<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>a</td><td></td><td>1 mark for:

• Binary is used because computers are made of switches that can only be on or off (box 3)</td><td>1</td><td>Accept cross or other indication as long as clear which one they intend. 2+ ticks = 0 mark

<u>Examiner's Comments</u>

This question required candidates to identify the true statement. Many responses identified that the third statement was true. Statement 1 was incorrect because binary digits cannot include the value 2. Statement 2 was incorrect because the left-most bit is the largest value. Statement 4 was most commonly given as an incorrect choice, the smallest whole number that can be stored in 8 bits is the number 0, not the number 1.</td></tr>
<tr><td></td><td>b</td><td></td><td>1 mark for each completed box

<table><tr><th>Denary</th><th>8-bit binary</th><th>Hexadecimal</th></tr><tr><td>7</td><td>00000111</td><td>7</td></tr><tr><td>49</td><td>00110001</td><td>31</td></tr><tr><td>102</td><td>01100110</td><td>66</td></tr><tr><td>244</td><td>11110100</td><td>F4</td></tr></table></td><td>4</td><td>Must be 8-bits.

Ignore case in hex.

Ignore calculations in answer box

<u>Examiner's Comments</u>

This question required candidates to translate denary, binary and hexadecimal numbers into each of the other forms.

Many responses accurately converted the 8-bit binary to denary. The binary conversion was often correctly converted. However, some candidates did not include the required 0s at the start to make the answer an 8-bit binary number as required.

The conversion of the third binary number to denary was more challenging. A range of responses were often seen including 114, and conversion to hexadecimal.

The final conversion to hexadecimal was often given inaccurately, for example E4 or F2 being given instead.</td></tr>
</table>

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Question			Answer/Indicative content	Marks	Guidance
	c		1 mark for: • 200MB (box 3)	1	Accept cross or other indication as long as clear which one they intend. 2+ ticks = 0 mark <u>Examiner's Comments</u> There were a range of responses given by candidates. Many candidates identified 200MB as the correct response. 2300 KB was commonly given as an incorrect response.
	d		1 mark for both boxes: • 4 500 000 bytes (box 1) 4.5 MB (box 3)	1	Accept cross or other indication as long as clear which one they intend. 1/3+ ticks = 0 mark <u>Examiner's Comments</u> This question required candidates to work out which of the two file sizes were the same. Candidates had to tick two boxes. Many candidates identified the two correct answers. Correct responses often had working at the side of the answer. There was a range of incorrect answers given where different combinations were selected.

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Question			Answer/Indicative content	Marks	Guidance
	e		1 mark each: • Answer (1) 0 0 0 0 1 1 1 1 • Correct working e.g. carrying (might be above, below etc.) 0 1 1 1 0 0 0 1 1 0 0 1 1 1 1 0 0 0 0 0 1 1 1 1 carries: 1 1 1	2	Do not award marking for converting each number to denary and adding them together. If the carries are present, and converting to denary is present – award the carries (conversion can be used to check their answer). Marks are not dependent. <u>Examiner's Comments</u> Candidates were required to complete the addition in binary. Some responses converted each binary number to denary, added these, and then converted them back to binary. This allowed them to access the final answer mark, but **not** the mark for showing their working. The mark for showing working out required candidates to show how the data was carried. Some responses correctly identified the inclusion of an overflow. The overflow was not required for the mark this time but is good practice. Incorrect answers must be clearly crossed out. The new answer must be written clearly and separately. Some candidates overwrite a 1 with a 0, or vice-versa, making it impossible to identify the intended answer.
	f		1 mark each: • Left shift • 3 places	2	<u>Examiner's Comments</u> This question was often answered well. For full marks, candidates needed to accurately identify that it was a left 3-place shift. Some responses only gave the direction, i.e. left, and did not note the number of marks (2) that can identify the level of response required.
			Total	11	

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<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2</td><td>a</td><td>i</td><td>1 mark for each protocol

<table><tr><th>Task</th><th>Protocol</th></tr><tr><td>Requesting a webpage from a web server</td><td>HTTP // HTTPS</td></tr><tr><td>Entering a username and password to access their bank account</td><td>HTTPS</td></tr><tr><td>Downloading a text document from a web server</td><td>FTP // HTTP // HTTPS</td></tr><tr><td>Checking for new emails in their inbox</td><td>IMAP // POP</td></tr></table></td><td>4</td><td>Mark first answer in each box.

