



National
Qualifications
2018

2018 Computing Science

Higher

Finalised Marking Instructions

© Scottish Qualifications Authority 2018

The information in this publication may be reproduced to support SQA qualifications only on a non-commercial basis. If it is reproduced, SQA should be clearly acknowledged as the source. If it is to be used for any other purpose, written permission must be obtained from permissions@sqa.org.uk.

Where the publication includes materials from sources other than SQA (secondary copyright), this material should only be reproduced for the purposes of examination or assessment. If it needs to be reproduced for any other purpose it is the centre's responsibility to obtain the necessary copyright clearance. SQA's NQ Assessment team may be able to direct you to the secondary sources.

These marking instructions have been prepared by examination teams for use by SQA appointed markers when marking external course assessments. This publication must not be reproduced for commercial or trade purposes.



General Marking Principles for Higher Computing Science

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.

- (a) Marks for each candidate response must **always** be assigned in line with these general marking principles and the detailed marking instructions for this assessment.
- (b) Marking should always be positive, ie marks should be awarded for what is correct and not deducted for errors or omissions.
- (c) If a specific candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you must seek guidance from your team leader.
- (d) Marks should be awarded regardless of spelling as long as the meaning is unambiguous.
- (e) Candidates may answer programming questions in any appropriate programming language or pseudocode. Marks should be awarded, regardless of minor syntax errors, as long as the intention of the coding is clear.
- (f) Where a question asks the candidate to **describe**, the candidate must provide a statement or structure of characteristics and/or features. This should be more than an outline or a list. It may refer to, for instance, a concept, process, experiment, situation or facts in the context of, and appropriate to, the question. The candidates will normally be required to make the same number of factual/appropriate points as are awarded in the question.
- (g) Where a question asks the candidate to **explain**, marks should only be awarded where the candidate goes beyond a description, for example by giving a reason, or relating cause to effect, or providing a relationship between two aspects. These will be related to the context of the question or a specific area within a question.

Marking Instructions for each question

Section 1

Question			Expected response	Max mark	Additional guidance
1.			1000 1000	1	
2.			<ul style="list-style-type: none"> A public key is used to encrypt the personal data. (1 mark) A private key is used to decrypt the personal data. (1 mark) <p>OR</p> <ul style="list-style-type: none"> Public key is known to all systems. (1 mark) Private key to one system only. (1 mark) 	2	1 mark for the concept of encrypt / decrypt without assigning to appropriate keys.
3.			<p>Rules (1 mark)</p> <p>1 mark for any one bullet from</p> <ul style="list-style-type: none"> Use variables which can be applied to existing fact/rules. Reduces the need for repetition of facts/ additional lines of code. Adds information/meaning based on other facts/rules. Establishes relationships between facts/rules. Can implement recursion. <p>OR</p> <p>Queries (1 mark)</p> <ul style="list-style-type: none"> allow facts/rules to be interrogated (1 mark) <p>OR</p> <p>Pattern matching (1 mark)</p> <ul style="list-style-type: none"> allows facts/rules to be matched. (1 mark) 	2	
4.			<ul style="list-style-type: none"> Malware on one drive automatically mirrored on backup. Corruption and accidental deletion of original data mirrored on backup. Additional cost of duplicated hard drive. Higher energy consumption as a result of writing to multiple disks at the same time. 	2	1 mark for each bullet. Maximum 2 marks

Question			Expected response	Max mark	Additional guidance
5.			<p>Unicode can represent more characters. (1 mark)</p> <p>1 mark for any one bullet from</p> <ul style="list-style-type: none"> • 2^{16} when compared to ASCII $2^8/2^7$. <p>OR</p> <ul style="list-style-type: none"> • uses 16 bits compared to 8/7. 	2	<p>Allow UTF -8, UTF -16, UTF -32 or UCS -2 (17×2^{16})</p> <p>More languages on its own does not get first mark</p>
6.			<p>A key added to an entity to act as a primary/unique key. (1 mark)</p> <p>1 mark for any one from</p> <ul style="list-style-type: none"> • Where no natural (primary) key already exists. • Surrogate key does not add meaning to the entity. 	2	
7.	(a)		<p>Line 8: position to index (1 mark)</p> <p>Line 10: 1 mark for any bullet</p> <ul style="list-style-type: none"> • target=list(position) • target = list(index) • position = index 	2	
	(b)		-1	1	
8.			<p><u>Read line</u> (on control bus) is activated. (1 mark)</p> <p>Instruction is transferred (from memory) to the processor on the data bus. (1 mark)</p>	2	<p>Incorrect order of two correct statements award 1 mark</p> <p>Data bus and direction of transfer must be mentioned for second mark</p>
9.	(a)		<ul style="list-style-type: none"> • Multi-core/number of processors. • Increase width of data bus. • Increase clock speed. • Increase RAM/memory. • Increase use of solid state. • Any other valid response. 	1	1 mark for any one bullet
	(b)		<p>Matching reason eg</p> <ul style="list-style-type: none"> • Simultaneous execution of instructions/parallel processing. • More bits transferred in a single operation. • More fetch-executes per clock pulse. • Reduces the need/faster access to access slower backing storage. • Faster access than slower backing storage. 	1	1 mark for a bullet that matches trend stated in (a)

