Cambridge Assessment International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9608/13**

Paper 1 Written Paper **October/November 2020**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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[Turn over

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

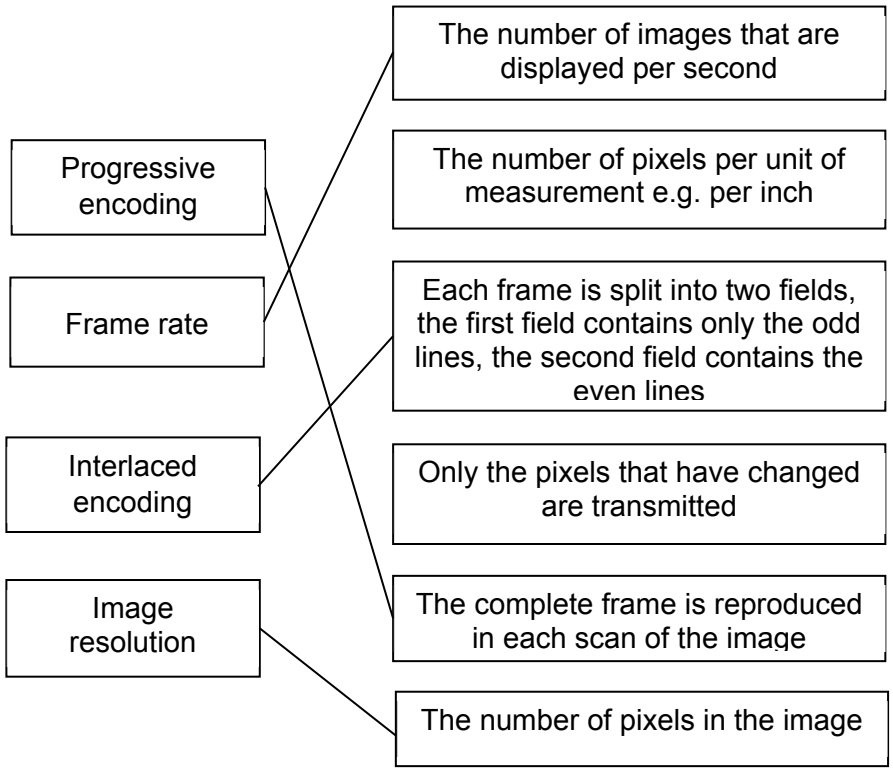
Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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Question	Answer	Marks
1	**1 mark** for each correct utility program **Task** / **Utility program** Rearrange the data on a disk so that files are contiguous, and all free space is collected together — **Disk defragmenter** Prepare a disk for initial use — **Disk formatter** Reduce the size of a file — **File compression** Examine the disk to find any bad sectors — **Disk contents analysis / repair**	**4**

Question	Answer	Marks
2	**1 mark** for each correct line 	**4**

Question	Answer	Marks
3(a)	**1 mark** per bullet point to **max 2** • To run / test the incomplete program • To locate individual errors in the program because the interpreter stops • … and allows the programmer to correct errors in real-time • To change the program and see the effects of the changes in real-time	**2**

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Question	Answer	Marks
3(b)	**1 mark** per bullet point to **max 2** • To run / test the program multiple times without re-compiling • To produce an executable file • … so that it can be distributed without the source code	**2**
3(c)	**1 mark** for a benefit, **1 mark** for a drawback Benefit: • Programs may be interpreted on different platforms Drawback: • Intermediate code / program still needs to be interpreted on the user's computer, which may run slowly • Extra CPU resources may be required	**2**

