



Cambridge International AS & A Level

COMPUTER SCIENCE

9608/11

Paper 1 Written Paper

May/June 2020

MARK SCHEME

Maximum Mark: 75

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

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

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

This document consists of **10** printed pages.

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.

| Question | Answer | Marks | | | | | | | | |
|------------------|--|------------------|-------------|----------------|---|------------|---|--------|--|----------|
| 1(a) | <p>1 mark for each correctly completed term.</p> <p>Validation checks that the data entered is reasonable. One example is a presence check.</p> <p>Verification checks that the data entered is the same as the original. One example is double entry.</p> | 4 | | | | | | | | |
| 1(b) | <p>1 mark for each correct entry</p> <table border="1"> <thead> <tr> <th>Security measure</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Disk mirroring</td> <td>Data are written on two or more disks simultaneously.</td> </tr> <tr> <td>Encryption</td> <td>Contents are scrambled so they cannot be understood without a decryption key</td> </tr> <tr> <td>Backup</td> <td>A copy of the data is taken and stored in another location</td> </tr> </tbody> </table> | Security measure | Description | Disk mirroring | Data are written on two or more disks simultaneously. | Encryption | Contents are scrambled so they cannot be understood without a decryption key | Backup | A copy of the data is taken and stored in another location | 3 |
| Security measure | Description | | | | | | | | | |
| Disk mirroring | Data are written on two or more disks simultaneously. | | | | | | | | | |
| Encryption | Contents are scrambled so they cannot be understood without a decryption key | | | | | | | | | |
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| Question | Answer | Marks | | | | | | | | | | | | | | | |
|-------------|---|--------|-------|--------|-------------|--|---|------------|---|--|----------|---|--|-------------|---|---|----------|
| 2(a) | <p>1 mark for first three rows, 1 mark for the touchscreen being both.</p> <table border="1"> <thead> <tr> <th>Device</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>LCD Monitor</td> <td></td> <td>✓</td> </tr> <tr> <td>Microphone</td> <td>✓</td> <td></td> </tr> <tr> <td>Keyboard</td> <td>✓</td> <td></td> </tr> <tr> <td>Touchscreen</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table> | Device | Input | Output | LCD Monitor | | ✓ | Microphone | ✓ | | Keyboard | ✓ | | Touchscreen | ✓ | ✓ | 2 |
| Device | Input | Output | | | | | | | | | | | | | | | |
| LCD Monitor | | ✓ | | | | | | | | | | | | | | | |
| Microphone | ✓ | | | | | | | | | | | | | | | | |
| Keyboard | ✓ | | | | | | | | | | | | | | | | |
| Touchscreen | ✓ | ✓ | | | | | | | | | | | | | | | |



| Question | Answer | Marks |
|----------|--|----------|
| 2(b)(i) | <p>1 mark for 1 correct entry 2 marks for 2 correct entries 3 marks for 3 correct entries 4 marks for 5 correct entries</p> <p>1 The object is designed using Computer Aided Design (CAD) software 2 C (The software splits the object into slices) 3 E (The data about the slices is sent to the printer) 4 The solid plastic is melted and transferred to the nozzle 5 A (A stepper motor moves the nozzle into position) 6 D (The nozzle extrudes the molten plastic) 7 The steps 5 to 6 repeat until the layer is complete 8 B (A fan cools the layer) 9 The steps 4 to 8 are repeated for each subsequent layer</p> | 4 |
| 2(b)(ii) | <p>1 mark per bullet point. Max 3 for RAM, max 2 for ROM</p> <p>RAM</p> <ul style="list-style-type: none"> • Stores currently running parts of the 3D printer software • Stores the data about the layers being printed // contents of buffer • Stores current progress of printing • Stores the data about the printer, e.g. Plastic levels, nozzle position <p>ROM</p> <ul style="list-style-type: none"> • Stores the operating software for the 3D printer // OS for the 3D printer • Stores the boot-up/start-up instructions for the 3D printer | 4 |

| Question | Answer | Marks |
|----------|--|----------|
| 3(a) | <p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Outputs 12 // the result of 10 + 2 • In the object with the name "text 2" | 2 |
| 3(b) | <p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Declares a function called <code>calculateValue</code> • ... which takes two values as parameters | 2 |

| Question | Answer | Marks |
|----------|--|----------|
| 3(c) | <p>1 mark per bullet point to max 2</p> <ul style="list-style-type: none"> • Assigns the value 2 to the variable \$number1 • Outputs to the screen • the result of \$number1 to the power of 3 | 2 |