Allow full name to be written e.g. file transfer (protocol).

Accept POP3 or any other version

<u>Examiner's Comments</u>

Many candidates demonstrated an understanding of common protocols. The most common correct responses were giving HTTP and HTTPS as protocols for the first two tasks.

Responses to the last two tasks were more commonly inaccurate. A range of protocols were given including SMTP for email.</td></tr>
<tr><td></td><td></td><td>ii</td><td>1 mark each to max 2:

• Each layer is independent // layers are not reliant on other layers
• One layer can be changed without affecting the others // a layer can function without needing/changing/impacting any other layer // self-contained
• Separates tasks so they can be developed independently
• A developer can focus on only one layer // developer can specialise
• Allows for standards for individual tasks/layers to be developed // for compatibility
• Manufacturers can develop hardware to fit into one particular layer
• To group together similar protocols</td><td>2</td><td>Max 1 in each answer space

<u>Examiner's Comments</u>

Candidates were often able to show an understanding of layers but could not say why layers are used. The most common responses referred to the need for independence between layers, and that it provides the ability to change one layer without having to change/impact on any other layers.</td></tr>
<tr><td></td><td>b</td><td>i</td><td>1 mark from:

• Uses dedicated/own/internal hardware // no external/third party hardware/infrastructure // computers use MAC addresses to communicate within the LAN</td><td>1</td><td><u>Examiner's Comments</u>

Candidates often gave a benefit of a LAN instead of a characteristic. This was often in comparison to a WAN. Examples included that it is cheaper, or that you can share devices and transfer data. Some responses identified the use of owner-owned hardware, or that third-part hardware was not required.</td></tr>
</table>

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Question			Answer/Indicative content	Marks	Guidance
		ii	1 mark each to max 4: e.g. • Allows **more** devices to connect … • …for example televisions, mobile phones • Easy to connect (devices) // Easier to setup (wireless connections) // By example e.g. easier for guests to connect their devices • Home is likely small area • … so short distance wireless is sufficient • Devices can move around // can use devices in different areas // can connect from anywhere in the house // can use where wires don't reach // can access from a larger area (than wired) • … by example e.g. student is using a laptop so does not need to be tied to one place // by example e.g. they don't have to disconnect before moving // e.g. they can stay connected whilst moving • Cheaper to **purchase/install/setup** for new devices // no cost for (new/replacement) wires/hardware • …because no **additional/fewer** wires are needed • Fewer trip hazards from trailing wires // reduce risk of damage to cables // fewer cables to damage • More compatible // some devices only have wireless connections	4	Easier/cheaper on their own is NE <u>Examiner's Comments</u> Candidates were often able to explain the benefits of including wireless connections. Common answers included the ability to be mobile and move around the home and allowing a wider range of devices to connect to the network. Some candidates extended their answers by explaining or justifying the wider range of devices. For example by stating mobile phones do not have wired ports. Some responses answered the question as though it was excluding wired connections all together and that the wires were being replaced; this did not answer the question asked which was the benefits of it including wireless – as well as wired.

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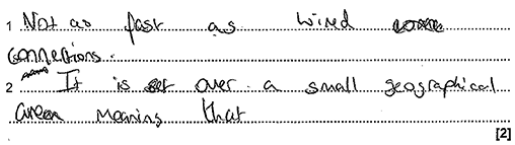
Question			Answer/Indicative content	Marks	Guidance
		iii	1 mark each to max 2: e.g. • Prone to interference // by example • Limited range of signal • Slower rate of transmission // less bandwidth // reduced network performance// increased latency // BOD slower connection // more users reduces rate of transmission / bandwidth /performance etc. • Increased risk of **security** concerns // by example e.g. A hacker could connect to the wireless connection • Less stable connection • Higher chance of collisions // Higher error rate	2	MP3 needs to say what is slower / decreased e.g. It's slower, is NE Mark first drawback in each answer space. Less reliable is TV on its own for MP 5 <u>Examiner's Comments</u> Candidates often demonstrated a good understanding of the drawbacks of wireless connections. Common responses included lower bandwidth and possible interference from other devices and/or objects. In this response some candidates stated that wireless connections could be slower – but did not give enough information to explain what was slower. Exemplar 1  1 Not as fast as wired connections. 2 It is over a small geographical area meaning that [2] The response in Exemplar 1 has identified that wireless is "not as fast as wired connections". However, the candidate has not specified what it is not as fast at doing. To gain the mark, the candidate could refer to the transmission speed, the speed that errors are corrected, the speed that it loads, etc.
			Total	**13**	

