OCR
RECOGNISING ACHIEVEMENT

GCSE

Computing

General Certificate of Secondary Education

Unit **A451:** Computer systems and programming

Mark Scheme for June 2013

Oxford Cambridge and RSA Examinations

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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1. **Annotations**

Annotation	Meaning
^	Omission mark
BOD	Benefit of the doubt
C	Subordinate clause / consequential error
	Incorrect point
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	No benefit of doubt given
P	Point being made
REP	Repeat
	Slash / half-mark
	Correct point
TV	Too vague
0	Zero (big)

12. Subject-specific Marking Instructions

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.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td></td><td></td><td>
<table>
<tr><th>Statement</th><th>True</th><th>False</th></tr>
<tr><td>CPU stands for Central Processing Unit</td><td>✓</td><td></td></tr>
<tr><td>The CPU fetches and decodes instructions</td><td>✓</td><td></td></tr>
<tr><td>The speed of a CPU is usually measured in GigaHertz (GHz)</td><td>✓</td><td></td></tr>
<tr><td>If a CPU has many cores, this slows down the computer</td><td></td><td>✓</td></tr>
<tr><td>The hard disk drive is part of the CPU</td><td></td><td>✓</td></tr>
</table>
One mark per row
</td><td>5</td><td></td></tr>
<tr><td>2</td><td>(a)</td><td></td><td>• 1 kilobyte = 1024 bytes/~1000bytes
• 1 gigabyte =1024 x 1024 x 1024 bytes/~1000000000 bytes.</td><td>2</td><td>1024 x 1024 x 1024 = 1073741824.</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>ROM
• Stores the boot program/bootstrap loader/BIOS
• Used to start the computer/Loads the operating system.

RAM
(ii) • Stores the parts of the OS/programs <u>that are running</u>…
• Stores the data <u>currently in use</u>
• … for access by the CPU
(2 for each)</td><td>4</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>eg
• ROM is non-volatile and RAM is volatile
• RAM is easily expandable, ROM size is (usually) fixed for a given computer
• Contents of RAM change frequently, contents of ROM never (hardly ever) change.</td><td>1</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance	
					Content	**Levels of response**
3			Points may include: • Game console has input devices, usually specialised controllers but also keyboards, microphones etc similar to desktop computer • Output is similar to desktop computer on a screen and speakers (sometimes using the same standards eg HDMI, DVI) • Game console usually has an optical drive so that the software to be run can be inserted. Many also have a hard disk drive which is the same as that used on a desktop computer.	6		**High Level Response (5–6 marks)** A detailed comparison of game consoles and desktop computers referring to input, output and storage devices. 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 marks)** A comparison is made between desktop computers and game consoles, with at least two of input, output and storage devices mentioned but may not be described in detail. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct. **Low Level Response (1–2 marks)** There is an attempt to compare game consoles and desktop computers but some of the statements are incorrect or irrelevant. Information will be poorly expressed and there will be limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive. **Response not worthy of credit (0 marks)**

Question			Answer	Marks	Guidance
4	(a)	(i)	eg • To enter data from outside the system for processing	1	
		(ii)	eg • To return the results of processing	1	
	(b)		eg • Braille keyboard/input device • As this is a familiar entry method for blind users • Braille print out of transaction • so that customer can review it. • Use loudspeakers • To provide audio feedback of actions taken (but not when entering card details). *(marks in pairs, max 2 pairs)*	4	
5	(a)	(i)	• 64 + 32 + 8 + 1 • 105.	2	
		(ii)	Answer: 10011010 *(one mark per nibble if partly wrong)*	2	*Allow 1 mark for 01011001*
	(b)	(i)	Answer: 9 7 B *(one mark per hex digit)*	3	
		(ii)	• it is 4 bits per hex digit / straightforward to convert • shorter number <u>to remember</u>/quicker <u>to enter</u>/less susceptible to error.	2	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>
<table>
<tr><th>Field</th><th>Data type</th></tr>
<tr><td>Song</td><td>String</td></tr>
<tr><td>Length</td><td>Real</td></tr>
<tr><td>TimesPlayed</td><td>Integer</td></tr>
<tr><td>Protected</td><td>Boolean</td></tr>
</table>
(one mark per row)</td><td>4</td><td>Accept equivalent <u>names</u> of data types. NOT number, whole number, YES/NO or TRUE/FALSE</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Length > 2 :
• 001, 002, 003, 007
Artist = “MC Nail” OR Protected = False:
• 003, 005, 006, 007
Song = “Skit” AND TimesPlayed > 0:
• 006.