Question			Expected response	Max mark	Additional guidance
10.	(a)		<ul style="list-style-type: none"> Version of/out of date operating system. Downloaded file is corrupt. 	1	1 mark for any one bullet “operating system” alone is not enough
	(b)		<ul style="list-style-type: none"> Insufficient amount of RAM/memory. Minimum clock speed not available. Version of processor. Version of graphics card. 	1	1 mark for any one bullet Mention of a component is not enough

Section 2

Question			Expected response	Max mark	Additional guidance
11.	(a)	(i)	<ul style="list-style-type: none"> Public cloud services can be easily increased or decreased to match current needs. Can set up or easily expand capacity of public cloud storage without (Securebell) purchasing hardware. Public cloud removes need for backup/maintenance/administration strategies (for SecureBell). Public cloud has lower initial costs than private cloud. 	2	1 mark for each bullet. Maximum 2 marks Accept the converse if candidate refers to private cloud
		(ii)	<ul style="list-style-type: none"> <u>Username and passwords</u> to access public cloud. Use of encryption. Firewall. Require use of digital certificate. 	2	1 mark for each bullet. Maximum 2 marks
	(b)		<ul style="list-style-type: none"> Must provide keys for decryption (when approved access is required). Provide facilities for public authorities (eg police/MI5 government) to access electronic communications. Provide hardware and software to facilitate surveillance of electronic communications Pay for the hardware needed to store electronic communication. Inform staff that access to communication data is subject to RIPA. 	2	1 mark for each bullet. Maximum 2 marks
	(c)	(i)	33 177 600 (bits) (2 marks) OR <ul style="list-style-type: none"> Bit depth: 16 (1 mark) 33 177 600 (bits) (1 mark) 	2	Accept bit depth of 2 (bytes) (1 mark)
		(ii)	<ul style="list-style-type: none"> Key frames/I-frames are stored. (1 mark) Saves changes between (key) frames. (1 mark) 	2	Changes may be expressed as delta frames, p-frames or b-frames. Changes to each/every frame not accepted

Question			Expected response	Max mark	Additional guidance
11.	(d)	(i)	Bitmap (1 mark) 1 mark for any one from <ul style="list-style-type: none"> Image has become pixelated. Image is resolution dependent. 	2	
		(ii)	<ul style="list-style-type: none"> Stores the colour of a pixel. (1 mark) And the number of repetitions of that colour. (1 mark) 	2	

Question			Expected response	Max mark	Additional guidance
12.	(a)		<ul style="list-style-type: none"> Create prototypes/wireframes/design of user interface. Prospective users perform tasks. Developers observe/interview/discuss scenarios with users. Obtain feedback to influence changes. 	3	1 mark for each bullet. Maximum 3 marks
	(b)	(i)	Record name and appropriate start/end eg { } (1 mark) Four fields with correct data types (1 mark)	2	RECORD movie IS { STRING title, STRING studio, INTEGER rating, REAL takings }
		(ii)	Array of 100. (1 mark) Data type matching answer in (a). (1 mark)	2	DECLARE topMovies AS ARRAY OF movie INITIALLY[]*99
	(c)		Initialise and increment count. (1 mark) Loop that traverses array. (1 mark) If condition with: <ul style="list-style-type: none"> correct use of array variable (1 mark) comparing current value of studio field to target (1 mark) Open/Create & Close <u>file</u> . (1 mark) Write target & count to file. (1 mark)	6	(Referring to b part (i) and (ii) may be helpful) DECLARE count INITIALLY 0 RECEIVE target FROM KEYBOARD FOR index FROM 0 TO 99 DO IF topMovies(index).studio = target THEN count=count+1 END IF END FOR OPEN "highest.txt" WRITE target, count CLOSE "highest.txt"