Question			Answer/Indicative content	Marks	Guidance
3	a		1 mark for each completed space A character set stores **all** of the characters that the computer can represent. Each character is given a **unique/different** binary code. Lower-case and upper-case letters in a character set are given **unique/different/similar** binary codes. One example of a character set is ASCII. This character set uses **8** bits for each character. If the ASCII value for the character 'F' is 70 Then the ASCII value for the character "L" is **76**.	5	Award the same term used multiple times if used correctly Examiner's Comments This question required candidates to use the given terms to complete the description of character sets. Many responses accurately identified that a character set stores all the characters. Some candidates identified each character as being given an identical code or a repeated code. This is incorrect. The code for L was often given accurately. The number of bits for each character had a range of responses given, commonly 256 bits for each character. The specification for J277 states that in the exam ASCII will be described as having 8-bits to avoid confusion between ASCII and extended-ASCII, which are not differentiated in the specification.

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Question			Answer/Indicative content	Marks	Guidance
	b	i	1 mark: • Data about the data/image/file	1	Question is for a definition, not an example. If the definition is not clear, for example details about the image, information about the image – this is NE, but read the example to see if it clarifies. For example: 'Information about the image, such as the number of pixels' give a BOD. Data could be properties / characteristics. <u>Examiner's Comments</u> This question required a definition of the term metadata and many responses correctly defined it as the data about the image, or the data about the file. Some candidates used information, for example the information about the file, which was not precise enough - but they often carried on with an example that supported their statement and demonstrated their understanding.  **Misconception** A common misconception was that metadata identifies the colour of each pixel in the image.

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<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td></td><td>ii</td><td>1 mark each:

• First row: red red purple
• Remainder correct and in correct order

<table><tr><td>red</td><td>red</td><td>purple</td></tr><tr><td>blue</td><td>green</td><td>blue</td></tr><tr><td>purple</td><td>purple</td><td>purple</td></tr><tr><td>red</td><td>green</td><td>blue</td></tr></table></td><td>2</td><td>Ignore case/spelling as long as legible.

If a candidate has completed the table in the incorrect layout e.g. right to left, or bottom to top, then award MP2 as a FT if they have done it all correctly.

<u>Examiner's Comments</u>

This question required candidates to consider the binary number and the binary value for each colour, divide the binary number into groups of 4 bits and match them to the appropriate colour. This was completed accurately by many candidates who were able to match the codes and colours.

The instructions stated that the image starts in the top left, but some candidates started in the bottom right instead.

Some responses did not use the colours provided in the question and created their own colour scheme for the image, commonly just using black and white.</td></tr>
<tr><td></td><td></td><td>iii</td><td>16</td><td>1</td><td>Accept any calculation that equates to 16 i.e. 2^4

<u>Examiner's Comments</u>

Candidates were required to calculate the number of different colours that can be represented in 4-bits. This was done by working out how many binary numbers can be created using 4-bits. A common error was giving four colours, or in some cases only one or two colours.</td></tr>
</table>

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Question			Answer/Indicative content	Marks	Guidance
		iv	1 mark each to max 2: • The **quality** of the image can be improved • The **file** size will increase // takes up more **storage** space // image has/requires/takes up more data • The number of colours that can be represented/used will increase // BOD more colourful	2	Do not award higher resolution, image size increases, clearer image (NBOD) more detailed image (NBOD). Closer to original is NE on its own because there is not an original image in this context. Mark first answer in each answer space. <u>Examiner's Comments</u> This question was often answered well. Candidates commonly identified that the file size will increase with an increase in colour depth. Some responses also identified that this increase would allow the image to use more colours. **Misconception** A common misconception is that colour depth increases the resolution of the image. This would need to be an increase in the resolution (the number of pixels) as opposed to the number of bits per pixel.

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Question			Answer/Indicative content	Marks	Guidance

	c	i	1 mark for lossless
			
			1 mark each to max 2 for justification:
			e.g.
			
