Logic gate 1: **OR** • Logic gate 2: **AND**	**2** (AO2 1a)	Allow **A OR B** // **B OR A** for logic gate 1 Allow **A AND B** // **B AND A** for logic gate 2 If logic statement provided with multiple gates (e.g. A OR B AND C) this is incorrect. Allow use of symbols (e.g. ∨, + for OR, ∧, **.** for AND) Allow correct drawing of logic gates.

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Question			Answer	Mark	Guidance
5	(a)	(i)	1 mark each to max 2 • Check the program works (as intended) • meets user requirements. • gives the correct **output** / **result** • Find / detect / check for errors / bugs • Check the program does not crash // is robust // executes / runs • To try and break the program // destructive testing • Test for / improve usability / user experience / performance // check user feedback is **suitable** • Allow any errors to be fixed // make changes / improvements as a result of testing • Ensure no problems / issues fixed **when released**. • Defensive design considerations / anticipating misuse / so cannot be misused	**2** (AO1 1b)	Allow answers that explain what would happen if not tested (e.g. “there might be bugs”)

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Question			Answer	Mark	Guidance
5	(a)	(ii)	1 mark for name, 1 mark for matching description e.g. • Final / terminal testing… • … Completed at the end of development / before release. • … to test the product as a whole. • Iterative / incremental testing… • …completed during development. • …after each module is completed. • … test module in isolation • Normal testing… • …test using data that should be accepted // • …test that is expected to work / pass • Boundary / Extreme testing… • …test using data that is on the edge of being acceptable / unacceptable. • …test highest / lowest value • Invalid / Erroneous testing… • …test using data that should be **rejected** / is not acceptable / causes an error	**2** (1 AO1 1a), (1 AO2 1b)	Allow other sensible descriptive names for testing. Description must match test type. Must be a description and not just an example, but example may support description. Do not accept descriptions that simply repeat type of test without further clarification (e.g. “boundary, testing the boundary”). Allow : • Black box testing… • …testing **without** access / knowledge of a system’s workings. • White box testing… • …testing **with** access / knowledge of system’s workings. Allow other sensible / valid types of testing. Do not accept examples of validation (e.g. type test, range check) “data that is not expected” is NE for invalid/erroneous unless clarified.

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Question			Answer	Mark	Guidance
5	(a)	(iii)	1 mark for feature 1 mark for matching description e.g. • Translator / compiler / interpreter … • … convert to **low-level/machine code** • …allow program to be executed / run • …produce executable file (only for compiler) • …stops execution when error found (interpreter only) • Run-time environment / output window… • …allows **program / code** to be run / executed • …shows output of the **program / code** • Error reporting / diagnostics • … identify **location/detail** of errors • …suggests fixes • Debugger … • …find errors • Stepping … • … execute/run the program line by line • Variable watch…	**4** (AO2 1b)	Allow other sensible names for features. Description must add more than is given in the identification of the feature to be awarded. For example, “keyword highlighting, highlights keywords” is 1 mark for the feature only. If compiler and interpreter given as two distinct features, allow both (with suitable descriptions). Do not allow translator and compiler/interpreter. Description must match feature. “finding errors” is NE for description of error reporting. Allow sensible references to AI where appropriate. Sensible description of use needed. Allow other sensible features of an IDE (e.g. line numbering, auto indent, collapsed blocks, etc) with suitable description. For text editor / error diagnostics / debugger, allow other sensible features listed as features in the mark scheme as description (e.g. “text editor,

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Question			Answer	Mark	Guidance
			• … see the **contents/data** held in variables • Break points … • … will allow the program to stop **at a chosen / set position** • Text/code editor… • …allows program code to be **written** / **entered / changed** • …allows errors to be fixed • Pretty printing // keyword highlighting… • … allows keywords / variables to be coloured / identified • Keyword completion // syntax suggestion… • …suggests code/syntax when first part entered.		provides pretty printing", "debugger, provides stepping")

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Question			Answer	Mark	Guidance
5	(b)		1 mark for method, 1 mark to max 2 for each use e.g. • Range check • … checks **upper/max / lower/min / boundaries** • … make sure the players **answer / input** is between sensible limits (e.g. 20 or less, between 2 and 20 inclusive) // not negative • …by example of program code • Type check • … making sure the data inputted is of the correct **data type** • … make sure **answer / input** is an **integer** (or equivalent e.g. whole number) • Presence check • … making sure a value is inputted / not blank • … reference to **answer / input** • …by example of program code • Length check • … **limit** number of **characters** // check **maximum** / **minimum string** length • … **answer / input** must be **1 or 2 characters**	**6** (4 AO2 1b) , (2 AO1 1a)	Validation must be applied to the rules of the game as given; **do not** accept uses related to input not asked for (e.g. names, passwords, etc). Do not accept uses that simply repeat the name of the check (e.g. “range check, checks a range of numbers”) For range check, values must be sensible (e.g. 1 to 50), and allow input of 2 to 20. Do not allow 1 / 10 (answer could be over this). For length check, must be clear that the **string** version of the data input is being checked to award use marks (e.g. characters not digits). Accept alternative names or descriptions (e.g. existence check, boundary check) but name of check must be sensible. Mark each answer as a whole, ignore method/use headings. Do not accept defensive design elements (e.g. input sanitisation, authentication)

