OCR
Oxford Cambridge and RSA

…day June 20XX – Morning/Afternoon

GCSE (9–1) Computer Science

J277/01 Computer systems

SAMPLE MARK SCHEME

Time allowed: 1 hour 30 minutes

MAXIMUM MARK 80

SAMPLE MARK SCHEME

This document consists of 14 pages

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 **required number** of standardisation responses.

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

LEVELS OF RESPONSE QUESTIONS:

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'.

	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.

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Question			Answer	Marks	Guidance
1	a		It has more cores.	1 (AO2 1a)	Although Computer 1 has a lower clock speed than the CPU in Computer 2 it has more cores, which means that it can be faster than Computer 2. Any answer relating to splitting a program into processes that be carried out consecutively will be accepted.
1	b		RAM SSD HDD Graphics card (GPU)	2 (AO2 1a)	Marks can be awarded for other appropriate responses: e.g. Motherboard Sound card
1	c		• data is transferred faster (1)… • …which makes a CPU more efficient (1) • It is faster to transfer to and from cache (1)… • …than transferring to and from RAM (1).	2 (AO2 1a)	1 mark to be awarded for each correct identification and 1 mark to be awarded for the associated explanation to a maximum of 2 marks.
1	d		• An instruction is fetched from memory • The instruction is then decoded • The decoded instruction is then executed so that the CPU performs continuously • The process is repeated • The program counter is incremented • The instruction is transferred to the MDR • The address of the instruction to be fetched is placed in the MAR	2 (AO1 1a)	1 mark to be awarded for each correct answer to a maximum of 2 marks.
2	a		• Long term/non-volatile storage of data/files • External/auxiliary storage of data	1 (AO1 1a)	1 mark only to be awarded for a correct definition.
2	b		• Optical • Magnetic • Solid state	3 (AO1 1a)	1 mark only to be awarded for each correct definition.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2</td><td>c</td><td></td><td>Four characteristics from:
• Capacity/size
• Speed
• Portability
• Durability
• Reliability
• Cost</td><td>4
(AO1 1b)</td><td>1 mark to be awarded for each correct characteristic to a maximum of 4 marks.</td></tr>
<tr><td>3</td><td>a</td><td></td><td><table><tr><th></th><th>RAM</th><th>ROM</th></tr><tr><td>Stores the boot up sequence of the Sat Nav.</td><td></td><td>✓</td></tr><tr><td>The contents are lost when the Sat Nav is turned off.</td><td>✓</td><td></td></tr><tr><td>Holds copies of open maps and routes.</td><td>✓</td><td></td></tr></table></td><td>3
(AO2 1a)</td><td>Award 1 mark for each correct tick.

No marks should be awarded if ticks are in both boxes in a given row.</td></tr>
<tr><td>3</td><td>b</td><td></td><td>• A computer system that is built into another device</td><td>1
(AO1 1a)</td><td></td></tr>
<tr><td>3</td><td>c</td><td></td><td>Three devices from:
e.g.
• Dishwasher
• MP3 player
• Washing machine
• Mobile phone
• Manufacturing equipment</td><td>3
(AO1 1a)</td><td>1 mark to be awarded for each correct example identified to a maximum of 3 marks.

There are many other examples of devices with embedded systems which may be acceptable.</td></tr>
</table>

Question			Answer	Marks	Guidance
4	a		• The height of the wave is measured/sampled (at regular/set intervals) • Turned into/stored as binary	2 (AO1 1b)	1 mark for each bullet, to a maximum of 2.
	b		• The quality will improve • The file size will increase	2 (AO1 1b)	1 mark for each bullet.
5	a		203	1 (AO2 1b)	Correct Answer Only
	b		00110010	1 (AO2 1b)	Correct Answer Only
	c		• Divide the number by 4 • Loses precision	2 (AO2 1b)	
6			1 mark per bullet • each character from MOP has its ASCII code stored in the order written • **77 79 80 (MOP)** • ASCII code converted to 8-bit binary number	2 (AO2 1a AO2 1b)	
7	a		• A set of rules for communication	1 (AO1 1a)	1 mark only to be awarded for a correct definition.
7	b	i	• A division of network functionality	1 (AO1 1a)	Candidate's responses may differ from the given answer but must represent conceptually the same thing. e.g. "a layer is where jobs/processes are split up" would receive the mark.
7	b	ii	• It is self-contained (1)… • …it allows different developers to concentrate on one aspect of the network (1) • A layer can be taken out and edited without affecting other layers (1)… • …it promotes interoperability between vendors and systems (1)	2 (AO1 1a)	1 mark to be awarded for the correct identification and 1 for a valid description up to a maximum of 2 marks.
7	c		• It is easy to add a new node or device	2	1 mark to be awarded for each correct

