OCR
Oxford Cambridge and RSA

GCSE

Computing

Unit **A451**: Computer systems and programming

General Certificate of Secondary Education

Mark Scheme for June 2015

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
∧	Omission mark
BOD	Benefit of doubt
C	Subordinate clause/Consequential error
✖	Cross
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
P	Point being made
REP	Repeat
/	Slash
✔	Tick
TV	Too vague
0	Zero (big)

Here are the subject specific instructions for this question paper

ADDITIONAL OBJECTS: You **must** annotate the additional objects for each script you mark. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU, likely to be 'seen' or the highlighting tool.

CROSSED OUT, RUBRIC ERROR (OPTIONAL QUESTIONS) AND MULTIPLE RESPONSES

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. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

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.

Question			Answer/Indicative content	Mark	Guidance
1			e.g. • Input device: <u>touch</u> screen / microphone / accelerometer/(hardware) button/ camera / (hard) keyboard • Output device: screen / speaker / vibrating device / LEDs • Storage device: Solid state memory e.g. SD card, memory card, flash memory , SIM card	3	*Accept any devices that can be built-in to a mobile phone.* Do not accept devices which send or receive binary data as input or output devices (such as those involved with Bluetooth, Wi-Fi, GPS). For output accept display Do not accept headphones as they are not built-in. Do not accept Hard Disk/Hard drive as a storage device.
2	a		<table><tr><td>**Content**</td><td>**Type of file**</td></tr><tr><td>An image showing a map of the school.</td><td>JPG</td></tr><tr><td>A text document containing information to parents about the school rules.</td><td>PDF</td></tr><tr><td>A high resolution picture of all the staff and pupils.</td><td>JPG</td></tr><tr><td>A short video clip of some pupils saying why they like the school.</td><td>MPEG</td></tr></table> 1 mark per row	4	
	b		• When the file is compressed some detail/data/quality/resolution is lost... • ... which is <u>not noticeable</u> in the video file/<u>video still viewable</u> with lower quality • … but would make the text file unreadable/lose meaning or comprehension	3	*The first bullet is for the idea that something is lost in the compression process.* *The second bullet is for the idea that the video file is still usable with this loss.* *The third bullet is for the idea that the text file is not usable.*

Question			Answer/Indicative content	Mark	Guidance
3	a		<table><tr><td>**Variable**</td><td>**Data Type**</td></tr><tr><td>**Gender**</td><td>String</td></tr><tr><td>**Dose**</td><td>Real</td></tr><tr><td>**isPregnant**</td><td>Boolean</td></tr></table> 1 mark per row	3	Allow known equivalent names of data types: String: alphanumeric/text. Do not accept character but accept an array of character or pointer to character. Real: single, double, float, decimal. Do not accept Number. Boolean: Yes/No, True/False
	b		• (Age < 20 is FALSE so) <u>Dose = 2</u> • (Gender = "Female" is FALSE) so Dose = Dose * 0.5 • ... therefore Dose = 1	3	**Award mark for first bullet only if 2 clearly refers to the dose.** Allow follow through error for second and third bullet. i.e. if candidate has the wrong dose they can still get a mark for Dose * 0.5 and for doing this calculation correctly. (Typically 3 * 0.5 = 1.5 which is therefore worth 2 marks)
	c		• (Age is less than 20 = true) so Dose = 0.1 * Age • 1.9 • <u>[isPregnant AND Dose > 1.5]</u> is TRUE • Dose = 1.5	4	**Candidates do not need to refer to dose, provided it is clear that they are performing the correct operation.** For 3rd bullet it is sufficient if the candidate has shown that both isPregnant and (Dose > 1.5) are TRUE (This may not be at the same point in the answer and they do not need to explicitly state the result of the AND)..
4	a		• antivirus • firewall	2	

Question	Answer/Indicative content	Mark	Guidance
b	e.g. • (User name and) password • Only allows you to use the system if you are authorised • Encryption • Prevents hackers from understanding any data if accessed (e.g. passwords) • Access rights • To prevent files from being modified/deleted • User access control • Prevents users from making changes to the system Marks in pairs	4	*Accept any security measure that is provided by the operating system itself but not by standard utility programs (even if the utility program is normally bundled with operating systems).* *The first bullet is for identifying or a brief description of a measure.* *The second bullet is for a further more detailed description or a description of how the measure ensures security.* Any reasonable biometrics is acceptable.