Question	Answer	Marks
4(a)(i)	**1 mark** per bullet point • To identify the laptop on the home network • To allow the router to send data to the laptop from the Internet / another device on the home network	**2**
4(a)(ii)	**1 mark** per bullet point to **max 2** • The router has the public IP address for the home network • All data comes through the router • The laptop is not accessible / visible to the outside world • … to ensure security // to protect the laptop from external threats	**2**
4(a)(iii)	**1 mark** per bullet point to **max 3** • IPv4 has 4 groups of digits, IPv6 has 8 groups of digits • In IPv4 each group is from 0-255, in IPv6 each group is from 0-65535 • IPv4 uses a full-stop between each group, IPv6 uses a colon between each group • IPv4 is 32-bit, IPv6 is 128-bit // IPv4 uses 4 bytes, IPv6 uses 16 bytes	**3**
4(b)	**1 mark** for identification, **1 mark** for further description • Dedicated lines / leased line services • Connection that is only used for that business/organisation // permanent connection • Cell phone network • Send data to cell towers over mobile connection • Satellite • Send data to satellites in orbit	**4**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(c)(i)</td><td>1 mark for each correct description

<table>
<tr><th>PHP Code</th><th>Description</th></tr>
<tr><td><code>echo "Hello World";</code></td><td>Outputs the string Hello World to the browser</td></tr>
<tr><td><code>$number1 = 22;</code></td><td>Stores the number 22 in the variable $number1</td></tr>
<tr><td><code>$newValue = $ _ GET["number"];</code></td><td>Get the value assigned to number and store it in the variable $newValue</td></tr>
<tr><td><code>print "Hello " . $name . "<br>";</code></td><td>Output Hello, followed by the value stored in the variable $name and then force a new line break</td></tr>
</table></td><td>4</td></tr>
<tr><td>4(c)(ii)</td><td>1 mark for a correct answer

• Javascript</td><td>1</td></tr>
<tr><td>4(d)</td><td>1 mark per bullet point to max 2

• Automatically checks for errors on receipt of data
• Alerts if data has been received incorrectly // requests data to be re-sent
• Provides a verification check on data</td><td>2</td></tr>
</table>

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>5(a)(i)</td><td>1 mark for each correct row

<table>
<tr><th>Letter</th><th>Action</th><th>Register transfer notation</th></tr>
<tr><td>A</td><td>The Memory Address Register (MAR) stores an address. The contents of this stored address are copied to the Memory Data Register (MDR).</td><td>MDR ← [[MAR]]</td></tr>
<tr><td>B</td><td>The contents of the Program Counter (PC) are copied to the Memory Address Register (MAR).</td><td>MAR ← [PC]</td></tr>
<tr><td>C</td><td>The contents of the Memory Data Register (MDR) are copied to the Current Instruction Register (CIR).</td><td>CIR ← [MDR]</td></tr>
<tr><td>D</td><td>The contents of the Program Counter (PC) are incremented.</td><td>PC ← [PC] + 1</td></tr>
</table></td><td>4</td></tr>
<tr><td>5(a)(ii)</td><td>1 mark for B, A, C in order

1 mark for D at any point after B</td><td>2</td></tr>
<tr><td>5(b)</td><td>1 mark for the first three rows correct 1 mark for the last row correct

<table>
<tr><th>Statement</th><th>Address bus</th><th>Control bus</th><th>Data bus</th></tr>
<tr><td>Receives data from the MAR</td><td>✓</td><td></td><td></td></tr>
<tr><td>Carries an address or an instruction or a value</td><td></td><td></td><td>✓</td></tr>
<tr><td>Transmits timing signals to components</td><td></td><td>✓</td><td></td></tr>
<tr><td>Bidirectional</td><td></td><td>✓</td><td>✓</td></tr>
</table></td><td>2</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>5(c)(i)</td><td>1 mark for each correct example, ignore operand

Arithmetic:
• ADD // INC

Data movement
• STO // LDD // LDI // LDM</td><td>2</td></tr>
<tr><td>5(c)(ii)</td><td>1 mark for each correct shaded section

