GCSE
COMPUTER SCIENCE
8525/2
Paper 2 Computing concepts

Mark scheme

June 2024

Version: 1.1 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

Further copies of this mark scheme are available from aqa.org.uk

The following annotation is used in the mark scheme:

; - means a single mark

// - means alternative response

/ - means an alternative word or sub-phrase

A - means acceptable creditworthy answer. Also used to denote a valid answer that goes beyond the expectations of the GCSE syllabus.

R - means reject answer as not creditworthy

NE - means not enough

I - means ignore

DPT - in some questions a specific error made by a candidate, if repeated, could result in the candidate failing to gain more than one mark. The DPT label indicates that this mistake should only result in a candidate losing one mark on the first occasion that the error is made. Provided that the answer remains understandable, subsequent marks should be awarded as if the error was not being repeated.

Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question	Part	Marking guidance	Total marks
01		**Mark is for AO1 (recall)** **B** All data and instructions are represented using binary; **R**. if more than one lozenge shaded	1

Question	Part	Marking guidance	Total marks
02	1	**Mark is for AO2 (apply)** 183;	1

Question	Part	Marking guidance	Total marks
02	2	**2 marks for AO2 (apply)** 70;; If the answer given is not fully correct then award **a maximum of 1 working mark** as follows: • writing 07 instead of 70; • converted 112 to `01110000`; • converted 112 to an incorrect 8-bit binary number but converted this correctly to hexadecimal; • attempted division of 112 by 16;	2

Question	Part	Marking guidance	Total marks
03		**2 marks for AO2 (apply)** `11010`; `101`;	2

Question	Part	Marking guidance	Total marks
04	1	**Mark is for AO2 (apply)** `11001100`;	1

Question	Part	Marking guidance	Total marks
04	2	**Mark is for AO2 (apply)** 102;	1

Question	Part	Marking guidance	Total marks
04	3	**Mark is for AO2 (apply)** **D** Multiply or divide numbers by powers of two; **R**. if more than one lozenge shaded	1

Question	Part	Marking guidance	Total marks
05	1	**Mark is for AO2 (apply)** 40 (pixels);	1

Question	Part	Marking guidance	Total marks
05	2	**Mark is for AO2 (apply)** 1/one (bit);	1

Question	Part	Marking guidance	Total marks
05	3	**2 marks for AO2 (apply)** 10;; If the answer given is not fully correct then award **a maximum of 1 working mark** as follows: • Identifying the colour depth as 2; • Multiplying a value by 2; • Multiplying a value by 40; • Dividing the result of a calculation by 8;	2

<table>
<tr><th>Question</th><th>Part</th><th>Marking guidance</th><th>Total marks</th></tr>
<tr><td>05</td><td>4</td><td><b>Mark is for AO2 (apply)</b>
All rows correct;
<table>
<tr><th>Colour</th><th>Binary representation</th></tr>
<tr><td>White</td><td>00</td></tr>
<tr><td>Black</td><td>01</td></tr>
<tr><td>Grey</td><td>10</td></tr>
</table>
</td><td>1</td></tr>
</table>

Question	Part	Marking guidance	Total marks
05	5	**2 marks for AO2 (apply)** **Image C**: (The file size) would increase/double // it would take up more storage space; **I.** any incorrect reference to how much it would increase **Image D**: (The file size) would stay the same // no impact;	2

Question	Part	Marking guidance	Total marks
06		**2 marks for AO2 (apply)** 56 000 000 (bits);; If the answer given is not fully correct then award **a maximum of 1 working mark** as follows: • Multiplying by 7 000 000; • Multiplying by 8; • Multiplying by 1000;	2

<table>
<tr><th>Question</th><th>Part</th><th>Marking guidance</th><th>Total marks</th></tr>
<tr><td>07</td><td>1</td><td>

Mark is for AO2 (apply)

<table>
<tr><td><b>C</b></td><td>
<table>
<tr><th>A</th><th>B</th><th>Q</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>1</td></tr>
</table>
</td></tr>
</table>

