OCR
Oxford Cambridge and RSA

Practice Paper

GCSE (9-1) Computer Science
J277/01 Computer Systems

MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 80

Version:
Last updated: 10/6/20

(FOR OFFICE USE ONLY)

MARKING INSTRUCTIONS

PREPARATION FOR MARKING
SCORIS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris 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 scoris and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses.

   YOU MUST MARK 10 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 scoris 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 scoris messaging system, or by email.

5. Work crossed out:
   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

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. There is a NR (No Response) option. Award NR (No Response)
   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in any way relate to the question (eg 'can't do', 'don't know')
   - OR if there is a mark (eg a dash, a question mark) which isn't an attempt at the question

   Note: Award 0 marks – for an attempt that earns no credit (including copying out the question)

8. The scoris **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 scoris 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.

10. For answers marked by levels of response:
    - to determine the level – start at the highest level and work down until you reach the level that matches the answer
    - to determine the mark within the level, consider the following

The indicative content indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance.
Using 'best-fit', decide first which set of BAND DESCRIPTORS best describes the overall quality of the answer. Once the band is located, adjust the mark concentrating on features of the answer which make it stronger or weaker following the guidelines for refinement*.

Highest mark: If clear evidence of all the qualities in the band descriptors is shown, the HIGHEST Mark should be awarded.

Lowest mark: If the answer shows the candidate to be borderline (i.e. they have achieved all the qualities of the bands below and show limited evidence of meeting the criteria of the band in question) the LOWEST mark should be awarded.

Middle mark: This mark should be used for candidates who are secure in the band. They are not 'borderline' but they have only achieved some of the qualities in the band descriptors.
Be prepared to use the full range of marks. Do not reserve (e.g.) high Band 3 marks 'in case' something turns up of a quality you have not yet seen. If an answer gives clear evidence of the qualities described in the band descriptors, reward appropriately.
*When only two marks are available (low mark band) only use Highest and Lowest mark guidance for 'best-fit'.

11. **Annotations**

Annotation	Meaning
	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
	Benefit of doubt
	Subordinate clause/Consequential error
	Cross
	Expansion of a point
	Follow through
	Not answered question
	Benefit of doubt not given
	Point being made
	Repeat
	Slash
	Tick

12. Subject Specific Marking Instructions

LEVELS OF RESPONSE QUESTIONS:

	AO2.1a	**AO2.1b**
High (thorough) (6 – 8 marks)	Precision in the use of terminology. Knowledge shown is consistent and well-developed. Clear appreciation of the question from a range of different perspectives making extensive use of acquired knowledge and principles of computer science.	Understanding of concepts is consistently applied to context enabling a logical and sustained argument to develop. Examples used enhance rather than detract from response.
Middle (reasonable) (3 – 5 marks)	Awareness of the meaning of the terms in the question. Knowledge is sound and effectively demonstrated. Demands of question understood although at times opportunities to make use of acquired knowledge and concepts are not always taken	Understanding of concepts is shown and is applied to context. There is clear evidence that an argument builds and develops through the response but there are times when opportunities are missed to use an example or relate an aspect of understanding to the context provided.
Low (basic) (1 – 2 marks)	Confusion and inability to deconstruct terminology as used in the question. Knowledge partial and superficial. Focus on question narrow and often one-dimensional.	Inability to apply understanding of key concepts in any sustained way to context resulting in tenuous and unsupported statements being made. Examples if used are for the most part irrelevant and unsubstantiated.
0 marks	No response or no response worthy of credit.	No response or no response worthy of credit.

	Assessment Objective
AO1	Demonstrate knowledge and understanding of the key concepts and principles of computer science.
AO1 1a	Demonstrate knowledge of the key concepts and principles of computer science.
AO1 1b	Demonstrate understanding of the key concepts and principles of computer science.
AO2	Apply knowledge and understanding of key concepts and principles of computer science.
AO2 1a	Apply knowledge of key concepts and principles of computer science.
AO2 1b	Apply understanding of key concepts and principles of computer science.

Where bullets are in the MS, it is 1 mark per bullet. Each bullet can only be awarded once in a response.

Where there is an 'e.g.' at the start of a set of bullets, this indicates that there are many possible marks and too many that can be listed here.

Ellipses (…) at the start of a bullet without Ellipses at the end of the previous bullet mean that the sentence reads on from the previous bullet.
e.g.

- Mark point 1
- …Mark point 2

Ellipses (…) at the start of a bullet, and ellipses at the end of the previous bullet meant that MP2 cannot be awarded if MP1 is not awarded.