Question			Answer/Indicative content	Mark	Guidance
5	a	i	High level code : • human oriented code / written by programmers • contains words for commands / closer to English/natural language • Machine independent /Portable to different systems • Needs to be translated before it can be executed. • Problem based • One (high level) command equates to many machine code instructions. Machine code: • Code for the CPU to execute / not readily understandable by humans • binary instructions • specific to a particular (type of) computer / not portable to different systems • does not need to be translated [max 2 marks for each type of code]	4	Award marks for correct points about machine code made under high level code and vice versa. Do not accept Machine code is in Hex
		ii	• To translate the <u>high level code into machine code</u> • To pick up (syntax) errors	1	Translate to object code is acceptable Accept "errors" on its own, but do not accept answers referring specifically to logic or runtime errors.

Question			Answer/Indicative Content	Marks	Guidance	
					Content	**Levels of response**
5	b		Examples of standards; • Code should be written using standard/agreed conventions • ... such as in the choice/capitalisation of variable names • …language chosen • ..use of functions • ..comments • Meaningful identifiers • Indenting (constructs) Examples of justification • … compatibility between components • ..consistency • …allow multiple people to work on the same project • …ensure coding conventions are kept • …so others can read/edit the code	6	Allow answers relating to standardised design.	**High level Response (5-6)** A number of examples of coding standards are explained and justified. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly. **Medium level Response (3-4)** Description of why standards are required with at least one example of a coding standard. Examples may not be wholly relevant. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct. **Low level Response (0-2)** A vague description of coding standards or attempt to explain the need for standards. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.

Question			Answer/Indicative content	Mark	Guidance
6	a		• Software that is produced for a variety of users / not for a specific user / commercially available to anyone / immediately available	1	Do not accept answers that state that it is not bespoke / custom written. Candidates need to be more specific. Do not accept simply "can be bought" as custom written software is also bought. Do not accept "can be bought off the shelf".
	b		• <u>Create</u> tables / entities • <u>Define</u> fields / attributes / columns • <u>Define</u> (primary) keys • <u>Define</u> relationships / links between tables / foreign keys • <u>Set</u> the constraints on the data /validation rules / data types / field lengths / other suitable example	3	Accept define secondary keys / indexed fields
	c		e.g. • Add client/appointment data • Edit client/appointment data • Delete client/appointment data • Run/Create/View reports using a relevant example of a report that would be needed e.g. today's appointments • Search/query for data using a relevant e.g. search for a client's phone number • Back up (client/appointment) data. • Archive (client/appointment) data/ example of archiving	2	*Accept any two <u>different</u> operations that would be typical of the use of a database system by the hairdresser in managing client and appointment data.* Bullets 1,2,3 should specifically mention data from the context. Bullets 4,5 should contain a relevant example Bullets 6,7 need not be in context.
7	a		• Instructions/programs(currently running)/data are stored in the RAM... • these are fetched <u>from the RAM</u> by the CPU /Processor • ... where the instructions are executed / instructions are processed / data is processed	3	If the candidate has described the functions of RAM and the CPU separately, only award the 2nd bullet if it is clearly stated that instructions are fetched from RAM. Mention of the fetch – execute cycle in the CPU is enough to award bullet 3.

Question			Answer/Indicative content	Mark	Guidance
	b		• To store instructions/data that is frequently used / previously used / next to be used • Data does not need to be fetched from RAM • Speeds up access	2	

Question			Answer/Indicative Content	Marks	Guidance	
					Content	**Levels of response**

7	c		E.g.
			Memory;
			    • Smaller in size
			    • Faster access
			    • Larger capacity
			    • More durable
			    • Costs less per byte/kb etc
			
			Technology can;
			    • be smaller
			    • be more mobile/portable
			    • have similar capacity
				6		**Higher Level Response (5-6)**
						Candidates will describe the advances in memory and how these have impacted computers. Points made about the memory are detailed and linked to the advances
						There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.
						