<table>
<tr><th rowspan="2">Instruction address</th><th rowspan="2">ACC</th><th colspan="4">Memory address</th></tr>
<tr><th>900</th><th>901</th><th>902</th><th>903</th></tr>
<tr><td></td><td></td><td></td><td></td><td>0</td><td>0</td></tr>
<tr><td>500</td><td>2</td><td></td><td></td><td></td><td></td></tr>
<tr><td>501</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td>502</td><td>10</td><td></td><td></td><td></td><td></td></tr>
<tr><td>503</td><td></td><td>10</td><td></td><td></td><td></td></tr>
<tr><td>504</td><td>10</td><td></td><td></td><td></td><td></td></tr>
<tr><td>505</td><td></td><td></td><td></td><td>10</td><td></td></tr>
<tr><td>506</td><td>0</td><td></td><td></td><td></td><td></td></tr>
<tr><td>507</td><td>1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>508</td><td></td><td></td><td></td><td></td><td>1</td></tr>
<tr><td>509</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>510</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>502</td><td>3</td><td></td><td></td><td></td><td></td></tr>
<tr><td>503</td><td></td><td>3</td><td></td><td></td><td></td></tr>
<tr><td>504</td><td>13</td><td></td><td></td><td></td><td></td></tr>
<tr><td>505</td><td></td><td></td><td></td><td>13</td><td></td></tr>
<tr><td>506</td><td>1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>507</td><td>2</td><td></td><td></td><td></td><td></td></tr>
<tr><td>508</td><td></td><td></td><td></td><td></td><td>2</td></tr>
<tr><td>509</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>511</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td><td>6</td></tr>
<tr><td>5(d)(i)</td><td>202</td><td>1</td></tr>
<tr><td>5(d)(ii)</td><td>–54</td><td>1</td></tr>
<tr><td>5(d)(iii)</td><td>Both nibbles are binary numbers representing denary numbers greater than 9</td><td>1</td></tr>
</table>

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Question	Answer	Marks
6(a)	**1 mark** for each valid point or appropriate expansion to **max 2** e.g. • Reduce his workload // Review his work demands • Redistribute his work • Arrange a meeting with him • ... to discuss the reasons why he is struggling	**2**
6(b)	**1 mark** for each valid point or appropriate expansion to **max 2** e.g. • Not acting in best interest of the client • ... The error could cause significant problems for the client if encountered • The product does not meet the highest possible standard • Not acting in the best interest of the development company • … if the error occurs, it could lead to repercussions for the development company	**2**
6(c)(i)	**1 mark** from • Protects the intellectual property • Allows legal action against anyone else who claims it as their own • Formally / Legally identify the client as the owner of the software	**1**
6(c)(ii)	**1 mark** for each correct licence • Commercial • Shareware	**2**
6(c)(iii)	**1 mark** for correctly identifying a licence, **1 mark** for justification • Open Source // Free Software • Anyone can modify/copy the source code and re-distribute which is not what the client wants	**2**

Question	Answer	Marks
7(a)	1 mark per bullet point to max 4 • Each item is a drawing object • Properties of each drawing object are stored • … an example of a property e.g. the position/coordinates of each drawing object • … a second example of a property e.g. the line colour • Exact dimensions are not stored // a calculation for proportional size is stored • Objects are created using mathematical calculations	**4**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>7(b)(i)</td><td>1 mark for working
1 mark for correct answer

Working:
1024 × 2048 = 2 097 152 pixels
= 2 097 152 bytes (8 bits per pixel)
= 2 097 152 / 1024 = 2048 KB
= 2048 / 1024 MB

Answer: 2 MB</td><td>2</td></tr>
<tr><td>7(b)(ii)</td><td>1 mark for identification of method, max 2 for description for one method

e.g.
• Reduce the colour depth
• … reduce the number of bits per colour
• … each pixel has fewer bits

• Reducing the resolution
• … fewer pixels per unit measurement
• … fewer pixels / binary numbers are stored</td><td>3</td></tr>
<tr><td>8(a)</td><td>1 mark for each pair of correct answers (shaded)

<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working space</th><th>X</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td></td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td></td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td></td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td></td><td>0</td></tr>
</table>
</td><td>4</td></tr>
</table>

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>8(b)</td><td>1 mark for correct name, 1 mark for corresponding truth table

• NAND
<table><tr><th>A</th><th>B</th><th>Output</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>
• XOR
<table><tr><th>A</th><th>B</th><th>Output</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table></td><td>2</td></tr>
</table>

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