- Mark point 1 …
- …Mark point 2

Any text that is underlined must be present in the format given
e.g.
Number of <u>clock</u> cycles

Any text that is emboldened, the idea of that term/phrase must be present but not in this exact format
e.g.
Prevents **unauthorised** access

A single forward slash means that there are alternative words that are acceptable in that sentence
e.g.
An example threat is a virus/spyware/unauthorised access

A double forward slash means that these are alternatives for the same MP. If a candidate gives both sides of the // then there is still only 1 mark awarded for that MP
e.g.
More instructions can be executed per second // by calculation

Question			Answer	Mark	Guidance
1	a	i	1 mark e.g. All the different characters a computer can represent	1	'The set of characters' is repeating the question and not enough
1	a	ii	256	1	
1	a	iii	1 mark for working, 1 mark for answer e.g. 2000 * 8 = 16000 16000/1000 = 16 Kilobytes	2	Ignore any overheads e.g. adding 10%
1	a	iv	UNICODE	1	
1	b		01001010	1	cao
1	c		1 mark for adding 1 to J: binary 01001011 // converting J to hexadecimal and adding 1 1 mark for answer 4B	2	Allow 1 mark for converting J into 4A without adding 1
1	d		1 mark for left 1 mark for 3 places	2	Ignore any reference to arithmetic/logical
2*			**Mark Band 3–High Level** **(6-8 marks)** The candidate demonstrates a thorough knowledge and understanding of a wide range of considerations in relation to the question; the material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate is able to weigh up both sides of the discussion and includes reference to the impact on all areas showing thorough recognition of influencing factors. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Mark Band 2-Mid Level** **(3-5 marks)** The candidate demonstrates reasonable knowledge and understanding of a range of considerations in relation to the question; the material is generally accurate but at times	8 AO2 1a (4) AO2 1b (4)	The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive: **Indicative Content:** <u>Diagnosis</u> • Search records faster • Identify range of possibilities based on symptoms • Identify patterns • More accurate/automated/AI equipment • May miss some symptoms, or suggest incorrect results <u>Treating</u> • AI/Automated surgery e.g. can control from another country • …access to specialists who are not local • Technology may be subject to hacking

			underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate makes a reasonable attempt to discuss the impact on most areas, showing reasonable recognition of influencing factors. *There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.* **Mark Band 1-Low Level** **(1-2 marks)** The candidate demonstrates a basic knowledge of considerations with limited understanding shown; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than an unsupported assertion. *The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.* **0 marks** No attempt to answer the question or response is not worthy of credit		• Error in software could have fatal consequences • May have little human interaction <u>Storage</u> • Centralised storage • All medical people can access all information about patients from all people involved in care • Concerns over privacy and security of communication of data e.g. if central storage is accessed personal information may be leaked

<table>
<tr><td>3</td><td>a</td><td>i</td><td>1 mark for correct ticks and gaps on each row

<table>
<tr><th>Statement</th><th>MAR</th><th>MDR</th><th>Cache</th><th>Program Counter</th><th>RAM</th></tr>
<tr><td>It stores a single address</td><td>✓</td><td></td><td></td><td>✓</td><td></td></tr>
<tr><td>It stores frequently used instructions</td><td></td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>It is a register</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr>
<tr><td>It stores all currently running data and instructions</td><td></td><td></td><td></td><td></td><td>✓</td></tr>
</table></td><td>4</td><td>If extra ticks on each row, 0 marks for that row</td></tr>
<tr><td>3</td><td>a</td><td>ii</td><td>1 mark for register e.g. accumulator
1 mark for description e.g. stores the result of arithmetic operations</td><td>2</td><td></td></tr>
<tr><td>3</td><td>b</td><td></td><td>1 mark per bullet
• faster/higher clock speed
• 3.2GHz will run more Fetch-Execute (F-E) cycles per second
• …therefore the more instructions can be executed per second // by calculation</td><td>2</td><td></td></tr>
<tr><td>4</td><td></td><td></td><td>1 mark for each completed term

Embedded systems have limited functions. They are

often built into a larger machine. Two examples of

embedded systems are a washing machine and</td><td>4</td><td></td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>automated lights in a car.</td><td></td><td></td></tr>
<tr><td>5</td><td>a</td><td></td><td>1 mark for 2 correct ticks
2 marks for all 4 correct ticks

<table>
<tr><th></th><th>True</th><th>False</th></tr>
<tr><td>Each colour has a unique binary code</td><td>✓</td><td></td></tr>
<tr><td>Metadata stores the colour of each pixel in the image</td><td></td><td>✓</td></tr>
<tr><td>A bitmap is made of pixels</td><td>✓</td><td></td></tr>
<tr><td>The higher the colour depth, the smaller the number of different colours that can be displayed</td><td></td><td>✓</td></tr>
</table>
</td><td>2</td><td>2 ticks in 1 row is incorrect</td></tr>
</table>

<table>
<tr><td>5</td><td>b</td><td>i</td><td>1 mark for working, 1 mark for answer
1000*3
= 3000 images</td><td>2</td><td></td></tr>
<tr><td>5</td><td>b</td><td>ii</td><td>1 mark for suitable type i.e. solid state // magnetic
1 mark per bullet to justification to max 2
solid state e.g.:
• Large enough capacity
• Can move computer without damaging storage
• Faster access speeds

magnetic e.g.:
• Largest capacity
• Do not need to move computer so moving parts do not matter
• More reliable long-term</td><td>3</td><td></td></tr>
<tr><td>5</td><td>b</td><td>iii</td><td>1 mark for 2 correct ticks
2 marks for all 3 or 4 correct ticks
3 marks for all correct

