CAMBRIDGE
International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/12**

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.

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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.

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)	**Instructions/program** that is used to operate a computer/hardware	**1**
1(b)	B	**1**
1(c)	Operating system // system software	**1**

Question	Answer	Marks
2(a)	bit	**1**
2(b)	4	**1**
2(c)	Any **two** from: • 22 016 × 8 then divided 8 • 22 016 × 10 • 220 160 / 1024 **One** mark for: 215 KiB	**3**
2(d)(i)	Reducing the **size** of a file	**1**
2(d)(ii)	It will take up/use less **storage** space	**1**

Question	Answer	Marks
3(a)(i)	They are both **number systems**	**1**
3(a)(ii)	• Binary is base-2 whereas hexadecimal is base-16 • Binary only uses numbers whereas hexadecimal also uses letters // Binary only uses 0 and 1 whereas hexadecimal uses 0 to 9/A to F	**2**

Question	Answer	Marks
3(b)	• (0000)1111 • 10110100 • 11101011	**3**
3(c)	• E • 64 • FA	**3**
3(d)(i)	Any **two** from: • **Each/All/Every value/digit/bit** in the binary number is **shifted/moved** to the **left** • The **left most/most significant** bit is lost • A **0** is added as the **right most/least significant** bit	**2**
3(d)(ii)	The binary integer is multiplied by 2	**1**
3(e)	Two's complement	**1**

Question	Answer	Marks
4(a)	Any **two** from: • Touchscreen • Microphone • Button • (Digital) camera • Sensor // by example	**2**
4(b)	Any **one** from: • Screen • Speaker • LED • Actuator	**1**

Question	Answer	Marks
4(c)	Any **two** from: • To **store** the BIOS • To **store** the bootstrap • To help start-up the smart watch // to **store** start-up instructions • To **store** the firmware • For non-volatile storage // to store data **permanently** • To **store data/instructions** that **should not change** (unless needed)	**2**
4(d)(i)	Any **two** from: • A collection of servers • Allows access to data remotely // Stores data in a remote location • Hardware can be owned/managed by a third party • Data storage that is stored/accessed using the internet	**2**
4(d)(ii)	Any **four** from: • No need to maintain the hardware • … the third party is responsible for maintaining the hardware / security of the data • Resources can be increased / decreased (on demand) // Can have unlimited storage capacity • … no need to worry about running out of storage space • … can save cost of **purchase** of **hardware** • Need less/no (secondary) storage space **on the watch** • … watch can remain/is small in size • … costs of watch can be kept lower • Can access the data from **other/any devices** • … if the watch breaks/is lost data is still available	**4**

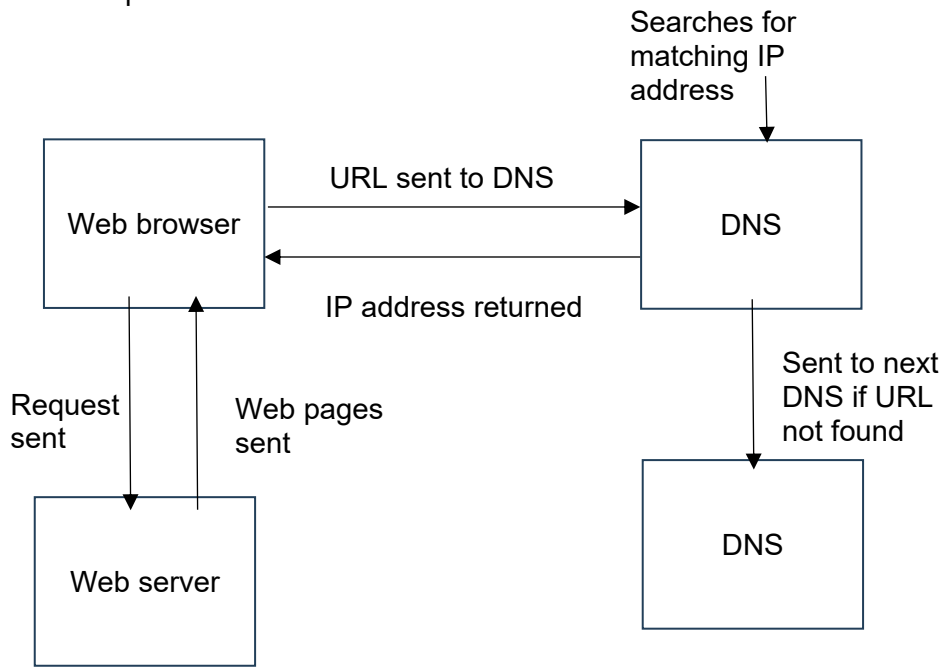
Question	Answer	Marks
4(e)	Any **two** from: • The watch can only perform a dedicated/limited functions/tasks • … and a general purpose computer performs many/multiple functions • … (this means that) it is an embedded system • You cannot plug in peripherals • You cannot reprogram the smartwatch // Cannot install other software/apps • It would only have a microprocessor // It would not have a CPU	**2**