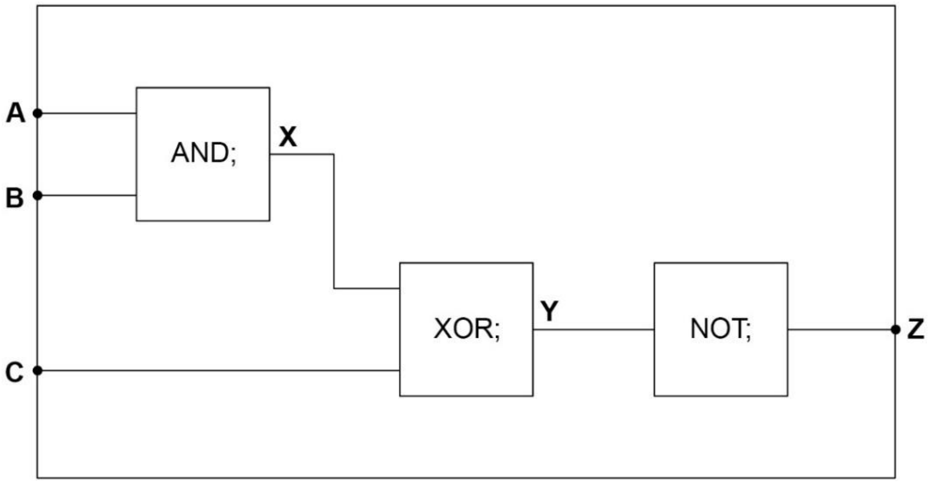
R. If more than one lozenge shaded

</td><td>1</td></tr>
</table>

<table>
<tr><th>Question</th><th>Part</th><th>Marking guidance</th><th>Total marks</th></tr>
<tr><td>07</td><td>2</td><td>

3 marks for AO2 (apply)

1 mark for each correct logic gate name in the correct box



A. if the name is not inside the box, but it is clear which box the name refers to
R. if logic gate symbols used instead of names

</td><td>3</td></tr>
</table>

Question	Part	Marking guidance	Total marks
07	**3**	**3 marks for AO2 (apply)** **Note to examiners**: any alternative notations **must** be referred to a senior examiner. $\bar{A} + B.C$;;; If equation is not correct then award a **maximum of 2 marks** from the following: • Using the AND symbol . in between inputs **B** and **C**; • Using the OR symbol + in between input **A** and another gate; • Using the NOT symbol ‾ above input **A**; **I.** Parentheses unless they change the order of precedence eg $(\bar{A} + B).C$ is incorrect	3

Question	Part	Marking guidance	Total marks
08	**1**	**6 marks for AO1 (understanding)** **Note for examiners:** • points from **all three** components must be included for 6 marks • points from at least **two** components must be included for 4 marks. **Maximum of 6 marks** from: **Control unit** MP1. Decodes instructions; MP2. Coordinates/directs the execution of instructions; MP3. Sends (control) signals to other components // Controls the transfer/flow of instructions and data (in the CPU) // Coordinates/directs the fetch execute cycle; **R.** messages for signals MP4. Coordinates the I/O devices; **A.** examples of control signals **Clock** MP5. Sends a regular (electrical) signal/pulse; MP6. Synchronises operations/components; MP7. Influences the number of instructions carried out each second; **Cache** MP8. Makes retrieving data/instructions from the computer's memory more efficient; MP9. Stores data/instructions for faster access (by the processor); MP10. Stores frequently used data/instructions // data/instructions likely to be used in the near future;	6

Question	Part	Marking guidance	Total marks
08	**2**	**3 marks for AO1 (recall)** **Maximum of 3 marks** from the following: MP1. Increase the clock speed; MP2. Increase the number of processor cores; MP3. Increase the cache size; MP4. Changing the type of cache memory (eg L3 to L1); **A.** increase data bus width, increase word size	3

Question	Part	Marking guidance	Total marks
09	**1**	**2 marks for AO2 (apply)** A**;** DDED; **I.** quotes around response **Max 1 mark** if any punctuation other than quotes	2