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Question			Answer	Mark	Guidance
			• …by example of program code • Format check • … making sure the data inputted follows a **set pattern** • … checking **answer / input** consists of **only** 1 or 2 numeric digits • …by example of program code • Look up / table check • … making sure the data inputted is one from an **allowed set of values** • … checking that **answer / input** is one of **[2, 3…20]** inclusive • …by example of program code		Examples of program code can be actual code (e.g. `if inp>=2 and inp<=20`) or identification of technique (e.g. “use IF statement / Case statement to limit values to between 1 and 20”). Do not accept code just showing casting.

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Question			Answer	Mark	Guidance

5	(c)		1 mark each to max 6
			
			• Initialise / declare `score` (to zero) before use, outside of any loop
			• Generates 2 random numbers between 1 and 10
			• Inputs answer from user displaying suitable numbers
			• Checks if input is correct answer…
			• … if correct adds 1 to `score`
			• Repeats BP2 to 5 three times (for bullet points attempted)
			• Outputs `score` after reasonable attempt at counting
				6
				(AO3 2b)
					No need to cast data to string/integer.
					
					If random numbers chosen, BP3 must use these. If no random numbers chosen, allow manually setting values
					
					BP6 can be awarded for either a loop repeating 3 times or the same code written out 3 times
					
					BP5 can be given FT if sensible attempt at BP4
					
					Do not award BP6 if same numbers used for every question. Must pick new values each time.
					
					Do not penalise potential off by 1 errors for looping (Python) or random number generation
					
					Example answer
					
					`score = 0`
					`for count = 1 to 3`
					`  num1 = random(1, 10)`
					`  num2 = random(1, 10)`
					`  ans = input("What is” +num1 +  " + " + num2 + "?")`
					`  if ans = num1 + num2 then`
					`  score = score + 1`
					`  end if`
					`next count`
					`print("You scored " + score)`

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Section B

<table>
<tr>
<td>6</td>
<td>(a)</td>
<td></td>
<td>1 mark for each row

<table>
<tr><th>Variable</th><th>Boolean</th><th>Char</th><th>String</th><th>Integer</th><th>Real</th></tr>
<tr><td>UserName</td><td></td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>EmergencyPhone</td><td></td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>DoorSensor</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>DoorTime</td><td></td><td></td><td></td><td>✓</td><td></td></tr>
</table>
</td>
<td>4
(AO3 2a)</td>
<td>No mark if more than 1 tick on a row.

Allow other indications of choice (e.g. cross) as long as clear.</td>
</tr>
<tr>
<td>6</td>
<td>(b)</td>
<td></td>
<td>1 mark each:
• Attempt at using selection / condition controlled loop
• Checking if system armed // while system armed
• If Door Sensor active OR Window Sensor active (both checks required)
• calling SoundAlarm correctly</td>
<td>4
(AO3 2b)</td>
<td>Selection could be done using IF statement, case statement or any other sensible valid method.

Allow reference to <code>AlarmActivated</code> or equivalent instead of <code>SystemArmed</code>

Ignore any inputs or modification of variables.

Allow True / False as strings. Allow checking against strings (e.g. <code>if SystemArmed == "active"</code>)

Allow checking armed/disarmed for BP2 and BP3

Only award BP4 if SoundAlarm correctly called / not called in every situation. If issues on previous lines (e.g. lack of brackets where needed) means this is not the case, do not award BP4.</td>
</tr>
</table>

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					Checking could be done by evaluating variable directly (`if SystemArmed`) or by comparison (`if SystemArmed == True`)
					
					Example answer 1
					
					`if SystemArmed then`
					`  if DoorSensorActive then`
					`  SoundAlarm()`
					`  else if WindowSensorActive then`
					`  SoundAlarm()`
					`  endif`
					`endif`
					
					Example answer 2
					
					`while SystemArmed then`
					`  if DoorSensorActive then`
					`  SoundAlarm()`
					`  else if WindowSensorActive then`
					`  SoundAlarm()`
					`  endif`
					`endif`
					