| Question | Answer | Marks | | | | | | |
|--------------------|--|-----------|---|--------------------|-----|-------------------|----|----------|
| 4(a) | <p>1 mark per bullet point</p> <ul style="list-style-type: none"> • $2000 * 1000 * 24 = 48\,000\,000$ bits • $48\,000\,000 / 8 / 1024 / 1024$ • = 6 MB or 5.7 MB | 3 | | | | | | |
| 4(b) | <p>1 mark per bullet point to max 2</p> <ul style="list-style-type: none"> • Only 1 bit needed to store the colour of each pixel ... • ... so number of pixels * bit depth is $2000 * 1000 * 1$ (rather than $2000 * 1000 * 24$) • ... so the calculation (in part 4(a)) results in smaller figure for file size | 2 | | | | | | |
| 4(c)(i) | 0110 0010 | 1 | | | | | | |
| 4(c)(ii) | <p>1 mark for each correct line</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Character</th> <th>t</th> </tr> </thead> <tbody> <tr> <td>ASCII denary value</td> <td>116</td> </tr> <tr> <td>Hexadecimal value</td> <td>74</td> </tr> </tbody> </table> | Character | t | ASCII denary value | 116 | Hexadecimal value | 74 | 2 |
| Character | t | | | | | | | |
| ASCII denary value | 116 | | | | | | | |
| Hexadecimal value | 74 | | | | | | | |

| Question | Answer | Marks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|--|-------|---------------|---|---------------|---|---|---|---|--|---|---|---|---|--|---|---|---|---|--|---|---|---|---|--|---|---|---|---|--|---|---|---|---|--|---|---|---|---|--|---|---|---|---|--|---|----------|
| 5(a) | <p>1 mark for each pair of correct answers (shaded)</p> <table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>Working space</th> <th>X</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td></td> <td>0</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td></td> <td>1</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>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td></td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td></td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td></td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td></td> <td>0</td> </tr> </tbody> </table> | A | B | C | Working space | X | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | | 1 | 0 | 1 | 0 | | 1 | 0 | 1 | 1 | | 0 | 1 | 0 | 0 | | 1 | 1 | 0 | 1 | | 1 | 1 | 1 | 0 | | 0 | 1 | 1 | 1 | | 0 | 4 |
| A | B | C | Working space | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Question | Answer | Marks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|--|--------|--|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|--|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5(b) | <p>1 mark for name, 1 mark for symbol, 1 mark for truth table</p> <ul style="list-style-type: none"> NAND  <table border="1"> <thead> <tr> <th colspan="2">Input</th> <th rowspan="2">Output</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <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> </tbody> </table> <ul style="list-style-type: none"> NOR  <table border="1"> <thead> <tr> <th colspan="2">Input</th> <th rowspan="2">Output</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table> | Input | | Output | A | B | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Input | | Output | A | B | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 3 |
| Input | | Output | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Input | | Output | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Question | Answer | Marks |
|----------|--|-------|
| 6(a)(i) | <p>1 mark for each correct answer</p> <p>A: The number 193</p> <p>B: The data in memory location 193</p> <p>C: The data in the memory location found by adding the contents of the IX to 193</p> | 3 |
| 6(a)(ii) | <p>1 mark each correct answer</p> <ul style="list-style-type: none"> Indirect Relative | 2 |

| Question | Answer | Marks |
|----------|---|----------|
| 6(b) | <p>1 mark for correctly naming register, 1 mark for appropriate role</p> <ul style="list-style-type: none"> • Program counter // PC • Stores the address of the next instruction to be fetched • Memory address register // MAR • Stores the address where data/instruction is to be read from or saved to • Memory data register // MDR • Stores data that is about to be written to memory // Stores data that has just been read from memory • Current instruction register // CIR • Stores the instruction that is currently being decoded/executed | 4 |

| Question | Answer | Marks |
|----------|---|----------|
| 7(a) | <p>1 mark per bullet point to max 2</p> <ul style="list-style-type: none"> • Reduced data redundancy • Reduced data dependency • Improved data integrity • Improved data privacy • Program-data independence • Ability to create ad hoc queries | 2 |
| 7(b) | <p>1 mark for each correct link</p> <pre> classDiagram class INSTRUCTOR class LESSON class STUDENT class INSTRUCTOR_CAR class CAR INSTRUCTOR < -- LESSON INSTRUCTOR < -- INSTRUCTOR_CAR LESSON < -- STUDENT INSTRUCTOR_CAR < -- CAR </pre> | 4 |

