Question			Answer/Indicative content	Marks	Guidance
1	a		1 mark for each completed term to max 6 An **analogue** sound wave needs to be converted into a digital sound wave. Sound **sampling** is when the amplitude of the sound wave is measured at set intervals. The **sample rate** is the number of times a second the sound wave is measured. This is given in Hertz. Each amplitude is given a **unique** binary number. The number of bits allocated to each sample is the **bit depth**. The **higher** the number of bits, the wider the number of amplitudes can be measured.	6	<u>Examiner's Comments</u> Candidates were often able to demonstrate a good understanding of sound representation, identifying the appropriate missing terms. Candidates most commonly correctly identified that an analogue wave is converted into digital. The final space was often inaccurately completed with smaller, when instead it is the higher the number of bits the wider the number of amplitudes.
	b	i	1 mark from • The **smallest unit/part** of an image • A (single) square/dot/diode which has **one/single colour**	1	Accept screen in place of image. BOD block/particle etc. in place of square. <u>Examiner's Comments</u> Some candidates found it challenging to define the term pixel. The most common accurate responses identified it as the smallest part of an image, or a single square of one colour. Some responses described it as a square that contains many colours; while one pixel can have a different colour stored in it at different times, it can only ever have one colour at a time. Other inaccurate responses included describing it as a bit of data or just a square on a screen; when a square on a screen can be made up of many pixels.

Question			Answer/Indicative content	Marks	Guidance
		ii	1 mark for one stage of working: • 800 * 500 (= 400 000) • 400 000 * 10 = 4 000 000 • 4 000 000 * 8 (= 32 000 000 bits) • 32 000 000 / 8 = 4 000 000 • 4 000 000 / 1000 = 4 000 1 mark for answer 4000 kilobytes	2	For MP1 accept 8 * 5 BOD. Accept any method of doing calculations e.g. statements, grids, calculations. Accept division by 1024 instead of 1000. Final answer will be 3906.25 kilobytes. If no answer in the final answer space, look for answer clearly identified in working. Examiner's Comments Candidates were often able to accurately show part of the working, most commonly for multiplying 800 and 500. Fewer candidates were able to complete the calculation to gain the correct response. A common missed element was giving the file size of one image instead of multiplying it by 10 to give the file size of the ten images.
		iii	8	1	Allow calculation that equates to 8 Examiner's Comments There were a mix of responses to this question, with some candidates giving 2^240, 256, etc. Some candidates identified the need for 8 bits but gave the response to the question as 2^8, meaning that there would be 256 bits.

Question			Answer/Indicative content	Marks	Guidance
	c		No mark for choice 1 mark per bullet to max 4 for matching justification Solid-state choice e.g. • Durable/robust // Less likely to be damaged/break • … no moving parts // because it does not get scratched like a disk • Larger **capacity** (than optical) // store more **data** • … needed because the **files** could be very large // there could be many **files** to transfer // store large number of **files** • Portable • … small in (physical) size // lightweight • **Fast** to **read/write/access** data • More compatible • … no additional device/drive is needed Optical choice e.g. • Large (enough) **capacity** // store sufficient **data** // BOD larger capacity • … needed because the **files** could be very large // there could be many **files** to transfer // store large number of **files** • Portable • … small in (physical) size // lightweight • Cost per unit is less // Cost for the same amount of storage is less • The fast access/read/write speed is not required • … files are being copied not run direct from the storage	4	Accept type by example. No choice – check justification for clearly stated choice and then award justification. No clear choice then 0 marks. Allow justification marks for using one, or not using the other. SS – BOD faster to transfer the data for read/write/access SS – BOD more 'efficient' to read/write/access. SS – accept optical may only be able to be written to once. Do not accept longevity/reliability. <u>Examiner's Comments</u> Candidates were often able to justify the type of storage that they selected. Solid-state was most commonly selected, with responses identifying the small size, durability, portability and large capacity. Some candidates stated that it was faster than optical, without referencing what it is faster at, i.e. reading/writing data. Some candidates accurately justified solid-state, by identifying that it had sufficient capacity for the files and that it was portable. The stronger responses justified the choices for the given scenario, identifying that images could have large file sizes so the solid-state would be more likely to hold all of the required files, or that the need to transport that device might damage an optical disk by scratching it.
			Total	14	

<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></td><td>1 mark for each row to max 5

<table>
<tr><th>Operating system function</th><th>Memory management</th><th>Peripheral management</th><th>User management</th><th>File management</th></tr>
<tr><td>Multitasking</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>Renaming a folder</td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>Creation of user accounts</td><td></td><td></td><td>✓</td><td></td></tr>
<tr><td>Installation of a printer driver</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>Transfer of data to and from RAM</td><td>✓</td><td></td><td></td><td></td></tr>
</table>
</td><td>5</td><td><u>Examiner's Comments</u>