Question	Part	Marking guidance	Total marks
09	**2**	**3 marks for AO2 (apply)** 95 (bits);;; If the answer given is not fully correct then award **a maximum of 2 working marks** as follows: **Huffman coding calculation** 6*2 + 5*2 + 4*2 + 3*3 + 2*3 // 15*2 + 5*3 // 45 bits // 011101110000011111001011011100000010110111011; **A.** a calculation that clearly attempts to multiply the frequency of each character by the number of bits for that character but has arrived at wrong total **ASCII calculation** 20 (characters) * 7 (bits) // 140 (bits); **A.** a calculation that clearly attempts to multiply 20 by 7 but has arrived at wrong total **Bit saving calculation** Subtracting Huffman bit total from ASCII bit total; (even if totals used are incorrect, as long as it is clear that there is an ASCII bit total and a Huffman bit total).	3

Question	Part	Marking guidance	Total marks
10		**2 marks for AO1 (understanding)** **A** Machine code is directly executed by the processor; **E** Machine code is specific to a family of processors; **R.** If more than two lozenges shaded	2

Question	Part	Marking guidance	Total marks
11		**3 marks for AO1 (understanding)** **Maximum of three** marks from: MP1. HLL has higher level of abstraction; MP2. HLL runs across different CPU families / is portable; MP3. HLL is English-like / easier to learn / understand / debug; **R.** (HLL are) easier to read MP4. HLL may require a compiler to translate the code / create executable program; MP5. HLL may require an interpreter to run (the program); MP6. HLL commands equate to multiple machine code commands; MP7. HLL programs provide built-in subroutines; MP8. Programs written in LLL are (usually) more efficient; MP9. Programs written in LLL (usually) use less memory; MP10. Programs written in LLL can directly access hardware components; **R.** LLL don't need to be translated before execution	3

Question	Part	Marking guidance	Total marks
12		**6 marks for AO1 (understanding)** **Note for examiners:** **Maximum of three** marks if only **one** of compiler or interpreter is described **Maximum of six** marks from: Compiler MP1. Translates/compiles the whole program (in one go); MP2. Standalone program does not require the compiler / source code on computer to run; MP3. Produces a list of (syntax) errors after translation; MP4. does not execute the programming code // creates an executable file / object code / machine code; Interpreter MP5. Translates/executes one line at a time; MP6. Program requires interpreter to be present (on computer) to run the code; MP7. Requires source code to be present/translated each time program is run // no separate executable file is created; MP8. Stops execution/displays an error message as soon as a (syntax) error is encountered; MP9. Executes the programming code as it is being translated;	6

Question	Part	Marking guidance	Total marks
13	**1**	**2 marks for AO1 (recall)** a group/collection/number of computers; **A.** devices (that contain CPUs) connected/linked together; **A.** joined	2

<table>
<tr><th>Question</th><th>Part</th><th>Marking guidance</th><th>Total marks</th></tr>
<tr><td><b>13</b></td><td><b>2</b></td><td>
<b>6 marks for AO2 (apply)</b>
<table>
<tr><th>Level</th><th>Description</th><th>Mark Range</th></tr>
<tr><td>3</td><td>Response demonstrates a <b>sustained line of reasoning</b> and contains a <b>thorough discussion</b> of the advantages <b>and</b> disadvantages to the school/staff/students of installing a network instead of standalone computers.

There is a <b>structured</b> discussion of the advantages and disadvantages of installing computers in a network and the response includes points that are <b>clearly relevant</b> to the context.</td><td>5–6</td></tr>
<tr><td>2</td><td>Response includes <b>explanations</b> of the advantages <b>and/or</b> disadvantages of installing computers in a network and is <b>generally relevant</b> to the school/staff/students. The response makes sense when read as a whole.

