AQA

AS
COMPUTER SCIENCE
7516/2

Paper 2

Mark scheme

June 2023

Version: 1.0 Final

2 3 6 A 7 5 1 6 / 2 / M S

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.

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

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.

To Examiners:

- **When to award '0' (zero) or '–' (hyphen) when inputting marks on CMI+**

  A mark of 0 should be awarded where a candidate has attempted a question but failed to write anything creditworthy.

  Insert a hyphen when a candidate has not attempted a question, so that eventually the Principal Examiner will be able to distinguish between the two (not attempted/nothing creditworthy) in any statistics.

- This mark scheme contains the correct responses which we believe that candidates are most likely to give. Other valid responses are possible to some questions and should be credited. Examiners should refer responses that are not covered by the mark scheme, but which they deem creditworthy, to a **Team Leader**.

The following annotation is used in the mark scheme:

; - means a single mark
// - means an alternative response
/ - means an alternative word or sub-phrase
A. - means acceptable creditworthy answer
R. - means reject answer as not creditworthy
NE. - means not enough
I. - means ignore
DPT. - means "Don't penalise twice". In some questions a specific error made by a candidate, if repeated, could result in the loss of 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.

Examiners are required to assign each of the candidate's responses to the most appropriate level according to **its overall quality**, and then allocate a single mark within the level. When deciding upon a mark in a level, examiners should bear in mind the relative weightings of the assessment objectives.

eg

In the following questions the marks available are as follows:

Question 05.4 (max 2 marks)
AO1 (knowledge) – 1 mark
AO1 (understanding) – 1 mark

Question 06.1 (max 2 marks)
AO1 (knowledge) – 1 mark
AO1 (understanding) – 1 mark

Question 11 (max 9 marks)
AO1 (understanding) – 3 marks
AO2 (analyse) – 6 marks

Question 12.1 (max 2 marks)
AO1 (knowledge) – 1 mark
AO1 (understanding) – 1 mark

Question 12.2 (max 2 marks)
AO1 (knowledge) – 1 mark
AO1 (understanding) – 1 mark

Where a candidate's answer only reflects one element of the AO, the maximum mark they can receive will be restricted accordingly.

Qu	Pt	Marking Guidance	Marks
01	1	**Mark is for AO1 (understanding)** **B** ($\sqrt{2}$); **R**. More than one lozenge shaded.	1

Qu	Pt	Marking Guidance	Marks
01	2	**Mark is for AO1 (understanding)** **C** (73); **R**. More than one lozenge shaded.	1

Qu	Pt	Marking Guidance	Marks
01	3	**Mark is for AO1 (knowledge)** The set of all possible real-world quantities; Includes all rational and irrational numbers; A value that represents any quantity along an infinite number line; **A.** All numbers excluding imaginary/complex numbers. **MAX 1**	1

Qu	Pt	Marking Guidance	Marks
01	4	**Mark is for AO1 (knowledge)** **A** ($\mathbb{N}$)**;** **R**. More than one lozenge shaded.	1

Qu	Pt	Marking Guidance	Marks
01	5	**Mark is for AO1 (knowledge)** Ordinal numbers are used to represent/describe the position/index of an object/entity placed in order/sequence; **A.** By example (1^{st}, 2^{nd}, 3^{rd}, etc) as long as at least three given.	1

Qu	Pt	Marking Guidance	Marks
02	1	**Mark is for AO1 (understanding)** More compact when displayed // Can be displayed in fewer digits; **NE**. Takes up less space. **R**. If answer states that hexadecimal uses less memory/storage. Easier (for people) to understand/remember; **A.** Read. **R.** Implication that it is easier for computers. Lower likelihood of an error when typing in data; Saves (the programmer) time writing/typing in data; **MAX 1**	1

Qu	Pt	Marking Guidance	Marks
02	2	**Mark is for AO2 (application)** 2^{10} // 1024;	1

Qu	Pt	Marking Guidance	Marks
03	1	**Mark is for AO1 (knowledge)** **E** (mega); **R**. More than one lozenge shaded.	1

Qu	Pt	Marking Guidance	Marks
03	2	**Mark is for AO2 (application)** Mark is for result and carry mark completed as shown **A.** Missing 0s in carry row.	1