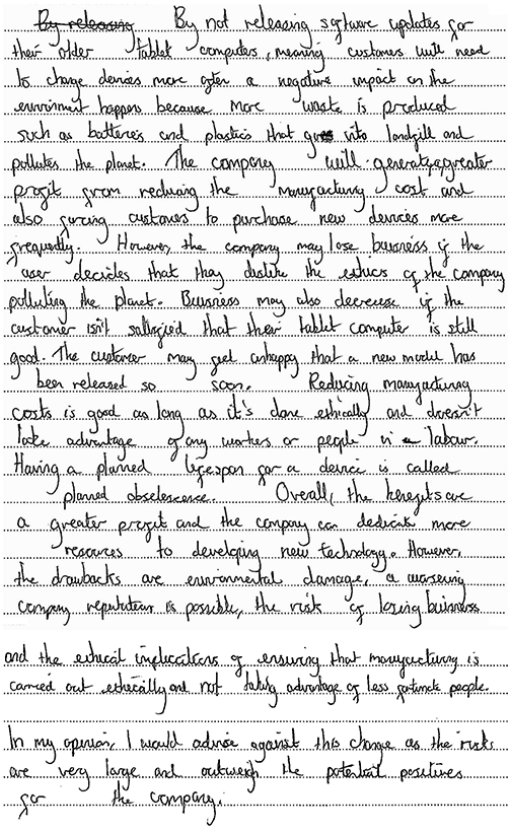
Candidates were often able to identify renaming a folder as file management.

Multitasking was most commonly incorrect, with a range of responses commonly including peripheral or user management.

Printer driver was occasionally inaccurately given as file or memory management instead of peripheral management.</td></tr>
</table>

Question			Answer/Indicative content	Marks	Guidance
	b	i	1 mark from • Perform housekeeping tasks • Perform maintenance // Keep the computer running smoothly // identify/fix errors // improve performance of computer • To monitor / manage / configure a computer system	1	Do not accept a specific example of utility software. Do not accept a task performed by one example of utility software. Read whole answer and award a correct statement. <u>Examiner's Comments</u> The most common responses related to utility software being used to maintain the computer, or to perform housekeeping tasks. Some responses identified it as managing utilities or providing utilities which was insufficient to explain what a utility was and its purpose. Some candidates gave specific examples of utility software and what this software did, for example defragmentation of encryption. These did not answer the question of the purpose of utility software in general, instead just the purpose of that one example of utility software.
		ii	1 mark each • Jumble / mix-up / encode / scramble / cypher data • Encrypt / decrypt using an algorithm / key • Make it meaningless (if intercepted / unauthorised access) // it cannot be understood / used (if intercepted / unauthorised access)	3	MP3 do not accept it cannot be 'read' or 'accessed'. <u>Examiner's Comments</u> Common responses included the use of a key to encrypt or decrypt the data. Some candidates identified that this key scrambled the data or turned it into cypher text.  **Misconception** Encryption does not stop data from being intercepted and does not stop the data being read. The transmission of encrypted data can be intercepted and the datafile can be opened. However, the datafile will be meaningless and not make any sense. The data is still there, but mixed up by the key and the encryption algorithm.
			Total	**9**	

Question	Answer/Indicative content	Marks	Guidance
3	**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*. Includes benefits and drawbacks. At least one ethical and at least one environmental issue. References both customer and company clearly for top of band. Points are expanded. **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 on most areas, 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*. Covers benefits or drawbacks to achieve band, top of band requires at least one of each. Covers ethical and/or environmental. Some points are expanded. May only reference customer or company.	8	The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive: **Indicative Content:** Ethical issues: • Will cost remain the same? – unfair on customers • Will customers be told? Or are they being deceived? • Can improve profit for company – allow staff to be paid more • Ethical to the company but unethical to the customers • Reduced cost may mean reduced reputation- long term loss If people move to other companies • Customers want most up-to-date devices – prepared to spend regularly • Lower cost to purchase may allow more people to afford device Environmental issues • Increase in e-waste from products that are disposed • Older devices could be distributed to people without devices to reduce waste • Products could be recycled for components Benefits and drawbacks: • Company Increase sales Increase profit Decrease popularity/reputation • Customer Increase in cost May be able to buy when couldn't before if initial cost is less Less reliable devices Effort/time to install new devices more regularly <u>Examiner's Comments</u> Many responses were suitably structured, with the stronger responses taking each of the bullet points in the question in turn. Some responses made appropriate use of bullet points and tabular structures, especially for the benefits and drawbacks which presented their arguments appropriately. When using bullets and tables candidates need to make sure they include their expansions alongside.