						Medium level Response (3-4)
						Candidates will describe some advances in memory and improvements in performance. Points made about the memory lack detail or may not be linked to the advances.
						There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.
						
						Low level Response (0-2)
						Candidates may identify changes in technology or changes in memory. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.

Question			Answer/Indicative content	Mark	Guidance
8	a	i	• (Part of the instruction which) specifies the operation to be carried out • e.g. 00001000 = add to timer/00000100 = subtract from timer	2	The answer must refer specifically to the operation to be carried out and not the instruction as a whole.
		ii	• (Part of the instruction which) supplies the data/ address/value needed for an operation • e.g. the number to be added/subtracted from the timer / numerical example from the table (00010100 or 00000001)	2	For data, accept number/integer.
	b		00000101 00011110 1 mark per byte	2	All 8 bits must be correct for each byte.
	c		• Instructions and data are fetched at different points of the fetch execute cycle • Instructions and data are kept in separate parts of the memory (by the operating system)	1	Award the mark for: • The program counter points to the address of instructions
9	a		e.g. • record log on / log off times • remote access / view users' screens • audit printing • keylogging • monitor internet usage / downloads • monitoring emails / files sent / copied • inspect files in users' areas	2	*Accept answers which show how the LAN is used to <u>monitor the work of employees</u> rather than advantages of using a LAN in general*

Question			Answer/Indicative content	Mark	Guidance
	b		- IP addresses can be changed / are allocated as needed - MAC addresses can't be changed / every device has a fixed MC address - IP(v4) addresses are 4 bytes long - MAC addresses are 6 bytes long - IP(v4) addresses are normally written in denary - MAC addresses are normally written in Hex - IP addresses are configured by software - MAC addresses are configured in hardware - IP addresses are used for routing across a WAN/internet - MAC addresses are only used within the LAN [marks in pairs, maximum 2 pairs]	4	For bullets 3 and 4, accept answers where candidates refer to IPv6 being 16 bytes(128 bits). Award one mark if candidates state that IP addresses and MAC addresses are of different size.
	c		- Redundant components/hardware/capacity (servers/disks/routers etc) is built into the network - If there is a failure, network automatically switches to use the spare capacity - Allows the bank to continue to operate / avoids network downtime - avoiding loss of income /customer dissatisfaction/ loss of records / other example related to the bank	4	

10	a		• Lidia	1	Accept incorrect spelling if intention is clear.
	b		• Program finds there is no position 7 in the array / array index out of bounds • An error will occur / an error message would be displayed / program will crash	2	Only award bullet 1 if answer is clearly about the contents of the array and not about the context. Do not award bullet 2 if candidate specifically mentions syntax error.

	c		Example
			<pre> INPUT Num
			
			    For i = 1 to Num
			      Temp = PlayerName(6)
			      PlayerName(6) = PlayerName(5)
			      PlayerName(5) = PlayerName(4)
			      PlayerName(4) = PlayerName(3)
			      PlayerName(3) = PlayerName(2)
			      PlayerName(2) = PlayerName(1)
			      PlayerName(1) = Temp
			    Next i</pre>Award marks for:
			• Input the number of places to move (e.g. Num)
			• Use of temporary variable(s) or second array to avoid overwriting values in the array
			• Sensible use of a loop
			• ... with correct end condition
			• Correctly deals with moving from position 1 (e.g. 1 + Num)
			• Correctly deals with moving from position 6 (e.g. Num)
				6	If there is more than one loop, award bullets 3 and 4 for any non-trivial loop that contributes to the solution.
					
					For bullet 3, "sensible" use of a loop, requires that the loop clearly address the problem (e.g. move every player from pos a to b). Although candidates can get partial marks here, candidates will only get full marks (incl bullet 6) if all conditions of all loops are correct.

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