Number 1	0	0	0	1	1	0	1	1
Number 2	0	0	0	0	0	1	1	1
Result	0	0	1	0	0	0	1	0
Carry	0	0	1	1	1	1	1	

Qu	Pt	Marking Guidance	Marks
03	3	**Marks are for AO2 (application)** **1 mark** for correct conversion of `00100100` (36) to `11011100` (–36); **1 mark** for binary addition of `00011011` and `11011100` producing `11110111`; **A.** Follow through of incorrect representation of –36 for second mark. // **2 marks** if correct answer and any relevant working shown which indicates an attempt at using two's complement to solve the problem. **R.** Reject both marks if only decimal subtraction has been used.	2

Qu	Pt	Marking Guidance	Marks
03	4	**Mark is for AO1 (understanding)** Lowest: –128 Highest: (+)127 **Note:** Both answers must be correct to award mark.	1

Qu	Pt	Marking Guidance	Marks
03	5	**Marks are for AO2 (application)** $3\frac{29}{64}$ // $\frac{221}{64}$ // 3.453125 **Mark as follows:** **1 mark** for correct integer part (3) **1 mark** for correct fractional part ($\frac{29}{64}$ or .453125) // **2 marks** for $\frac{221}{64}$	2

Qu	Pt	Marking Guidance	Marks
04	1	**Mark is for AO1 (understanding)** (If five bits are transmitted) there will always be a majority // (if five bits are transmitted) could correct errors when two bits changed // if four bits are transmitted both 0 and 1 may be received twice // if four bits are transmitted there could be no bit received a majority of times;	1

Qu	Pt	Marking Guidance	Marks
04	2	**Marks are for AO1 (understanding)** Data could be transmitted more quickly / using less bandwidth; **A**. as less bits sent The cost of transmitting multiple copies may be high; It may be more effective/efficient to retransmit corrupted data than transmit multiple copies in the first place; **MAX 2**	2

Qu	Pt	Marking Guidance	Marks
04	3	**Mark is for AO2 (analyse)** Second byte (01000001) circled; 0 1 0 1 0 0 1 0	0 1 0 0 0 0 0 1	1 1 0 0 1 1 0 1 **A.** Any clear indication that the middle byte is selected	1

Qu	Pt	Marking Guidance	Marks
05	1	**Mark is for AO1 (understanding)** Number of pixels multiplied by colour depth / the number of bits used to represent a pixel/colour; Width is multiplied by the height multiplied by the colour depth / the number of bits used to represent a pixel/colour; **MAX 1 mark**	1

Qu	Pt	Marking Guidance	Marks
05	2	**Mark is for AO1 (knowledge)** The number of samples taken/measured in a second/given period of time;	1

Qu	Pt	Marking Guidance	Marks
05	3	**Mark is for AO1 (knowledge)** The sample resolution is the number of bits used to represent/store each sample;	1

Qu	Pt	Marking Guidance	Marks
05	4	**Marks are for AO1 (knowledge) and AO1 (understanding)** **Mark as follows:** **AO1 (understanding) – 1 mark:** The quality may limit later editing possibilities; The sampled sound may not be fully reproducible // The quality of the reproduced sound will not be as good as the original sampled sound; **MAX 1 mark** **AO1 (knowledge) – 1 mark:** Data is discarded/lost when storing using a lossy format;	2

Qu	Pt	Marking Guidance	Marks
05	5	**Marks are for AO1 (understanding)** More compact representation; **NE.** requires less space Easy to modify / edit notes // easy to change values eg octave for entire score // easy to change instruments; Simple method to compose algorithmically; Musical score can be generated directly from a MIDI file; No data lost about musical notes // no data lost through sampling; **A.** "better quality" but only if there is some explanation of this related to the sampling process eg "no error introduced during sampling", "no background noise recorded" **A.** MIDI records the musician's inputs rather than the sound produced The MIDI file can be directly output to control an instrument / a device; **MAX 2**	2

