

Cambridge IGCSE™

COMPUTER SCIENCE**0478/11**

Paper 1 Computer Systems

October/November 2024**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 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **13** printed pages.

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 descriptions 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.

Mark scheme abbreviations

/ separates alternative words / phrases within a marking point

// separates alternative answers within a marking point

underline actual word given must be used by candidate (grammatical variants accepted)

max indicates the maximum number of marks that can be awarded

() the word / phrase in brackets is not required, but sets the context

Note: No marks are awarded for using brand names of software packages or hardware.

Question	Answer	Marks
1(a)	B	1
1(b)(i)	<ul style="list-style-type: none"> • Lossy • Lossless 	2
1(b)(ii)	<p>Any three from:</p> <ul style="list-style-type: none"> • The file requires less storage space • Takes less time to transmit • A lower bandwidth can be used to transmit the file • Less data usage for data allowance • More likely to meet file size limits set by email clients/apps 	3

Question	Answer	Marks
2(a)	<p>Any two from:</p> <p>For example:</p> <ul style="list-style-type: none"> • Touchscreen • Microphone • Sensor // by example • Biometric device • Button • (Digital) camera 	2
2(b)	<p>Any two from:</p> <p>For example:</p> <ul style="list-style-type: none"> • Screen • Speaker • LED • Actuator 	2

Question	Answer	Marks
2(c)(i)	<p>Any two from:</p> <ul style="list-style-type: none"> • To store data/files permanently • ... otherwise, data/programs would need to be downloaded/entered/installed every time the smartphone was turned on • To allow software to be downloaded/installed on the smartphone // • To store user files • For the creating of <u>virtual memory</u> 	2
2(c)(ii)	<p>One mark for:</p> <p>Solid state</p> <p>Any Three from:</p> <ul style="list-style-type: none"> • It is small/thin in size • ... so it would fit easily into the smartphone device • It is lightweight • ... so it wouldn't make the smartphone heavy to carry • It has no moving parts • ... so it would be durable/robust • ... if the smartphone is dropped the data is less likely to be damaged/lost • It has fast read/write speeds • ... so it would be quick to load files/software • It runs at a cool temperature • ... so it wouldn't make the smartphone hot to hold for the user • It doesn't make a lot of noise • ... so it wouldn't ruin the user's experience of listening to music/watching videos • It doesn't require much power • ... so it won't drain the battery • It can have a large storage capacity • ... so can store files that are multimedia 	4

Question	Answer	Marks
3(a)	Unicode	1
3(b)(i)	<ul style="list-style-type: none"> • (0)1000001 • (0)1101101 	2
3(b)(ii)	<ul style="list-style-type: none"> • 41 • 6D 	2
3(c)(i)	121	1
3(c)(ii)	79	1
3(c)(iii)	00011110	1
3(d)	<p>One mark for correct working, for example: carries One mark for each correct nibble.</p> $ \begin{array}{r} 111\ 1 \\ 01010100 \\ \underline{01110100} \\ 11001000 \end{array} $	3

Question	Answer	Marks
4(a)	<p>Any four from:</p> <ul style="list-style-type: none"> • The data packet has three sections • It has a packet header ... • ... that contains data such as the destination address • It has a payload ... • ... that contains the main data for the email • It has a trailer ... • ... that contains data such as the error detection system used 	4

Question	Answer	Marks
4(b)(i)	<p>Any four from:</p> <ul style="list-style-type: none"> • It sends the data multiple bits at the same time // It uses multiple wires • ... so the transmission speed of the data will be fast • Data may not need to travel a long distance • ... as the devices are all within a single room • It sends data in both directions at the same time • ... so users on the network can send data to each other with no delay 	4
4(b)(ii)	<p>Any two from:</p> <ul style="list-style-type: none"> • More interference/crosstalk (due to multiple wires) • Data may be skewed (due to multiple bits at a time) // <u>bits</u> may arrive out of order • More chance of data collisions (as data sent in both directions at the same time) • More chance of error in the data 	2
4(b)(iii)	<p>Any one from:</p> <ul style="list-style-type: none"> • Serial simplex • Serial half-duplex • Serial full-duplex • Parallel simplex • Parallel half-duplex 	1