			• Lossless will not remove any **data**
			// No **data** is lost with lossless
			// **File/data** can be fully reconstructed back to the original
			• Text files require all data to open/be used/work
			// text files will not work if any data is lost
			// lossy cannot (usually) be used on text files
			// none of the required characters / words / spaces / case / formatting / information would be lost
			// the text will remain accurate
			// the text will not have changed meaning
			// the text will still make sense
				3	Do not award an example of lossless for 1st mark (e.g. RLE), but FT for justification.
					
					Do not FT for lossy.
					
					Accept reverse for answers e.g. Lossy will remove data.
					
					If compression type is missing, read justification and if clearly stated which type is used then award justification.
					
					MP1 requires reference to the data (or equivalent) not information.
					MP2 requires reference to the text file context and information is allowed.
					
					If not valid compression – 0 mark.
					
					<u>Examiner's Comments</u>
					
					Lossless compression was often correctly identified as the type of compression used for text.
					
					Some candidates justified this in context either by explaining why lossless is required for text files, or by explaining why lossy was not appropriate.

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Question			Answer/Indicative content	Marks	Guidance
		ii	1 mark for lossy 1 mark each to max 2 for justification e.g.: • Will reduce the **file size more/significantly** (than lossless) • Image will only lose **quality** // changes may **not be noticed** by the user // remove **unnoticeable/unnecessary** detail/content	3	Do not award an example of lossy for 1st mark (e.g. reduce resolution), but FT justification. Do not award lossless but FT for justification for lossless: e.g. • Quality/detail of the image can be retained • No data will be lost (permanently) • File size may still be a substantial reduction If compression type is missing, read justification and if clearly stated which type is used then award justification. Do not award how the file can be compressed e.g. reduce number of colours – unless they also state that this change will not be noticed. MP1 it compresses the file more is NE – compression is in the question, the candidate needs to explain what this means. If not valid compression – 0 mark. <u>Examiner's Comments</u> Many candidates correctly identified that lossy is the most appropriate. Lossless could be used but is not as appropriate in this scenario. Candidates who stated lossy compression were often able to describe how the loss of data would not be noticed, and some responses also identified that the file size could be decreased more. Candidates that gave lossless were able to gain marks for the justification. However, often candidates could not justify it appropriately, for example by describing how it would be compressed instead of why this was appropriate.
			Total	17	

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<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4</td><td>a</td><td></td><td>1 mark for each row

<table>
<tr><th>Threat</th><th>Anti-malware</th><th>Penetration testing</th><th>Encryption</th><th>Firewall</th></tr>
<tr><td>Spyware</td><td>✓</td><td></td><td></td><td>(✓)</td></tr>
<tr><td>Brute-force attack</td><td></td><td>(✓)</td><td></td><td>✓</td></tr>
<tr><td>Data interception</td><td></td><td></td><td>✓</td><td></td></tr>
<tr><td>SQL injection</td><td></td><td>✓</td><td></td><td>(✓)</td></tr>
</table></td><td>4</td><td>(✓) can be present, or not

<u>Examiner's Comments</u>

This question required candidates to consider which methods would be appropriate to prevent each threat. For each threat there was one method that was most appropriate. Some threats had other suitable responses. Some candidates did not take note of these instructions and only ticked one box for each row, commonly missing another appropriate method.

 
Misconception

A common misconception was that a firewall and penetration testing could stop data interception. Both of these methods would prevent access to a computer system, but if data is being transferred between computers (for example on the internet) then there will be no firewall to stop the interception.</td></tr>
</table>

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Question	Answer/Indicative content	Marks	Guidance
b	1 mark for threat 1 mark each to max 2 for description e.g. • Threat: Social engineering • Using deception to manipulate users • …to gain personal data • Threat: Shoulder surfing (threat or expansion) • Watching a person entering a password • …and using it to access an account • Threat: Phishing • Fake emails sent to person // click on link from fake email • Person sends personal data // gives away personal data • Threat: Pharming • Software that redirects user to fake website // use of a fake website • Person enters personal data // gives away personal data • Threat: Denial of service // DOS // DDOS • Multiple requests sent to a **server** (simultaneously) // **server** is flooded with requests • More requests than the server can process // uses all of the bandwidth available • Server cannot respond // server crashes/denies access // stops access to a network // slows access to a network • Threat: Hacker • Person gaining unauthorised access to a system/account • To delete/damage/access data • Threat: Virus/malware • Software that replicates/spreads • Fills disk space • Deletes/corrupts data // allows unauthorised access • Threat: Trojan • Malware disguised as legitimate software • Once installed acts as a virus // by example of action e.g. deleting files /	3	If threat is clearly wrong do not FT. If no threat given, read description for name of threat. If no name, do not award. If threat is vague award matching description. Allow social engineering as the threat – naming and description of phishing/pharming/shoulder surfing in the description. Ransomware – MP3 cannot be awarded for 'ransom' on its own without reference to it being paid. For actions that the malware/virus etc. can carry out – award any feasible action. <u>Examiner's Comments</u> Many responses accurately identified another threat. The most common responses were denial of service or virus. Some responses gave a keylogger which was a repeat of spyware because it is a specific type of spyware. DDOS was often described appropriately, although some responses described it as being an attack on an individual's device instead of a server. Virus was also often described appropriately with the possible effects of deleting or corrupting files. Some responses described how to prevent the threat instead of describing the threat itself.