There is a <b>structured</b> consideration of the advantages <b>and/or</b> disadvantages of computer networks though some of the points made <b>may not be wholly relevant</b> to the context.</td><td>3–4</td></tr>
<tr><td>1</td><td>Response includes <b>descriptions</b> of the advantages <b>and/or</b> disadvantages of installing computers as a network with <b>little reference</b> to the school/staff/students.

There are a few <b>statements</b> related to one or more of the required points. The statements might be disjointed and without any cohesion.</td><td>1–2</td></tr>
<tr><td colspan="2"><b>No creditworthy material</b></td><td>0</td></tr>
</table>
<b>Indicative content</b>
Advantages:
<ul>
<li>folders and files (of staff/students) can be stored centrally and accessed by any authorised person</li>
<li>peripheral devices (such as classroom printer) can be shared // Fewer peripherals required</li>
<li>access to the Internet / communications can be shared</li>
<li>central management of resources / software // cheaper licencing</li>
<li>students/staff can have one account that can be accessed on any networked computer</li>
<li>central backup of files (of staff/students)</li>
<li>allows better monitoring of computer usage (of staff/students)</li>
<li>allows staff to access school files from home</li>
<li>students/staff can bring in own devices to connect to the network</li>
</ul>
</td><td>6</td></tr>
</table>

		• staff and students can change rooms and still have access to the network. Disadvantages: • difficulty of managing network (as it increases in size) • increase in potential cyber security issues when accessing staff/student records • server breakdown can prevent access to all connected devices // loss of work • viruses / malware can spread more easily • cost of cabling / servers • risk of malicious attack / hacking • speed can deteriorate as usage increases • reliance on network hardware (eg. switch) • cost of hiring network manager to maintain network • staff/students may require training on how to use network.	

Question	**Part**	**Marking guidance**	**Total marks**
14		**2 marks for AO1 (understanding)** SMTP: Sends emails (between servers); IMAP: Stores emails on a server; // Retrieves / receiving emails; // View and manipulate emails (as though stored locally); // Email displayed on client programs/devices;	2

Question	**Part**	**Marking guidance**	**Total marks**
15		**2 marks for AO1 (understanding)** (Encryption) scrambles the data (before transmission) // changes plaintext into ciphertext (before transmission); **NE** encrypts the data so it cannot be read/understood by unauthorised users/devices;	2

Question	Part	Marking guidance	Total marks
16		**4 marks for AO1 (understanding)** **Note for examiners:** **Maximum of two** marks if only **one** of blagging or phishing described **Maximum of four** marks from: **Both** blagging and phishing: MP1. Attempt to persuade person to divulge private / sensitive information / make payments; MP2. (Potentially) leading to identity / financial theft / data theft / access by unauthorised persons; MP3. Making up a (convincing) story; Blagging: MP4. Targets an individual; Phishing: MP5. Can be done by email / text / social media; MP6. Disguised to look as though from reputable source / organisation / company; MP7. Targets a large group of people (hoping to get some to respond); MP8. Often contains a link to click on, directing you to a fake website;	4

Question	Part	Marking guidance	Total marks
17		**4 marks for AO1 (understanding)** Maximum of **four** marks. **Note for examiners:** Marks are for the **description only**, not the name of the malware. Description must match the named malware to be credited. **Maximum of two** marks for any one form of malware. Virus: MP1. Can spread when executed; MP2. Attached to another program/file; MP3. Executed by clicking on host/infected program; Trojan: MP4. Poses as having a useful purpose / legitimate program (but has a malicious purpose); MP5. The user is tricked into executing the Trojan // when the program is executed the Trojan activates; **R.** downloading in place of executing Spyware: MP6. Gathers information about person/accounts/organisation/(computer) activity without their knowledge; MP7. Sends information back to originator;	4

Question	Part	Marking guidance	Total marks
18	**1**	**Mark is for AO1 (recall)** **Maximum of one mark from:** • A structured/organised set/collection of data; • A (persistent) store/file of structured/organised data; **R.** Information in place of data	1

Question	Part	Marking guidance	Total marks
18	**2**	**2 marks for AO1 (understanding)** • When the same data exists in multiple places; • but instances (of the data) are not identical; **A.** answer by example eg if we have an address of someone in many tables and the address gets changed in only one table;;	2