(correct answer only, but order does not matter)</td><td>3</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>• Length > 2.5
• AND
• TimesPlayed = 0 / TimesPlayed < 1</td><td>3</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>• An entity is a <u>type</u> of real world object (about which data is to be stored)
• e.g. Songs/albums/singers etc
• In the relational database each entity is modelled as a table
• Instances/examples/individuals of an entity are represented by records/rows of the table
• Entities can have attributes
• .. valid example of attributes e.g. length of song
• Attributes of an entity are represented by fields/columns of the table</td><td>4</td><td>Must include an example of an entity for full marks. The example does not need to be from the scenario in the question..</td></tr>
</table>

Question			Answer	Marks	Guidance
7	(a)		• Constant: PlayerKey • Variable: Position/KeyPressed.	2	Must be the identifier only and no additional code
	(b)		Selection • A condition is used to decide whether code should be executed • Position = Position + 1 is only run if the IF condition is met. Iteration • code is executed repeatedly • The code in the repeat loop will be run several times (until Position = 100).	4	
	(c)		e.g. • Position = Position + 1 should be changed • …so the increment is a random number • The random number should be relatively small • …so the game remains interesting • The end condition of the loop should be changed to UNTIL Position > 100 / check if position > 100 and if so change to 100 • ... as the position may not reach exactly 100 due to the random number. • seed/initialise random number generation • … so that numbers generated appear random Mark in pairs	4	Accept other suitable change and its justification

Question			Answer	Marks	Guidance
8	(a)		• Reduce the size of the file.	1	
			• Transmits more quickly / uses less bandwidth	1	Accept other valid advantages to do with *sending* files, NOT storage
	(b)	(i)	• Lossless compression • The code has to be exactly as it was originally written • … or else it will not work.	3	Explanation must follow from the type of compression given.
		(ii)	• Lossy compression • Achieves higher compression/ smaller file size / faster streaming than lossless • Video can still be viewed at lower quality (from the data compressed).	3	
9	(a)		• Off the shelf software is available for anyone to acquire and use / commercially available • Custom written software is made especially for the school/ for a specific user	2	
	(b)		• Proprietary software cannot be copied/altered (without permission of the copyright owner) • Open source software can be modified (provided it remains open source) • Proprietary software is distributed only as a compiled program/source code not available • Open source software is distributed with its source code. Mark in pairs	2	Not cost/free

Question			Answer	Marks	Guidance	
					Content	**Levels of response**
9	**(c)**		Points may include: • Must abide by software licence • So for open source, the school will be able to make modifications/customisations to exams system • But will probably have to make these modifications also available to other users • And credit all previous contributors in the code • Will have to purchase off the shelf attendance package legally • Software must be able to ensure all legal data protection requirements are met.	6	Candidates are most likely to discuss copyright issues to do with software licensing and/or data protection issues to do with pupils' personal data. Consider any relevant legal issues. It is the quality of discussion, not the breadth of issues that determines the level (eg it is possible to score a high level mark with a detailed description of copyright issues only).	**High Level Response (5–6 marks)** A detailed description of legal issues linked to the scenario in the question. 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 marks)** A description of legal issues and an attempt to link this to the scenario. Either the description of the issues or the links to the scenario may be weak. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct. **Low Level Response (1–2 marks)** Candidate outlines some obvious legal issues vaguely relevant to a school context. 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. **Response not worthy of credit (0 marks)**

Question			Answer	Marks	Guidance

10			Example
			`INPUT Length1`
			`INPUT Length2`
			`INPUT Length3`
			`IF Length1 = Length2 THEN`
			`  Output "Isosceles"`
			`ELSE`
			`  IF Length1 = Length3 THEN`
			`  Output "Isosceles"`
			`  ELSE`
			`  IF Length2 = Length 3 THEN`
			`  Output "Isosceles"`
			`  ELSE`
			`  OUTPUT "Not Isosceles"`
			`  END IF`
			`  END IF`
			`END IF`
			
			Award marks for:
			• Inputting three lengths
			• Comparing lengths in pairs
			• … for all three ways <u>correctly</u>
			• … outputting "Isosceles" for all valid cases
			• … outputting "Not Isosceles" for all cases and only in cases where the three lengths are different.
				5	There are various ways to implement this but the two most common methods will be the method shown or one disjuncted IF statement (ie IF Length1 = Length2 OR Length1 = Length3 OR Length2 = Length3). In all cases, apply the criteria in the last 4 bullet points to the whole algorithm to determine the mark.

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