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Question			Answer/Indicative content	Marks	Guidance
			allows unauthorised access • Threat: Worm • Software that replicates across a network • Uses up all the bandwidth • Threat: Ransomware • Encrypts/corrupts/locks access to data • Cannot access data without **paying** a fee/money // **pay** fee/money to get them back/decrypted // Cannot access data without meeting demands • Threat: Physical threat // by example • Damage to hardware • Deletes/corrupts data		
			Total	7	

Question			Answer/Indicative content	Marks	Guidance

5	a	i	1 mark each
			Primary
			
			• to store (active) **data/instructions/software/OS** that the **processor** needs to **access**
			// without primary the computer won't be able to start up/work
			// (ROM) so the start-up instructions are not deleted when the computer turns off
			// (RAM) to store the **currently** running **data/software/instructions**
			// (Cache) to store **frequently** used **data/instructions**
			
			Secondary
			
			• to store **data/files long-term/permanently**
			// without secondary the user's files will not be stored when the power is turned off
			// store **data** not currently being used
				2	Question is not what they store, but why they are needed.
					
					Secondary NBOD 'to backup data' without reference to the long-term/permanence
					
					<u>Examiner's Comments</u>
					
					Some candidates found this question challenging and often gave examples of each type of storage instead of answering why both are required. Some candidates were able to accurately describe the purpose of primary storage as storing currently running data and software.
					
					Misconception
					
					A common misconception was that secondary storage is used when primary storage is full, or that it is only used as a backup.

		ii	1 mark for device, 1 mark for data • Hard drive // SSD // USB (memory) stick // Flash memory card // CD // DVD etc. • E.g. Images created // documents // software // files // data moved from RAM to virtual memory	2	Allow any secondary device. BOD 'optical disc' Question asks for device not type of device e.g. magnetic/optical/solid state is NE. Award example even if incorrect secondary storage. USB on its own is NE <u>Examiner's Comments</u> Candidates were required to identify a secondary storage device. Some responses identified a type of storage media (for example magnetic) instead of identifying a device (for example hard drive). Some responses gave RAM or ROM as a secondary storage device. These responses were incorrect. The example data varied but many responses were able to identify the storage of files, the images or software.

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<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td></td><td>iii</td><td>1 mark for each row.

<table>
<tr><th>Statement</th><th>True (✓)</th><th>False – rewrite the statement to make it true</th></tr>
<tr><td>A section of primary storage is partitioned to act as virtual memory</td><td></td><td>A section of secondary storage is partitioned to act as virtual memory</td></tr>
<tr><td>Data from ROM is transferred into VM</td><td></td><td>Data from RAM is transferred into VM</td></tr>
<tr><td>VM is needed when RAM is full, or nearly full</td><td>✓</td><td></td></tr>
<tr><td>Data from VM is transferred back to secondary storage when needed</td><td></td><td>Data from VM is transferred back to RAM when needed</td></tr>
</table></td><td>4</td><td>Allow a description of the error in column 2, e.g.
in row 1: 'primary should be secondary'

Accept HDD/SSD for secondary storage for the 1st row.

Do not accept primary for RAM (rows 2 and 4).

<u>Examiner's Comments</u>

In this question candidates needed to consider each statement, identify whether it was true or false and if it was false re-write the statement about virtual memory to make it true.

Candidates commonly identified the third statement as being true.

The first statement was often correctly altered to identify that secondary storage was used. The second statement was sometimes changed correctly to RAM, but at other times was changed to secondary storage.