Qu	Pt	Marking Guidance	Marks
06	1	**Marks are for AO1 (knowledge) and AO1 (understanding)** **Mark as follows:** **AO1 (knowledge) – 1 mark: Max 1 mark** for explaining the term Provides routines that can be included/used in a program; **AO1 (understanding) – 1 mark: Max 1 mark** for a reason/need for library Improves the speed of development // reduces workload // requires (writing of) less code; Improves reliability; Provides operations that the programmer may not know how to code themselves;	2

<table>
<tr><th>Qu</th><th>Pt</th><th>Marking Guidance</th><th>Marks</th></tr>
<tr><td>06</td><td>2</td><td>

Marks are for AO1 (understanding)

Level of response question

<table>
<tr><th>Level</th><th>Description</th><th>Mark Range</th></tr>
<tr><td>3</td><td>Responses demonstrate a clear understanding of the differences between high and low-level programming languages by discussing a broad range of advantages and disadvantages of high-level programming languages when compared with low-level ones.

There will be explicit comparison of the two types of languages throughout the response.

Answers in this band are likely to offer clear examples of when each type of language would be beneficial but this is not necessary to gain the highest marks.</td><td>5–6</td></tr>
<tr><td>2</td><td>Responses demonstrate some understanding of the differences between high and low-level programming languages by discussing a small number of advantages and disadvantages of high-level programming languages when compared with low-level ones.

In order to gain marks at the top of this band, there should be some direct comparison of the two types of languages present in the response but this may not be throughout.</td><td>3–4</td></tr>
<tr><td>1</td><td>Responses demonstrate some awareness of the differences between high and low-level programming languages by stating a small number of features of high level or low-level programming languages. These may not be presented as advantages or disadvantages.

There is unlikely to be any clear comparison of the two types of languages but there is evidence of a limited understanding of the concept.</td><td>1–2</td></tr>
<tr><td>0</td><td>Nothing creditworthy is written</td><td>0</td></tr>
</table>

Indicative Content

Advantages of high-level languages / Disadvantages of low-level languages

- High-level languages may be processor agnostic // low-level languages are processor (family) specific.
- High-level languages are written in a form designed to be easier for humans to interpret // High-level languages are more abstracted from how the processor operates.
- High-level languages often have extra features such as abstract data types and built-in functions.
- High-level languages may have a wider range of programming structures (eg loops) available.
- High-level languages are easier to understand/write/debug/maintain than low-level languages // uses English-like kewords.

</td><td>6</td></tr>
</table>

		• Programs written in high-level language are quicker to write/develop. • More tools for developing high-level languages are likely to exist // low-level languages might have fewer tools available to aid development. • Some high-level languages (eg SQL) are designed for solving specific types of problem (as they provide domain specific features). **Advantages of low-level languages / Disadvantages of high-level languages** • Not all low-level languages need to be translated, all high-level languages do. • Low-level language programs are likely to use less memory when executing. • Low-level language programs may execute faster than (equivalent) high-level language programs. • Low-level language programs can directly interact with / control hardware. **A.** Examples, eg *"a program written in Python can be interpreted and executed on many types of processor".* **A.** Points expressed the other way around.	

<table>
<tr><th>Qu</th><th>Pt</th><th>Marking Guidance</th><th>Marks</th></tr>
<tr><td>07</td><td>1</td><td>Marks are for AO2 (application)

1 mark for each highlighted column L, N and Y completed correctly.

<table>
<tr><th>A</th><th>B</th><th>C</th><th>L</th><th>M</th><th>N</th><th>X</th><th>Y</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
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<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
</table>

A. Follow through for Y if column N is completed incorrectly.</td><td>3</td></tr>
</table>

<table>
<tr><th>Qu</th><th>Pt</th><th>Marking Guidance</th><th>Marks</th></tr>
<tr><td>07</td><td>2</td><td>Marks are for AO2 (application)

2 marks: $(A \oplus B) \cdot C + A \cdot B$ // $((A \cdot \bar{B}) + (\bar{A} \cdot B)) \cdot C + A \cdot B$ // $(\bar{A} \cdot B \cdot C) + (A \cdot (B + C))$

//

1 mark for one of the following somewhere in the expression:
• $(A \oplus B) \cdot C$ I. presence / absence of brackets around $A \oplus B$
• $((A \cdot \bar{B}) + (\bar{A} \cdot B)) \cdot C$
• $A \cdot B$