Question	Answer	Marks
5(a)	<p>Any two from:</p> <ul style="list-style-type: none"> • Program counter // PC • Memory address register // MAR • Memory data register // MDR • Current instruction register // CIR 	2
5(b)	<p>Any three from:</p> <ul style="list-style-type: none"> • CIR/CU receives the instruction from the MDR // Instruction sent from MDR to CIR/CU • ... using the data bus • Instruction is separated into opcode and operand • Control unit decodes the instruction • ... using an instruction set 	3
5(c)	<p>Any one from:</p> <ul style="list-style-type: none"> • Accumulator • Memory address register // MAR • Memory data register // MDR 	1
5(d)	<ul style="list-style-type: none"> • data • address • control 	3
5(e)	<ul style="list-style-type: none"> • It can now execute more instructions/FDE per second • ... this will increase the performance of the CPU 	2

Question	Answer	Marks
6(a)	<p>Any one from:</p> <ul style="list-style-type: none"> • Computer system that is designed to perform dedicated/single function • Computer system that contains a microprocessor (and)/dedicated hardware • Computer system that is built into a larger system 	1

Question	Answer	Marks
6(b)	Assembler	1
6(c)	Any one from: <ul style="list-style-type: none"> • Convert to hexadecimal • Convert to denary • A character set can be used 	1
6(d)	Any one from: <ul style="list-style-type: none"> • More control over manipulating the hardware • Faster execution for testing than a high-level language • They can use machine specific instructions 	1
6(e)	Six from (MAX 4 for stating features): Code editor that allows the user to enter and amend code in their program Run-time environment ... that allows a program to be run and see the outputs of their program Error-diagnostic ... to show the programmer where there are errors in the program Auto-completion ... to give the user options/suggestions of key commands to select Auto-correction ... to correct a command that has a minor misspelling Prettyprint ... changes the colour of key commands do they are easy to identify	6

Question	Answer	Marks
7(a)(i)	D	1
7(a)(ii)	<p>One mark for identifying a function. One mark for a matching description. For example:</p> <ul style="list-style-type: none"> • Memory management <ul style="list-style-type: none"> • ... managing what gets allocated where in memory • Managing peripherals and drivers <ul style="list-style-type: none"> • ... managing the communication between any input and output devices that are connected to the computer • Multitasking <ul style="list-style-type: none"> • ... managing the process of switching between tasks that are being carrying out • Platform for running applications <ul style="list-style-type: none"> • ... allowing communication between the applications software and the hardware • System security <ul style="list-style-type: none"> • ... proving features such as username and password • User accounts <ul style="list-style-type: none"> • ... allowing multiple user accounts to be created on a computer 	2
7(b)	<p>Any one from:</p> <ul style="list-style-type: none"> • Firmware • Bootloader • BIOS • Bootstrap 	1

Question	Answer	Marks
8	<p>One mark for each correct part.</p> <p>The diagram shows:</p> <ul style="list-style-type: none"> • Digital ledger is used • Device encrypting data • Device sending data to digital ledger • Payment being recorded on digital ledger • ... including details such as digital signature/time/date stamp • Transaction is stored in a block ... • ... in multiples • Each block has block hash/unique identifier • When block is executed or full • ... it is applied to every device that has the blockchain // Block is added to blockchain (on each device) <p>For example:</p> <pre> graph TD Device[Device] -- "Payment data sent" --> DigitalLedger[Digital ledger] DigitalLedger -- "Transaction is stored in a block" --> Block[Block
Block hash] Block -- "When block is full,
it is added to the
blockchain" --> Blockchain[Blockchain] </pre>	4

Question	Answer	Marks
9(a)	<p>One mark for each correct term in the correct order.</p> <ul style="list-style-type: none">• artificial• interface• inference engine• knowledge base• rule base• inference engine• interface	7
9(b)	Machine learning	1