The final statement was often changed to primary storage, which was not enough because primary storage would include ROM and cache, therefore not being precise enough to describe how VM works.</td></tr>
<tr><td></td><td>b</td><td></td><td>1 mark from:

• Performs housekeeping actions
• Monitor / manage / maintain a computer system
• Help the computer run smoothly/efficiently
• To diagnose/fix/identify problems with a computer system</td><td>1</td><td>Do not award example on its own

<u>Examiner's Comments</u>

Some candidates gave an example of utility software and described the purpose of that software instead of utility software in general. For example, a candidate gave defragmentation, or file management as the need.</td></tr>
</table>

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Question			Answer/Indicative content	Marks	Guidance
	c	i	1 mark for identification: • Artist's computer // computer uploading the images // BOD The artist 1 mark each for justification to max 2: e.g. • Sends the files/data for storage/to the **host**/web **server** // the files are stored on the web **server** • Performs the user's actions … • .. and sends the results to the web **server** • Sends a **request** to the web **server**… • … to **store/upload** its files • It does not store data for others to access • Confirmation of upload/error is received (from server) for display	3	Incorrect computer, do not award justification. Be careful the justification is talking about the upload of images to the web server, not the download. Accept host for web server. If 'user's computer' is given for identification, this is NE – read on for justification. If 'user viewing the website' or similar is given this is incorrect. <u>Examiner's Comments</u> Many responses identified the artist's computer as being the one that is acting as a client. Fewer responses were able to justify this, for example they described a different scenario, such as downloading the images to view the website, instead of the given scenario of the client uploading the files. Exemplar 2 Client computer Artist's Computer Justification The Artist's Computer is requesting a response for uploading images by the website [3] In this response the candidate has identified the correct computer. The justification states that it is requesting a response, but not where this response is from, and then that the images are uploaded to the website when in this scenario they should be referring to the server in the client-server relationship.

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Question			Answer/Indicative content	Marks	Guidance
		ii	1 mark for identification: • Web server 1 mark each for justification to max 2: e.g. • The images/data are stored on / uploaded to / sent to / hosted on the web server • Web server receives a request (from the artist's computer to upload the images) • Web server executes/responds to the request // Web server is doing the processing/handling the (request to) upload • Web server returns confirmation/error of the processing/upload	3	If computer is incomplete or inaccurate e.g. server/website instead of web server. Do not award computer, but award justification. Allow FT in justification if the same inaccurate term is used, for example 'website' is given as computer (NE), but justification is: 'images are sent to the website' (FT for website instead of web server). Incorrect computer, do not award justification. <u>Examiner's Comments</u> Fewer candidates were able to accurately identify the server in this scenario. Many candidates identified the website as a server when a website is not a computer. Some candidates who identified the webserver were also able to justify their choice by identifying the actions it was performing in the scenario. Exemplar 3 Server computer website server Justification the website server receives and processes data and does not send it back The response in Exemplar 3 has correctly identified the webserver as the computer. They have also identified that this server (the computer) receives the data and processes the data.

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Question			Answer/Indicative content	Marks	Guidance
	d	i	1 mark each: e.g. • Authors can earn money • …by selling for a fee // using licences to stop unauthorised use • No-one can see the code • …users cannot edit/change the software // by example inserting malware • …so it cannot be copied/resold/shared • More **control** over intellectual property // by example e.g. restrict users, restrict what can be done with the software without permission	4	Benefit is to artist and programmer – not user. Mark the answer as a whole. Do not award reference to ownership/copyright because both allow copyright of the code/program. <u>Examiner's Comments</u> This question required candidates to consider the benefits to the developer of releasing the software as proprietary. A common error was describing the benefits to the users, for example they know the software has not been tampered with and that there is lots of support. The most common responses included the ability to earn money from selling the software and retaining control due to no-one else being able to access the source code.
		ii	1 mark for point, 1 for expansion: e.g. • Users can **view/edit** the (source) code // Users can **edit** the program/software • …to **tailor/improve/adapt** it to do what they need/want • …so errors can be fixed (by anyone) • …users can learn how the software works • Freely accessible • …do not have to pay • …can redistribute … • …with changes	2	Benefit to users not artist and programmer <u>Examiner's Comments</u> This question required candidates to consider the benefits to the users of the software being released as open source. Many candidates were able to accurately identify that the source code comes with the software, and this allows the user to edit it to meet their needs.
			Total	21	