Note: If using a different algebraic notation refer to team leader.</td><td>2</td></tr>
</table>

<table>
<tr><th>Qu</th><th>Pt</th><th>Marking Guidance</th><th>Marks</th></tr>
<tr><td>07</td><td>3</td><td>Marks are for AO2 (application)

Marking guidance for examiners
• Award marks for working out until an incorrect step has been made.
• If, in any one step, a candidate is simplifying different parts of an expression simultaneously award all relevant marks for this multiple stage but don't award any further marks for working in any parts simplified incorrectly. Example, if the expression P.P.(P+Q) + P.P.1 was changed to P.(P+Q)+P.0, the candidate would get one mark for simplifying the first part to P.(P+Q) and could get further marks</td><td>4</td></tr>
</table>

for correctly simplifying this part of the expression further but should not be awarded marks for simplifying the incorrectly changed part P.0 (ie to 0).

Mark as follows:

MAX 3 marks for working

Award one mark each for applying the techniques below:

- A successful application of De Morgan's Law (and any associated cancellation of NOTs) that produces a simpler expression.
- Successfully expanding brackets.
- Extracting common factors from terms.

Award one mark for each application of a Boolean identity **MAX 2**.

Note: A simpler expression is one that is logically equivalent to the original expression but uses fewer logical operators.

1 mark for final answer: B

$\overline{\overline{A} + \overline{B}} + B \cdot \overline{A} \cdot 1$	[use of $\overline{C} + C = 1$]
$\overline{\overline{A} + \overline{B}} + B \cdot \overline{A}$	[use of $\overline{A} \cdot 1 = \overline{A}$]
$A \cdot B + B \cdot \overline{A}$	[use of de Morgan's Law]
$B \cdot (A + \overline{A})$	[factoring B]
$B \cdot 1$	[use of common factor - $B \cdot (A + \overline{A}) = B \cdot 1$]
B	[use of $B \cdot 1 = B$]

Alternative answer 1

$\overline{\overline{A} + \overline{B}} + B \cdot \overline{A} \cdot 1$	[use of $\overline{C} + C = 1$]
$\overline{\overline{A} + \overline{B}} + B \cdot \overline{A}$	[use of $\overline{A} \cdot 1 = \overline{A}$]
$\overline{(\overline{A} + \overline{B}) \cdot \overline{B \cdot \overline{A}}}$	[use of de Morgan's Law]
$\overline{(\overline{A} + \overline{B}) \cdot (\overline{B} + A)}$	[use of de Morgan's Law]
$\overline{\overline{A} \cdot \overline{B} + \overline{A} \cdot A + \overline{B} \cdot \overline{B} + \overline{B} \cdot A}$	[expansion of brackets]
$\overline{\overline{A} \cdot \overline{B} + \overline{B} \cdot \overline{B} + \overline{B} \cdot A}$	[use of $\overline{A} \cdot A = 0$, $A + 0 = A$]
$\overline{\overline{A} \cdot \overline{B} + \overline{B} + \overline{B} \cdot A}$	[use of $\overline{B} \cdot \overline{B} = \overline{B}$]
$\overline{\overline{B} + \overline{B} \cdot A}$	[use of $\overline{A} \cdot \overline{B} + \overline{B} = \overline{B}$]
$\overline{\overline{B}}$	[use of $\overline{B} + \overline{B} \cdot A = \overline{B}$]
B	[Negation of double NOTs]

Qu	Pt	Marking Guidance	Marks
08	1	**Marks are for AO1 (understanding)** **Max 1 mark for explanation:** Provides information about the result of the last (arithmetic/logical) instruction // to control conditional branch instructions; **Max 1 mark for example:** When the result of a comparison / (arithmetic) operation is zero/negative; When a carry needs to be carried out; When overflow/underflow occurs; When an interrupt occurs; When a comparison is made a flag is set as to whether the operands were equal;	2

Qu	Pt	Marking Guidance	Marks
08	2	**Mark is for AO1 (Knowledge)** (Main) memory (**A**. RAM); Secondary storage (**A.** example of secondary storage device); I/O devices (**A.** example I/O device); **R**. Processors. **R.** File system. **R.** Scheduling.	1

Qu	Pt	Marking Guidance	Marks
08	3	**Marks are for AO1 (Understanding)** The executable file is platform dependent / machine-specific / using the instruction set of the computer that created it; Different processors may have different instruction sets; **A.** Description of specific difference in architecture, eg different general-purpose registers.	2

Qu	Pt	Marking Guidance	Marks

09		**Marks are for AO3 (programming)**
		
		Mark as follows:
		
		AO3 (programming) – 4 marks
		For the AO3 (program) marks, the syntax used must be correct for the language as described on the question paper.
		