Question	Part	Marking guidance	Total marks
18	**3**	**2 marks for AO1 (recall)** A field in one table; that is a primary key in another table; // A primary key in one table; whose values are used in a field in another table;	2

Question	Part	Marking guidance	Total marks
18	**4**	**Mark is for AO2 (apply)** **Maximum of one** mark from: • ActorId • Firstname • Lastname **I.** Case / spacing	1

Question	Part	Marking guidance	Total marks
18	**5**	**2 marks for AO3 (program)** **1 mark** for each correct response for Ⓐ and Ⓑ. Ⓐ `SELECT` Ⓑ `Year = 2019` **I.** Case / spacing **I.** Semicolon after `2019` **A.** Quotation marks around `2019` **A.** == in place of = **R.** if any spelling mistakes	2

Question	Part	Marking guidance	Total marks

18	**6**	**3 marks for AO3 (program)**
		
		1 mark: correct `UPDATE` command clause;
		1 mark: `SET` clause completely correct;
		1 mark: correct condition in `WHERE` clause;
		
		Maximum of 2 marks if any errors
		
		Sample answer 1
		`UPDATE Film`
		`SET Title = 'Toy Story 4'`
		`WHERE FilmID = 101`
		
		Sample answer 2
		`UPDATE Film`
		`SET Title = 'Toy Story 4'`
		`WHERE Title = 'Toy Story 3'`
		
		DPT. missing quotation marks
		DPT. any spelling mistakes
		I. Case / spacing
		I. Quotation marks around `101`
		I. Semicolon at the end of the last line
		A. Double quotation marks instead of single
		A. == in place of =
			3

<table>
<tr><th>Question</th><th>Part</th><th>Marking guidance</th><th>Total marks</th></tr>
<tr><td>18</td><td>7</td><td>
<b>3 marks for AO3 (program)</b>
<b>1 mark</b> for each correct response for Ⓐ, Ⓑ and Ⓒ.
<table>
<tr><td>Ⓐ</td><td><code>Film</code> // <code>Film (FilmID, Title, Year)</code>
<b>Note to Examiners:</b> If field list given in <code>INSERT INTO</code> command then allow fields in any order, but must include all three fields.</td></tr>
<tr><td>Ⓑ</td><td><code>VALUES</code></td></tr>
<tr><td>Ⓒ</td><td><code>103,'Gladiator',2000</code>
<b>Note to Examiners:</b> If field list given in <code>INSERT INTO</code> command then values must match order in that command. If field list not given then values must be in order shown
<b>I.</b> spelling of Gladiator
<b>R.</b> if the answer is surrounded by parentheses</td></tr>
</table>
<b>I.</b> Case / spacing
<b>I.</b> Quotation marks around <code>103</code> or <code>2000</code>
<b>A.</b> Double quotation marks instead of single
</td><td>3</td></tr>
</table>

Question	Part	Marking guidance	Total marks
19	1	**2 marks for AO1 (recall)** The processes / practices / technologies / measures designed to protect networks / computers / programs / data; from attack / damage / unauthorised access;	2

Question	Part	Marking guidance	Total marks
19	**2**	**4 marks for AO1 (understanding)** **Maximum of two marks** from**:** CAPTCHA MP1. Used to stop computer programs/bots from accessing the website/creating an account; MP2. Checks the user is human (using a test that only a human can pass) // check the user is not a bot (by using a test that a bot cannot pass); MP3. (Helps to) prevent web-based database access; **Maximum of two marks** from**:** Email confirmations MP4. Send an email to a (registered) email address when an account is created (on the website); MP5. (Helps to) prevent unauthorised users (of the website) as they would also need access to the email account // confirms the user's identity by checking they have access to the (registered) email address; MP6. Stops unauthorised accounts/bots from creating accounts (for the website); MP7. Stops the creation of a high volume of accounts (for the website) and crashing the website;	4