					Example answer 3
					
					`if SystemArmed and (DoorSensorArmed or WindowSensor) then`

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					SoundAlarm()
					endif
					
					Note – above example needs brackets,
					
					if SystemArmed and DoorSensorArmed or WindowSensor then
					
					is not logically valid for this scenario (will sound alarm when not armed if window sensor is active)
					
					<u>Example answer 4</u>
					
					if SystemArmed and DoorSensorArmed
					SoundAlarm()
					else if SystemArmed and WindowSensorArmed
					SoundAlarm()
					endif

6	**(c)**	**(i)**	1 mark for • Line 04	**1** (AO3 1)	
6	**(c)**	**(ii)**	1 mark from • sensorType • sensorNumber • sensorID	**1** (AO3 1)	Do not penalise case, spacing or minor misspellings.
6	**(c)**	**(iii)**	1 mark for • Boolean	**1** (AO3 1)	Ignore minor misspelling. Accept Bool.

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6	**(c)**	**(iv)**	1 mark from • Line 01 • Line 02 • Line 03 • Line 05	**1** (AO3 1)	
6	**(c)**	**(v)**	1 mark each • Selection • Sequence	**2** (AO3 1)	Ignore minor spelling errors / differences Do not accept examples (e.g. IF)
6	**(d)**		1 mark each • `SELECT SensorID` // `SELECT *` • `FROM events` • `WHERE Length > 20 AND sensorType = "Door"` // `WHERE sensorType = "Door" AND Length > 20`	**3** (AO3 2c)	Max 2 if out of order or anything extra that affects the output. BP1 can select multiple fields as long as `SensorID` is included. Ignore case. Only penalise spaces if obvious. Field names must be correct. "door" must be in quotation marks for BP3. Allow quotation marks for field names and table name BP3 can use == or = for equivalence. Allow alternative WHERE clauses that are logically correct (e.g. `WHERE length >=21`)

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6	**(e)**		1 mark each
			• **Define** procedure SaveLogs…
			• …with **two** valid parameters
			• Open file (for write/append) …
			• … using the file name **passed in as parameter**
			• Write data **to file**…
			• …using the data **passed in as parameter**
			• Close file
				6
				(AO3 2b)
					Must be clear that answer is a procedure definition, do not credit calling procedure for BP1. Allow function definition.
					
					If parameters are later overwritten, do not credit BP2 but FT for BP4 and 6.
					
					Closing text file does not need reference to file name/object – e.g. "`close file`" is enough. However, if given reference must be correct.
					
					If code given outside of procedure, do not give BP4 and BP6
					
					Allow FT for multiple occurrences of same mistake (e.g. not using filename correctly for open and close)
					
					<u>Example answer</u>
					
					`procedure SaveLogs(data, filename)`
					`  logFile = open(filename)`
					`  logFile.writeLine(data)`
					`  logFile.close()`
					`endprocedure`

6	**(f)**	**(i)**	1 mark for: • Casting / cast	**1** (AO3 2a)	Accept type casting Do not accept conversion. Do not accept examples of casting.

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6	(f)	(ii)	1 mark each to max 6 • Input date and store in variable / use directly • Access **all** seven (indexes 0 to 6) events in array // loop for each event in array • Attempt at selection… • …to compare `date` input against `date` in array (element 0) • …adding `length` (element 3) from array to the total if dates match. • Outputting calculated total and date in appropriate message(s) at the end	**6** (AO3 2b)	BP2 can be achieved either by iteration accessing each event or manually repeating code to access each event. Must be 0 to 6, not 1 to 7. Allow reference `to events` (table given) or `arrayEvents` (2D array) in answer as long as used consistently. BP2 loop allow off by one errors (Python), looping to array length or array length – 1. Allow `for each item` in array or any other suitable loop. BP4 and BP5 allow array reference as either column major or row major. Output can either be once at the end or on every iteration, as long as it is output at the end. Only give output mark if attempt made to **calculate** total within the algorithm. Do not penalise capitalisation or minor misspellings of variable names.

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					Example answer 1
					
					`total = 0`
					`date = input("Please enter date")`
					`for count = 0 to events.length-1`
					`  if events[0, count] == date then`
					`  total = total + events[3,count]`
					`  endif`
					`next count`
					`print("There were " + total + "`
					`events on " + date)`
					
					Example answer 2
					
					`total = 0`
					`date = input("Please enter date")`
					`for item in events:`
					`  if item[0] == date then`
					`  total = total + item[3]`
					`  endif`
					`next count`
					`print("There were " + total + "`
					`events on " + date)

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