		1 mark: Comparing R2 against #0 and having a BGT/BEQ, or #1 and having a BLT
		1 mark: Adding R1 to R3 and storing result in R3
		1 mark: Subtracting #1 from R2 and storing result in R2
		1 mark: Having a B to branch to the start
		
		Max 3 marks for programming if any syntax incorrect or program does not work correctly under all circumstances.
		
		DPT. incorrect use of commas, colons, semi-colons, etc. Note this does not apply to #
		
		Note: HALT is not needed if on final line.
		
		Refer alternative answers not shown to team leaders
		
		Alternative answer 1
		`start: CMP R2, #0`
		`BGT addone`
		`HALT`
		`addone: ADD R3, R3, R1`
		`SUB R2, R2, #1`
		`B start`
		
		Alternative answer 2
		`start: CMP R2, #1`
		`BLT end`
		`ADD R3, R3, R1`
		`SUB R2, R2, #1`
		`B start`
		`end: HALT`
		
		Alternative answer 3
		`start: CMP R2, #0`
		`BEQ end`
		`ADD R3, R3, R1`
		`SUB R2, R2, #1`
		`B start`
		`end: HALT`
			4

		Alternative answer 4
		`start:  CMP R2, #0`
		`  BGT addone`
		`  B end`
		`addone:  ADD R3, R3, R1`
		`  SUB R2, R2, #1`
		`  B start`
		`end:  HALT`	

Qu	Pt	Marking Guidance	Marks
10		**Marks are for AO2 (analyse)** The processor must keep pace with a wide range of sensors, each frequently collecting data; All sensor data goes via the processor // all sensor data requires computation; Processor must run other software at the same time as collecting data from sensors // the processor must operate quickly enough to support multitasking between processing sensor data and the applications (playing music / loading images); Both the image and music (often) have large file sizes; **NE.** faster processing. **MAX 2**	2

<table>
<tr><th>Qu</th><th>Pt</th><th>Marking Guidance</th><th>Marks</th></tr>
<tr><td>11</td><td></td><td>

3 marks are for AO1 (understanding) and 6 marks are for AO2 (analyse)

Level of response question

<table>
<tr><th>Level</th><th>Description</th><th>Mark Range</th></tr>
<tr><td>3</td><td>A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. The response covers a wide range of issues that are consistently explained and/or supported by examples.
A very good understanding of how an image is captured is shown.
The response covers a wide range of moral/ethical, legal and cultural arguments, or examines a smaller range of arguments in greater depth.</td><td>7–9</td></tr>
<tr><td>2</td><td>A line of reasoning has been followed to produce a mostly coherent, relevant, substantiated and logically structured response. The response must include some analysis of the moral, ethical, legal or cultural issues involved.
The response may include some understanding of how the image is captured.

The response will cover a range of arguments in some depth.</td><td>4–6</td></tr>
<tr><td>1</td><td>There is little evidence that a line of reasoning has been followed. The response covers a small number of points which could cover either the image capture, or the moral, ethical, legal or cultural issues, or both.

The response lacks range and depth.</td><td>1–3</td></tr>
</table>

Indicative content:

AO1

Image Capture

- Light enters through / is focussed by the lens
- on to (an array of sensors on) the sensor chip **A**. light sensors capture/record light (intensity) **A.** CCD as sensor.
- Each sensor produces an electrical current/signal.
- The signal represents a pixel.
- An (ADC) converts measurement of light intensity into binary/digital data.
- A (colour) filter is applied to generate separate data values for red, green and blue colour components.
- The pixels are recorded as a group/array.