Question	Answer	Marks
5(a)	Any **four** from: • A check digit is **calculated** from/using the **barcode data** • … using an algorithm // by example e.g. Modulo 11 • … and added to the **barcode** • When/after the **barcode is scanned** the check digit is **recalculated …** • … using the **same** algorithm • If the **check digits** do not match an error has occurred when scanning the barcode // If the **check digits** match no error has occurred when scanning the barcode	**4**
5(b)(i)	• Bits are sent one at a time • Bits are sent down a single wire • Data is sent in one direction only	**3**

Question	Answer	Marks
5(b)(ii)	Any **three** from: • The stock control system may be a long distance away • … parallel should not be used in long distance transmission // Serial is more **reliable** for long distance transmission • The data does not need to be sent quickly • … the increased speed of parallel is not needed • … as only **small** amounts of data need to be sent • The bits are sent/arrived in order • … the **data** will not be skewed // the **data** could be skewed if parallel was used • … there will be no data collisions • There will be less interference/crosstalk (due to single wire) • … there will be fewer errors in the data • No need for a reply/response from stock control system • … **half-duplex/full-duplex** is not necessary as only one way transmission needed	**3**
5(b)(iii)	Any **two** from: • (Odd/even) Parity check // Parity byte check // parity block check • Checksum • Echo check • (Positive/negative) ARQ // Automatic repeat query // Automatic repeat request	**2**

Question	Answer	Marks
6	**One** mark for each correct term or definition in the correct place: **Components** • Control unit // CU • Memory address register // MAR • Data bus • Current instruction register // CIR **Descriptions** • (Program counter) Stores the address of the next instruction to be fetched • (Accumulator) Stores the interim **result** for a calculation	**6**

Question	Answer	Marks
7(a)	A **text-based address** for a **website**/**web page**	**1**
7(b)	Any **two** from: • Protocol • Domain name • File name	**2**
7(c)	Web browser	**1**

Question	Answer	Marks
7(d)	**One** mark for each correct part of the diagram. The diagram shows: • **URL** sent from **web browser** to the **DNS** • DNS finding **matching IP address** • If it cannot find the URL, it is sent to the next DNS (until found) • **IP address** returned to **web browser** • **Request** sent from **web browser** to **web server** (for web page) • Web page/HTML files sent from **web server** to **web browser** • Web browser **rendering HTML** For example:  	**5**

Question	Answer	Marks
7(e)	**One** mark for each correct term in the correct order: • Web browser • Web server • Web server • Web browser • Encrypted	**5**

Question	Answer	Marks
8(a)	A	**1**
8(b)	• Knowledge base • Rule base • Inference engine	**3**
8(c)	Any **three** from: For example: • It could **gather data** during **vacuuming** • … and adapt its **own processes** • … such as where obstacles are placed in the room • … such as where dirtier areas are • … such as a path through a room • … such as the shape of a room • … such as the most efficient route to vacuum a room • … so, it knows areas to avoid/concentrate on/use different cleaning tools	**3**