| Question | Answer | Marks |
|----------|---|----------|
| 7(c) | <p>1 mark for each correctly completed statement</p> <ul style="list-style-type: none"> • CREATE (line 1) • INTEGER (line 6) • PRIMARY KEY (line 7) <pre>CREATE TABLE INSTRUCTOR (InstructorID VARCHAR(5), FirstName VARCHAR(15), LastName VARCHAR(15), DateOfBirth DATE, Level INTEGER, PRIMARY KEY (InstructorID));</pre> | 3 |
| 7(d) | <p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Alter table student • Add an appropriate identifier with suitable data type <pre>ALTER TABLE STUDENT ADD TelNum VARCHAR;</pre> | 2 |
| 7(e) | <p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Select lesson date and lesson time • From table LESSON • Where InstructorID = "Ins01" • And lesson date is greater than today's date <pre>SELECT LessonDate, LessonTime FROM LESSON WHERE InstructorID = "Ins01" AND LessonDate > #####;</pre> | 4 |

| Question | Answer | Marks |
|----------|---|----------|
| 8(a) | <p>1 mark per bullet point to max 4</p> <ul style="list-style-type: none"> • Reads/writes data to/from RAM • ... e.g. current data/instructions from a game so the CPU can access it • Allocates virtual memory • ... when there is insufficient RAM to run a program/game • Allocates RAM to optimise performance • Paging • Segmentation | 4 |

| Question | Answer | Marks |
|----------|---|----------|
| 8(b) | <p>1 mark per bullet point to max 2</p> <ul style="list-style-type: none"> • Software will have been built using a compiler // the software is pre-compiled • Software is an executable file // the game is already in machine code // the game is already set-up to run on the console • Source code is not provided so does not need compiling/interpreting | 2 |
| 8(c) | <p>1 mark for each similarity, max 2</p> <ul style="list-style-type: none"> • Both devices regulate network traffic between two networks // connect two networks • Both receive packets from a network and both forward packets onto a network <p>1 mark for a difference</p> <ul style="list-style-type: none"> • A Router connects two networks using the same protocol, a Gateway can connect two networks using different protocols | 3 |

| Question | Answer | Marks | | | | | | | | | | | | |
|---|---|-------------|-----------------|---|-------------------------------------|---|---|--|-----------------------|----------|--|---|--|----------|
| 9(a) | <p>1 mark for each correctly identified utility program</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Utility program</th> </tr> </thead> <tbody> <tr> <td>Reorganises files on a disk to improve efficiency</td> <td>Defragmentation software</td> </tr> <tr> <td>Scans a hard disk to identify bad sectors</td> <td>Disk contents analysis / repair software</td> </tr> <tr> <td>Prepares a hard disk for first use</td> <td>Disk formatter</td> </tr> </tbody> </table> | Description | Utility program | Reorganises files on a disk to improve efficiency | Defragmentation software | Scans a hard disk to identify bad sectors | Disk contents analysis / repair software | Prepares a hard disk for first use | Disk formatter | 3 | | | | |
| Description | Utility program | | | | | | | | | | | | | |
| Reorganises files on a disk to improve efficiency | Defragmentation software | | | | | | | | | | | | | |
| Scans a hard disk to identify bad sectors | Disk contents analysis / repair software | | | | | | | | | | | | | |
| Prepares a hard disk for first use | Disk formatter | | | | | | | | | | | | | |
| 9(b) | <p>1 mark for 3 correct answers</p> <table border="1"> <thead> <tr> <th>Action</th> <th>Lossy</th> <th>Lossless</th> </tr> </thead> <tbody> <tr> <td>Reducing the resolution of an image</td> <td>✓</td> <td></td> </tr> <tr> <td>Using run-length encoding on a text file</td> <td></td> <td>✓</td> </tr> <tr> <td>Reducing the sampling rate of a sound file</td> <td>✓</td> <td></td> </tr> </tbody> </table> | Action | Lossy | Lossless | Reducing the resolution of an image | ✓ | | Using run-length encoding on a text file | | ✓ | Reducing the sampling rate of a sound file | ✓ | | 1 |
| Action | Lossy | Lossless | | | | | | | | | | | | |
| Reducing the resolution of an image | ✓ | | | | | | | | | | | | | |
| Using run-length encoding on a text file | | ✓ | | | | | | | | | | | | |
| Reducing the sampling rate of a sound file | ✓ | | | | | | | | | | | | | |