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Question	Answer/Indicative content	Marks	Guidance
6	**Mark Band 3–High Level** **(6–8 marks)** The candidate demonstrates a thorough knowledge and understanding of a wide range of considerations in relation to the question; the material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate is able to weigh up both sides of the discussion and includes reference to the impact on all areas showing thorough recognition of influencing factors. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Mark Band 2-Mid Level** **(3–5 marks)** The candidate demonstrates reasonable knowledge and understanding of a range of considerations in relation to the question; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate makes a reasonable attempt to discuss the impact and most are showing reasonable recognition of influencing factors. *There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.* **Mark Band 1-Low Level** **(1–2 marks)** The candidate demonstrates a basic knowledge of considerations with limited understanding shown; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than an unsupported assertion.	8 AO2 1a (4) AO2 1b (4)	The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive: **Indicative Content:** Some points may cover more than one 'issue'. Legal issues: • DPA needs to be followed or company could be fined e.g. Customers informed the system is used Data held for specified time/reasons Data kept secure • Centre is private property so customers can choose not to enter • Can be used to identify people committing crimes e.g. theft, used as evidence, make sure the correct people are caught. Ethical issues: • Users feel safer because they know any actions are being monitored and help/action will be taken if needed • If users have not done anything then there is no reason to be tracked/recorded so should not impact them • Users feels unsafe because they are being watched • Users may be unaware they are being recorded - need to be informed, give consent • Users do not know where the videos/data about them and their movements is stored/how it is used - DPA reference Privacy issues: • Users may feel it is an invasion of privacy • Users are in a public place and can be legally recorded by anyone anyway • Users may feel like they are being watched all the time • Users have not given their permission to be tracked • Users may not know the system exists <u>Examiner's Comments</u> The quality of written communication

Question			Answer/Indicative content	Marks	Guidance
			The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. 0 mark No attempt to answer the question or response is not worthy of credit		required a balanced discussion of the positive and negative impacts of including facial recognition with CCTV cameras in a shopping centre. Some responses gave strongly negative arguments with little, if any, consideration for the positive impacts. Some candidates also chose to focus on the introduction of CCTV cameras, where the question states there are already CCTV cameras and the discussion is about the upgrade to facial recognition. The more successful responses considered the ethical, privacy and legal issues one at a time and identified the positive and negative impacts (where applicable) for each of these three sections. These responses were usually well structured and had a balanced discussion before leading to justified conclusions. Some successful responses included bullet points and table structures to help the candidates structure their response. These were often thorough and included detailed discussions. Some of the less successful responses focused on people not wanting to be watched by CCTV cameras, or that people would misuse the CCTV cameras. The CCTV cameras were already in existence and therefore this was irrelevant to the context of the question. More successful responses considered the storage of the tracked videos and how this could lead to data privacy issues. These responses also discussed how shops could use the stored data to analyse where people go in shops to identify areas where they could put more adverts.
			Total	8	

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Question			Answer/Indicative content	Marks	Guidance
7			1 mark for example: e.g. • Auto lights • Auto window wipers • Sat nav // GPS • Airconditioning // climate control • Radio/entertainment/infotainment system/media system • Lane assist • Engine management system • Auto-park • Cruise control • Auto-brake • Follow-me • Dashcam 1 mark each to max 2 for explanation. • **Limited** functions // by example e.g. the system **only** checks the light and turns lights on/off • **Dedicated** microprocessor // by example e.g. there is a microprocessor that is only checking the lights • Hard to change function // by example e.g. the user cannot make the light system do any other role	3	Allow anything that could be reasonably within a car. If example is not clear if it's an embedded system, read explanation for justification e.g. hazard lights – could be embedded if they are activated automatically when the car crashes. Award the example in the explanation if this occurs. If justification is generic features of an embedded system max 1 for explanation. Do not award 'built into the car/larger machine' because this is in the question. <u>Examiner's Comments</u> This question required candidates to consider embedded systems within a car. There were a range of possible systems, the most common being GPS or satellite navigation systems. Other common responses included automated lights, automated wipers, and parking sensors. The most common explanation was that the system has a single (or limited) purpose, but few candidates expanded beyond this. Some candidates repeated that it was built into the car but this was provided in the question. Some candidates provided examples of embedded systems such as a washing machine, a microwave and a fridge/freezer. This was not appropriate to the context of the question.
			Total	3	

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