Question			Expected response	Max mark	Additional guidance
13.	(a)		<ul style="list-style-type: none"> Database (holding city data) is not stored locally. Database must be accessed/ queried from (remote) server. Client (browser) cannot access database directly. 	1	1 mark for any one bullet
	(b)	(i)	<p>H1 with open and close bracket. (1 mark)</p> <p>AND</p> <p>Any two from three correct elements with appropriate attribute for 1 mark each. (maximum 2 marks)</p>	3	<pre>H1 {font-family: Arial; text-align: center; color: green }</pre> <p>Do not accept colour or centre</p>
		(ii)	<ul style="list-style-type: none"> Use external style sheet/ create a file with CSS rules. Create a link tag to external stylesheet. Place link to external stylesheet in all web pages. 	2	1 mark for each bullet. Maximum 2 marks
	(c)		<ul style="list-style-type: none"> Normal(this) (1 mark) x.style.height = "96px"; (1 mark) <p>1 mark for <u>both</u> bullets:</p> <ul style="list-style-type: none"> x.style.height = "32px" x.style.width = "32px"; 	3	
	(d)		<ul style="list-style-type: none"> Text in form assigned to variables. Connection with server/ database established. Database <u>selected</u>. (Form data used to) construct (SQL) query/query is run. Results of query returned <u>from server</u>. Code (PHP) processes result to generate appropriate output. 	4	1 mark for each bullet. Maximum 4 marks

Question			Expected response	Max mark	Additional guidance
14.	(a)			3	1 mark for each correct relationship
	(b)		InstructorID and StartTime and Date	1	
	(c)		Lesson.StartTime Lesson.Date Lesson.InstructorID Instructor.FirstName Customer.FirstName Customer.Surname	3	1 mark for the three correct tables 1 mark for the six correct fields 1 mark for relating fields to correct tables Accept Instructor.InstructorID Do not award the table mark if Resort table is introduced. Ignore Resort.name field when awarding mark for the six correct fields.
	(d)		[Lesson.Date]=17/12/18 (1 mark) (AND) [Lesson.InstructorID] = 14 (1 mark)	2	Field required, table name optional Accept valid alternative date formats Accept [Instructor.InstructorID]
	(e)		<ul style="list-style-type: none"> Summary Field. Report Footer. 	1	1 mark for any one bullet. Accept count function/expression
	(f)		<ul style="list-style-type: none"> Cost of additional servers or cloud storage. Subscription costs associated with software licenses for server-side software. Cost of connecting servers to ISPs. Cost of employing/training additional staff. 	1	1 mark for any one bullet. Accept alternative costs that can be linked to the information system.
	(g)		<ul style="list-style-type: none"> Connect with others interested in skiing. Exposure to people of a different demographic. Sharing ideas/reviews of ski resorts and instructors. 	1	1 mark for any one bullet. Any other valid response

Question			Expected response	Max mark	Additional guidance
15.	(a)		<ul style="list-style-type: none"> The upper index of the array is one less than the length of the array. Upper - 1 is the highest index position of the array. (Exceeds array index) so runtime error would occur. 	1	1 mark for any one bullet
	(b)		heat1 is the actual parameter. <div style="text-align: right;">(1 mark)</div> list is the formal parameter. <div style="text-align: right;">(1 mark)</div> 1 mark for any one bullet from <ul style="list-style-type: none"> Formal parameter (list) contains the pointer/address of actual parameter (heat 1). Any changes to the formal parameter (list) are automatically made to the actual parameter. 	3	Explanations based on passing by value are not acceptable.
	(c)		<ul style="list-style-type: none"> Local OR lines 1/2 to lines 9/10. <div style="text-align: right;">(1 mark)</div> It is only used within the function in which it is declared. <div style="text-align: right;">(1 mark)</div> 	2	
	(d)		A = 13.4 B = 14.5 C = 17.4	3	1 mark for each correct value A=13.4, B=13.4, C=14.5 Award 2 marks
	(e)	(i)	<ul style="list-style-type: none"> Use of < (instead of >). On line 5, list(index) and min should swap places. 	1	1 mark for any one bullet
		(ii)	Logic	1	
		(iii)	<ul style="list-style-type: none"> The maximum time/16.4 in heat 2 is lower than the maximum time/17.4 in heat 1 <div style="text-align: right;">(1 mark)</div> which coincides with the fastest time/10.1 being in heat 2. <div style="text-align: right;">(1 mark)</div> 	2	
	(f)	(i)	<ul style="list-style-type: none"> (If the times are equal) the IF condition is false/not met/is not less than <div style="text-align: right;">(1 mark)</div> therefore the else statement is executed. <div style="text-align: right;">(1 mark)</div> 	2	
		(ii)	Concept of nested if or else if statement.	1	

Question			Expected response	Max mark	Additional guidance
15.	(g)		<ul style="list-style-type: none"> • Tracks/checks available memory. • Allocates space/addresses in RAM for the function. • Protects other processes. 	2	1 mark for each bullet. Maximum 2 marks

[END OF MARKING INSTRUCTIONS]