<table><tr><th></th><th>True</th><th>False</th></tr><tr><td>The sample rate is the number of times the amplitude is recorded per second</td><td>✓</td><td></td></tr><tr><td>The smaller the bit depth the smaller the range of sounds recorded</td><td>✓</td><td></td></tr><tr><td>The larger the sample rate the larger the bit depth</td><td></td><td>✓</td></tr><tr><td>The frequency and pitch of the sound wave are measured</td><td></td><td>✓</td></tr><tr><td>Sound is stored using pixels</td><td></td><td>✓</td></tr></table></td><td>3</td><td>2 ticks in 1 row is incorrect</td></tr>
<tr><td>5</td><td>c</td><td>i</td><td>1 mark per bullet to max 2
• Reduces the file size…
• …takes up less space on the server</td><td>2</td><td></td></tr>
</table>

			• Faster upload to server • Faster download for users		

5	**c**	**ii**	1 mark for lossy 1 mark per bullet to max 2 • Lossy will most likely reduce the file size by a large amount than lossless • Lossy will remove data that is not noticeable // the changes will allow for further reduction without the user noticing	3	Award FT marks for justifying lossless appropriately to max 2
5	**d**		Copyright designs and patents act	1	
6	**a**		LAN // Local area network	1	
6	**b**	**i**	1 mark per bullet Max 4 for similarities, max 4 for differences Similarities: • They both connect devices • …they receive data from the devices • …they determine the correct destination for the data • …they transmit the data to its destination Differences: • A switch uses MAC addresses • A router uses IPs • A switch corrects nodes/computers • A router connects networks/Internet • A router stores the addresses of devices attached… • …a switch records the addresses as they are accessed // a switch has to look for correct address before sending	6	
6	**b**	**ii**	1 mark per bullet • Clearly labelled switch • 2 laptops, 4 phones, 2 TVs • All devices connected to switch and nothing else	3	Connections can be wired or any identifiable wireless connection. Ignore any additional devices

<table>
<tr>
<td>6</td>
<td>c</td>
<td></td>
<td>1 mark for each completed box
<table>
<tr><th>Form of attack</th><th>Description of attack</th><th>Method of prevention</th></tr>
<tr><td>Brute-force attack</td><td>A program attempting all possible password combinations</td><td>Strong password // set number of password attempts // firewall</td></tr>
<tr><td>Data interception</td><td>Data transmission being read by unauthorised user/program</td><td>Encryption</td></tr>
<tr><td>Malware//Virus//Trojan etc.</td><td>Software that damages/deletes data</td><td>Anti-virus</td></tr>
</table>
</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>a</td>
<td></td>
<td>1 mark per bullet to max 3

Takes less time to read/access a file because the data/files/pages are contiguous
…. so it does not need to move as far to read the next piece of data/file/page
…because it is in the next memory location
Takes less time to save new data/files because there is larger free space together
…so it does not need to split the data/file
… and can store them in contiguous spaces

</td>
<td>3</td>
<td></td>
</tr>
</table>

<table>
<tr><td>7</td><td>b</td><td></td><td>1 mark per row

<table><tr><th>Action</th><th>Memory management</th><th>Peripheral management</th><th>File management</th><th>User management</th></tr><tr><td>Creating a new folder to store documents in</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>Moving data from Virtual Memory to RAM</td><td>✓</td><td></td><td></td><td></td></tr><tr><td>Renaming a file</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>Reading data from a scanner</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>Changing the password required to log onto the computer</td><td></td><td></td><td></td><td>✓</td></tr></table></td><td>5</td><td>No mark awarded if 2+ ticks on each row</td></tr>
<tr><td>7</td><td>c</td><td>i</td><td>1 mark per bullet to max 2
• Free of charge
• They can adapt it / add features</td><td>2</td><td></td></tr>
<tr><td>7</td><td>c</td><td>ii</td><td>1 mark per bullet to max 2
• She can charge customers // She can earn a profit
• She can restrict what users can do /// users can't edit it</td><td>2</td><td></td></tr>
<tr><td>7</td><td>d</td><td>i</td><td>1 mark per bullet to max 3
e.g.
• She can access the program from anywhere
• … does not need to carry a storage device with her
• Security/backup is (likely) managed for her
• …does not need to manually backup his work</td><td>3</td><td></td></tr>
<tr><td>7</td><td>d</td><td>ii</td><td>1 mark per bullet to max 3
e.g.
• If there is no Internet access he cannot access his work
• Transmission may not be secure
• …his work could be intercepted
• Security is out of his control
• …it may not be backed up/kept safe</td><td>3</td><td></td></tr>
</table>