GradeMax

CAMBRIDGE
International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/12**

Paper 1 Computer Systems **February/March 2026**

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 February/March 2026 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **17** printed pages.

© Cambridge University Press & Assessment 2026

[Turn over

GradeMax

PUBLISHED

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 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.

© Cambridge University Press & Assessment 2026

GradeMax

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.

© Cambridge University Press & Assessment 2026

0478/12 Mark Scheme March 2026

GradeMax

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	Correct point
	Incorrect point
	Unclear response
FT	Follow through
REP	Repetition
I	Ignore
BOD	Benefit of doubt given
TV	Content of response too vague
NAQ	Not answered question
	Omission

© Cambridge University Press & Assessment 2026

Annotation	Meaning
	Section not relevant
	Section incorrect
Highlighter	Information copied from the text
	Page or response seen by examiner

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.

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks
1(a)	C	1
1(b)	**One** mark for working, **One** mark for file size working: • 1024*1024 * 2 • Division by 1024*1024 File size of image **2 MiB**	2

Question	Answer	Marks
2(a)	Any **three** from: For example: • Displays a web page // Render HTML • Storing bookmarks/favourites • Recording history • Allowing use of multiple tabs • Providing navigation tools • Can set a homepage	3
2(b)(i)	To uniquely **identify** a **device** on a **network**/**internet**	1
2(b)(ii)	Any **three** from: • (Browser) **sends URL**/**domain name** to **DNS** • DNS **stores** a **table** of Domain names/URLs and their matching IP addresses • **DNS finds**/**searches** for **matching IP address** • If not found, URL/domain name sent to higher DNS … • … until URL/domain name is found • **IP address** returned to web browser/device	3

© Cambridge University Press & Assessment 2026

Question	Answer	Marks
2(c)(i)	A text file that stores data about user/browsing activities on the computer by the web browser	1
2(c)(ii)	**One** mark for session cookie example, **One** mark for persistent cookie example Session cookie examples: • Store shopping basket • Store progress e.g. survey // Allow for multi-page form progress • Store login details // store password • Enable live chat • Store preferences // by example Persistent cookie examples: • Store user accounts // password // retain login // store personal data // Store address/email • Store bank/card details • Store preferences // by example • Store shopping basket • Track internet surfing habits // track other websites visited // to carry out targeted advertising • Store progress on an online game/quiz	2

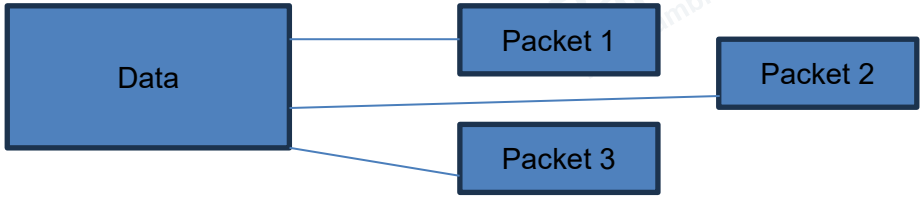
Question	Answer	Marks
3(a)	Any **two** from: • Mechanical structure/framework • Electrical components • Programmable • It can move	2
3(b)(i)	Proximity // infra-red	1