Question			Answer	Marks	Guidance
			• Fewer data collisions can occur • If a node or device fails it does not affect the rest of the network • A signal does not need to be transmitted to all computers in the network	**(AO2 1b)**	reason to a maximum of 2 marks. Any valid comparisons to other topologies can be awarded marks.
8	**a**		• Firewall (1 – AO2 1a) prevents unauthorised access (1 – AO2 1b) • Anti-malware (1 – AO2 1a) removes viruses/spyware from infecting the system (1 – AO2 1b) • Encryption (1 – AO2 1a) any intercepted data is rendered useless (1 – AO2 1b) • User access levels (1 – AO2 1a) users have restricted access (1 – AO2 1b) • Network policies (1 – AO2 1a) rules that define acceptable use (1 – AO2 1b)	**6** **AO2 1a (3)** **AO2 1b (3)**	1 mark to be awarded for each correct type to a maximum of 3 marks. (AO2 1a) 1 mark to be awarded for each correct explanation to a maximum of 3 marks. (AO2 1b)
8	**b**		• Brings in files via any medium (1 – AO2 1a)… • …not allowing/stopping external devices being used on the network (1 – AO2 1b) • Downloading infected files from the internet (1 – AO2 1a)… • …blocking/restricting access to insecure websites (1 – AO2 1b) • Allowing physical access to the surgery's network (1 – AO2 1a)… • …locking of doors/key cards/any physical security procedure (1 – AO2 1b) • Sending/sharing sensitive data with third parties (1 – AO2 1a)… • … blocking/restricting access to USB ports/email/internet/printing (1 – AO2 1b)	**6** **AO2 1a (3)** **AO2 1b (3)**	1 mark to be awarded for each correct identification to a maximum of 3 marks. (AO2 1b) 1 mark to be awarded for each correct outlining of a procedure to a maximum of 3 marks. (AO2 1b) Allow any reasonable combination of error and reasonable procedure to mitigate the risk.
9	**a**		• Orders have been saved onto the system as they order food and then deleted once processed (1) • Once other orders have been made, new files are created (1) which may be bigger than the spaces left by the deleted files (1) • The order files are split up (1)	**4** **(AO2 1b)**	Up to a maximum of 4 marks. A maximum of three marks if there is no contextualisation. Allow a mark if candidates state that fragmentation increases access time. (1)
9	**b**		• Files on the hard disk drive are moved (1) • Empty spaces collected together (1) • Files are moved to be stored together (1) • Fewer disc accesses are needed (1)	**3** **(AO1 1b)**	Up to a maximum of 3 marks.

Question			Answer	Marks	Guidance
10	a		• The computers are geographically remote/ distanced/ more than a mile apart • Communication medium is not owned by the law firm	1 (AO1 1a)	1 mark only to be awarded for a correct definition. Accept responses such as the company doesn't own the infrastructure. Do not accept 'Network over a wide area' or similar arrangement of wording.
10	b		Two advantages from: • It would offer additional storage (1) so the company can take on more cases (1) • It is a very efficient method of backing up data (1) and so saves the firm time and money (1) • It would allow their employees to work from anywhere (1) so they can take cases from other countries (1) • It is environmentally friendly (1) • Easy to increase availability of storage (1) • You don't need specialist network skills (1) so the firm don't need to employ more staff (1) • The third party provides security (1) so the company saves money on staff and software/hardware (1) • The third party provides backup (1) so the company saves money on staff and software/hardware (1) • Cheaper as don't need own infrastructure (1) Each advantage needs to be contextualised to gain 2 marks.	4 (AO2 1b)	1 mark to be awarded for each correct advantage, with a mark for a discussion of the advantage related to the law firm. To a maximum of 2 advantages. The total number of marks to be awarded for this task is 4 marks. Responses which are not contextualised will gain a maximum of 1 mark per advantage (to a maximum of 2 advantages).
10	c		Two disadvantages from: • You need a constant internet connection (1) which lawyers who travel a lot may not always have (1) • Reliant on third party to carry out security procedures (1) but the firm are	4 (AO2 1b)	1 mark to be awarded for each correct disadvantage with a mark for a discussion of the disadvantage related to the law firm. To a maximum of 2 disadvantages.

<table>
<tr><th colspan="3">Question</th><th colspan="5">Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td></td><td></td><td colspan="5">still legally responsible if things go wrong (1)
• Reliant on third party for back up connection (1)
• Data stored in the Cloud will be vulnerable to hacking and other threats (1) which the firm have no control over (1)
• Issues regarding data ownership (1)
• Implications of Data Protection Act (1)

Each disadvantage needs to be contextualised to gain 2 marks</td><td></td><td>The total number of marks to be awarded for this task is 4 marks.