AO2

Note: Some points may fit under more than one category. These have been indicated with a #.

</td><td>9</td></tr>
</table>

		Moral/Ethical • Could the AI or computer program include unconscious bias as a result of the dataset it has access to or the programmers? • Would the owners of the system use the system to steer customers towards more expensive/higher profit garments? • Will the owners of the system use the data collected for other purposes? # • May put pressure on users to spend more money than they have. • Application may include advertising for certain brands. • Photographs may be uploaded by third parties and the result used without knowledge / consent of the person in the photograph. # • Might the application recommend outfits which may be deemed inappropriate by some? **Legal** • Will the data be stored securely? # • Who will own copyright of the generated images? • An image identifies a living person and so can be classed as personal data under the Data Protection Act / GDPR. • How will the application authenticate that the photograph is of the person using the system or has the permission of the person whose photograph it is? • Will there be an age authentication of the user of the system? Will there be an age restriction? How is this verified? • How long will the images be made available for? **Cultural** • Some outfits suggested may be offensive to certain groups of users (eg in certain religions) • Could the AI make inappropriate decisions about what clothes to suggest based on ethnicity / gender / disability / body-size? • Developers may deliberately or unintentionally (due to the algorithm) influence fashion trends.	

Qu	Pt	Marking Guidance	Marks
12	1	**Marks are for AO1 (knowledge) and AO1 (understanding)** **AO1 (knowledge) – 1 mark:** An SSID is a (locally unique) identifier (**A**. name) for a wireless network; **AO1 (understanding) – 1 mark:** Makes it harder for (**A.** prevents) a client joining the wireless network unless they know the SSID;	2

Qu	Pt	Marking Guidance	Marks
12	2	**Marks are for AO1 (knowledge) and AO1 (understanding)** **AO1 (knowledge) – 1 mark:** (Strong) encryption used to secure wireless networks // to encrypt data that is being transmitted // to make the communications link more secure; **AO1 (understanding) – 1 mark:** (Significantly) reduces the probability that (**A.** prevents) an <u>unauthorised</u> device/person will be able to interpret/comprehend (**A.** read) data that is transmitted across the network; **NE**. Stops the data being read.	2

Qu	Pt	Marking Guidance	Marks
12	3	**Marks are for AO2 (analyse)** The coffee shop wants to let everyone (except specific people/devices) access the network // open access in a public space; Maintaining the list would be time consuming for staff // would be expensive/resource-intensive for the coffee shop // Every device would need to be manually added to the list of known/accepted/registered devices; Maintaining the list would require staff to have technical knowledge // costly to train staff or employ a specialist; A customer with multiple devices could be frustrated / inconvenienced having to whitelist multiple times; **A.** customer concern about what their MAC address would be used for. **MAX 2**	2

Qu	Pt	Marking Guidance	Marks
13	1	**Marks are for AO1 (Understanding)** Every device is (directly) connected to a central switch; **A.** hub Every device sends data via the central switch; **A.** hub The switch sends packets of data to the intended recipient only // The hub sends every packet of data to every device; **DPT**. Server/router instead of switch. **MAX 2**	2

Qu	Pt	Marking Guidance	Marks
13	2	**Marks are for AO1 (Knowledge)** Clients request services from a server; **A.** Direct communication with server provided client initiates. The server responds to client requests (by providing resources/services); Resources are stored on the server; **MAX 2**	2

Qu	Pt	Marking Guidance	Marks
14		**Marks are for AO2 (Analyse)** RFID tags are small/lightweight, making them easy to carry/integrate with Staff ID cards; RFID tags are cheap, making it more affordable to provide them to as many staff members as necessary; RFID tags are durable, making them more reliable over time / in emergency situations; RFID tags do not require their own power sources, making them more reliable / lower maintenance; RFID tags can be read quickly, making it suitable for access in emergency situations; RFID tag has storage, which could be used to store access credentials // no need to remember a keypad code // different staff could be given different access levels; RFID permits contactless access, allowing access where staff do not wish to touch a communal access control mechanism; **MAX 3** If no other marks awarded allow 1 mark for at least 2 reasons why RFID is used in this scenario, or at least 2 characteristics of RFID (with no reference to the scenario).	3