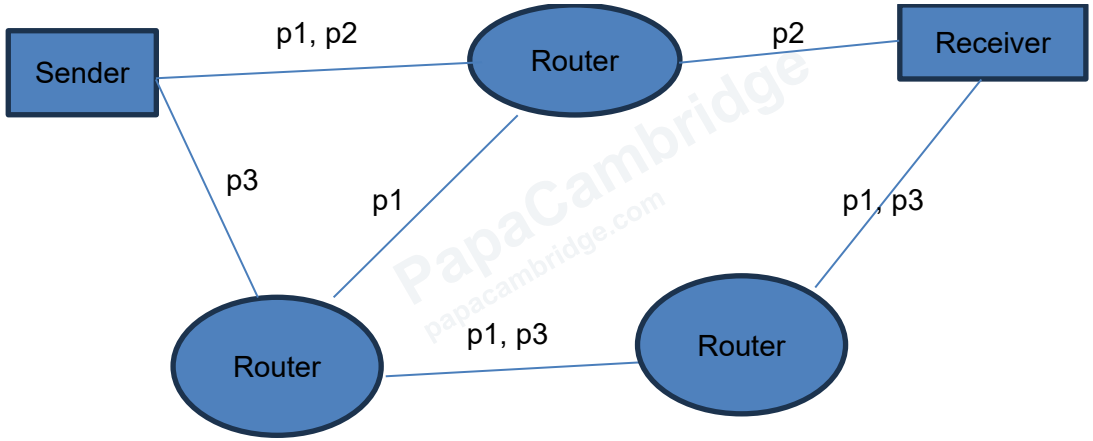
© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks
3(b)(ii)	Any **one** from: • **Integrated circuit** that performs all the functions of a **CPU** • **Integrated circuit** on a single **chip** • Single chip processor/CPU	**1**
3(b)(iii)	Any **four** from: • Sensor continually transmits digitised data to the microprocessor • Microprocessor compares received data to the stored data of an object/distance • If data is less/greater than/matches stored distance/object microprocessor transmits signal to stop the drone in that direction • If data is less/greater than/matches stored distance/object the drone continues/no action taken • Actuator is used to stop/change/control the drone • Process repeats until the drone lands/is turned off	**4**
3(c)(i)	Any **one** from: • Defines how data is transmitted down the cable/wires • Defines the protocols used to transmit down the cable/wires	**1**
3(c)(ii)	Any **two** from: • Transmits one bit at a time • … using one wire • In both directions at the same time	**2**

© Cambridge University Press & Assessment 2026

Question	Answer	Marks
4	Any **two** from: • Packet having a header, payload and trailer • Header with at least one contents (for example sequence number and destination IP) • Trailer with at least one contents (for example error detection, end of packet) • Payload contains the data being transferred Any **two** from: • Data split into packets • Each packet travels on a different route • **Routers direct** packets towards their destination // **Routers transmit** packets on fastest/most efficient route • Packets (might) arrive out of order • When all packets arrive at destination, they are put back in order  *Data split into packets:* *Header* | *Payload* | *Trailer* *IP destination* | *Data* | *Error detection*	**4**

Question	Answer	Marks
4		

Question	Answer	Marks
5(a)	• Non-volatile • Not directly accessible by the CPU	**2**
5(b)	**One** mark for each term: The hard disk has several platters. Each platter is split into tracks and **sectors**. To read, data the read/write head moves over the platters to the position where data starts. The **electromagnetic field** indicates if the data is a 1 or a 0. A solid-state drive uses NAND gates or **NOR gates**. It is made of transistors that work as floating gates and **control** gates. The gates control the **flow** of electrons to memory cells.	**5**
5(c)(i)	Storage of files/data on remote/third-party/off-site servers	**1**

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks
5(c)(ii)	Any **two** from: For example: • Data can be accessed from any device • … if anything happens to their computer the data is still on the cloud • …they can store the data at school and access at home • Can free some storage space on their computer	**2**
5(c)(iii)	Any **two** from: For example: • Can access without internet access • … if the Internet 'goes down' they still have access to the data • No dependence on a third party • … control over maintenance/use • … control over backup • … control over security/access • … can set up own passwords / firewall etc.	**2**

Question	Answer	Marks
6(a)	1001 0110	**1**
6(b)	1111 0000 1000	**1**
6(c)	11010100	**1**
6(d)	117	**1**

© Cambridge University Press & Assessment 2026

Question	Answer	Marks
6(e)	**One** mark for working e.g. 6 carries **One** mark for right nibble **One** mark for left nibble and no overflow bit 0001 1010 + 0110 1110 1000 1000 1 1 1 1 1 1	**3**

Question	Answer	Marks
7(a)	No mark for choice. Any **two** for justification: Serial • Could be a long distance between devices • Less likely to have errors/interference/crosstalk • Data will arrive in the order transmitted // no skewing // data does not have to be rearranged on arrival • Still sufficiently fast transmission Parallel • Faster transmission than serial • … there may be a large amount of data • Could be a short distance … • … so bits will not be skewed	**2**