Responses which are not contextualised will gain a maximum of 1 mark per disadvantage (to a maximum of 2 disadvantages).</td></tr>
<tr><td>10</td><td>d</td><td></td><td>Action</td><td>Data Protection Act 1998</td><td>Computer Misuse Act 1990</td><td>Copyright Designs and Patents Act 1988</td><td>6 (AO1 1b)</td><td>1 mark for each tick in the correct box.

0 marks for a row with more than one tick.</td></tr>
<tr><td></td><td></td><td></td><td>Using a picture for the law company's new logo without the original creator's permission</td><td></td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>A secretary accessing a lawyer's personal email account without permission</td><td></td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>Making a copy of the latest Hollywood blockbuster movie and sharing it with a client</td><td></td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>Storing customer data insecurely</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>A lawyer installing a key logger on the secretary's computer</td><td></td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>Selling client's personal data to a marketing company without their permission</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
11 *			**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 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	**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>Smartphone users</u> • Can adversely affect people in this country and abroad: o health issues o financially o socially o culturally <u>Cultural issues</u> • Desire/need to own newest device • …to fit in with peers • May have new features that users require for work/leisure <u>Environmental issues</u> • The type of devices that are disposed of • Modern phones poorly designed for durability • Phones' hardware not upgradeable/replaceable • Reference to e-waste (people dispose of their devices in landfill even if they are in good working order) • Some equipment is also sent abroad to be disposed of • Leads to excessive landfill (in this country and/or abroad, e.g. Africa

Question			Answer	Marks	Guidance
			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.		and Asia) • Toxic waste released into land, ground water, air (in this country and/or abroad, e.g. Africa and Asia) • Waste of resources • Precious metals in phones <u>Ethical issues</u> • Contributes to ill health • Contributes to the digital divide • Contributes to social divide • Problem of confidential data stored on the devices • Puts social pressure on parents to pay for their children to upgrade • Puts social pressure on the public to upgrade • Can lead to bullying of those who cannot afford the latest technology • Phone manufacturers intentionally designing fragile phones so they need to be replaced more often • High cost of new devices.

Summary of updates

<table>
<tr><td>July 2019</td><td>2</td><td>To clearly differentiate the updated approach for the external assessment of practical programming skills for first teach 2019 / first assessment 2022, we have updated our qualification code from J276 to J277.</td></tr>
<tr><td>July 2019</td><td>2</td><td>There have been some changes to the Component 1 sample assessment material (SAM) based on content changes related to specification and assessment updates made for first teach 2020 / first assessment 2022.

Mapping of questions:

<table>
<tr><td>Updated: Version 2 SAM (J277)</td><td>Version 1 SAM (J276)</td></tr>
<tr><td>1(a) 1(b) 1(c) 1(d)</td><td>1(a) (b) (c) (d)</td></tr>
<tr><td>2(a) 2(b) 2(c)</td><td>2(a) 2(b) 2(c)</td></tr>
<tr><td>3(a) 3(b) 3(c)</td><td>3(a) 3(b) 3(c)</td></tr>
<tr><td>4(a)</td><td>1(a) on Component 2 SAM</td></tr>
<tr><td>4(b)</td><td>1(b) on Component 2 SAM</td></tr>
<tr><td>5(a) new</td><td></td></tr>
<tr><td>5(b)</td><td>3(a) on Component 2 SAM</td></tr>
<tr><td>5(c)</td><td>3(b) on Component 2 SAM</td></tr>
<tr><td>6 new</td><td></td></tr>
<tr><td>7(a)</td><td>5(a)</td></tr>
<tr><td>7(b)(i) and 7(b)(ii)</td><td>5(b)(i) and 5(b)(ii)</td></tr>
<tr><td>7(c) updated</td><td>5(c)</td></tr>
<tr><td>8(a)</td><td>6(a)</td></tr>
<tr><td>8(b)</td><td>6(b)</td></tr>
<tr><td>9(a)</td><td>7(a)</td></tr>
<tr><td>9(b)</td><td>7(b)</td></tr>
<tr><td>10(a)</td><td>8(a)</td></tr>
<tr><td>10(b)</td><td>8(b)</td></tr>
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<table>
<tr><td></td><td></td><td><table>
<tr><td>10(c)</td><td>8(c)</td></tr>
<tr><td>10(d)</td><td>8(d)</td></tr>
<tr><td>11</td><td>9</td></tr>
</table></td></tr>
<tr><td>July 2019</td><td>2</td><td>We’ve reviewed the look and feel of our papers through text, tone, language, images and formatting. For more information please see our assessment principles in our ‘Exploring our question papers’ brochure on our website.</td></tr>
</table>