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks
7(b)	No mark for choice. Any **two** from for justification: Half-duplex • Printer needs to send data back to the computer • … not required for both to transmit at the same time Full-Duplex • Printer needs to send data back to the computer … • … both may need to be transmitting at the same time	**2**
7(c)(i)	Any **one** from: For example: • Data can be lost • Data could be gained • Data can be changed // Bits can be transposed • Skewing • Interference • Crosstalk • Data collisions • Data packets could time out/reach their hop count	**1**
7(c)(ii)	Any **three** from: • Receiver checks for errors … • …example method e.g. parity/cyclic redundancy • If there is an error receiver transmits negative acknowledgement to sender • If sender receives negative acknowledgement, it re-transmits the data • If no negative acknowledgement is received before timeout, then successful receipt is assumed	**3**

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks
8(a)	Any **two** from: • System software **manages/maintains** the **hardware/software** • Applications software allows the **user** to perform tasks	**2**
8(b)	Any **two** from: • Handling/installing/maintaining/downloading device drivers • Receiving data from devices/peripherals // transfers data to devices/peripherals	**2**

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks
8(c)	**One** mark for each security solution Any **two** for each explanation • Anti-virus // anti-spyware // anti-malware . … • … checks files/downloads against a **database** of viruses/spyware/malware definitions • … **quarantines** malware // informs user of malware • … **deletes** virus/spyware/malware • … protects against virus/spyware/malware deleting/changing/copying data // stops spyware recording keypresses/screen • Firewall… • … checks/examines incoming (and outgoing) data/transmission against set criteria • … blocks signals that do not meet criteria // only allows signals that meet criteria • … blocks entry by **specific ports**/**IPs** • … protects against unauthorised access/requests/transmission • Proxy (server) … • … checks/examines each request/incoming data/transmission against set criteria • … **slows down the rate at which/limits the number of** requests sent to the server • ... by using caching to respond to the request (rather than forwarding it to the server) • … blocks entry by **specific ports**/**IPs** • … protects against unauthorised access/requests/transmission/DOS/DDoS • Password … • … description of a strong password e.g. number of characters/mix of characters • … attacker needs to know/enter the password to gain entry • … protects against brute force attack // (strong password) is harder to guess • Biometric device // fingerprint // voice recognition // by example … • …requires access to the biometric/unique data to access the • …the pattern cannot be guessed • … stops brute force attack	**6**

© Cambridge University Press & Assessment 2026

Question	Answer	Marks
8(c)	• Two-factor/step authentication/verification // multi-factor authentication … • … requires access to additional data to access the computer • … for example: code to email/phone • … protects against brute force attack • Access rights … • … provide accounts with read access / write access / no access • … even if unauthorised access the data still cannot be read/changed	
8(d)	Any **one** for Firmware, any one for operating system(OS) Firmware: • **Instructions/software** that is used to configure/set up/control/run hardware • **Instructions**/**software** that is written into non-volatile/read only memory/ROM • **Instructions**/**software** that provides the OS with a platform to run OS: • Instructions/software that manages **hardware** • Instructions/software that provides an **interface** between the **user** and the **hardware** • Instructions/software that provides a **platform** for **application software** to run	**2**

Question	Answer	Marks
9(a)	Any **two** from: • Check digit is calculated from the data • … using an algorithm • … and input with the data • Computer **recalculates** the check digit (using the same algorithm) **after input** **One** mark for: • If the check digits match it has been input correctly // If the check digits do not match it has been input incorrectly	**3**

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks
9(b)(i)	Any **two** from: • Written in human/English language/style statements • Needs **translating** to be **run**/**executed** • It is a portable language (that can be used on any computer) // Machine independent	**2**
9(b)(ii)	Any **three** from: • Produces an error report • … so all errors can be fixed together • Produces executable file • … can test multiple times without retranslating • … can test on different systems without retranslating • … can test without needing the translator (on the system) • Final (compiled) program will **execute** faster • … because it optimises code	**3**

© Cambridge University Press & Assessment 2026