Question	Answer/Indicative content	Marks	Guidance
	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. *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*. Has a point for ethical/environmental/benefit/drawback, not all relevant. May not reference customer or company. **0 marks** • No attempt to answer the question or response is not worthy of credit		Candidates often focused on the drawbacks of the decision, most commonly the environmental impact of the waste generated from replacing devices. Similarly, many responses identified a potential increase in the digital divide. The most common argument was that people could not always afford to purchase new devices, and so would not have access to the most up-to-date technology.. Fewer responses considered a range of potential benefits beyond the increased profit for the company. Some stronger responses identified recycling the old devices to avoid waste, and providing these older devices at a lower cost to people who could not afford the newest devices. Exemplar 1  By not releasing software updates for their older tablet computers, meaning customers will need to change devices more often a negative impact on the environment happens because more waste is produced such as batteries and plastics that goes into landfill and pollutes the planet. The company will generate greater profit from reducing the manufacturing cost and also forcing customers to purchase new devices more frequently. However the company may lose business if the user decides that they dislike the ethics of the company polluting the planet. Business may also decrease if the customer isn't satisfied that their tablet computer is still good. The customer may get unhappy that a new model has been released so soon. Reducing manufacturing costs is good as long as it's done ethically and doesn't take advantage of any workers or people in a labour. Having a planned lifespan for a device is called planned obsolescence. Overall the benefits are a greater profit and the company can dedicate more resources to developing new technology. However, the drawbacks are environmental damage, a worsening company reputation is possible, the risk of losing business and the ethical implications of ensuring that manufacturing is carried out ethically and not taking advantage of less fortunate people. In my opinion I would advise against this change as the risks are very large and outweigh the potential positives for the company. This candidate considers both the benefits and drawbacks. They identify the environmental drawbacks of extra pollution and that customers may not be happy at having to replace devices so often. The response also considers the benefits of the company increasing their profits.

Question			Answer/Indicative content	Marks	Guidance
					This is expanded to explain how the profit can lead to more benefits, that they could put more resources into developing new technology. This response gained the top band mark because they included ethical and environmental impacts. They gave benefits and drawbacks. The response had expansions; the candidate did more than stating a point, they explained why it was relevant, or how this was a drawback. They also considered both the customer and the company and how the decision would affect both.
			Total	8	

Question			Answer/Indicative content	Marks	Guidance
4	a		1 mark each to max 2 • Small geographical location // single building • No use of external infrastructure // All hardware will be owned/managed by youth centre • Dedicated hardware // The hardware is not shared/used by anyone else/any other business • It is **not connecting networks** (like a WAN does)	2	Mark any two correct points as long as not contradicted. Examiner's Comments The most common response related to the distance of the network, identifying it as a small geographical area. Some candidates identified that the youth centre would own the hardware, or that external hardware would not be used. Some responses identified that a WAN is (usually) connections between networks, while a LAN is connections between nodes. Misconception A LAN and WAN are not defined by the number of computers that are connected. A WAN can have a smaller number of devices than a LAN. The differences are the distance between these devices and the hardware that is used to connect them.
	b	i	1 mark each to max 2 • (Partial mesh) means all devices are connected to one or more devices // (Full mesh) means all devices are connected to every other device • No need for **central** management / switch / device / node // All devices are **equal** // **Decentralised** • Multiple routes/paths (between devices)	2	MP1 BOD each device is connected to other devices // all devices are connected MP2 do not accept no central **server** Examiner's Comments Candidates often identified that devices are all connected to each other. Some candidates then confused a mesh topology with a client-server network and explained the use of a central device. Misconception A mesh network is the connections between devices in a network, it is not how the software for the network operates for example as a client-server network.

Question			Answer/Indicative content	Marks	Guidance
		ii	1 mark each to max 2 for drawback max 2 for benefit e.g. Benefits: • No purchase/cost of central switch / device • … lower cost to install/maintain network // no need to setup / connect to the central device • More connections/paths between devices // alternate routes • … no single point of failure // if a connection breaks can still connect • … more robust structure • More scalable // can have more devices/connections/nodes/computers • … easier to add devices • … can add / remove nodes without impacting other nodes/speed • Decrease in latency • … fewer collisions • Can be setup over a larger area // can provide a more stable connection • … each device acts as repeater Drawbacks: • Large number of / more connections/wires • … can involve redundant connections • … this is impractical • Reduced central management/control/oversight of the network/transmission • … less control over transfer/security of the network • Less secure BOD example less secure • … more routes/points/devices for data interception/attack/unauthorised access • Difficult to find an error • … because of the multiple routes where an error could occur • Mesh network uses more power • … more nodes are involved in each transmission	4	1 mark for a point 1 for expansion/reason/benefit. Any of the MPs can be the benefit/drawback and can be the expansion as long as they follow on. Do not accept faster/slower transmission speeds – dependent on media and many other factors. MP3 and MP4 can be in a single statement e.g. 'If one connection breaks the nodes can still connect through another route' <u>Examiner's Comments</u> The most common benefit was that there is no single point of failure, or by description that if one connection failed there is another connection. Few candidates identified a drawback. Candidates commonly referred to a star being able to install software on each device and that a mesh would not, but the star would need to include software to manage the network such as in a client-server model. The most common drawback identified was the increased number of connections between devices, which if cabled would be inconvenient to physically try and connect all devices to every other device.

<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td>c</td><td>i</td><td>1 mark each to max 3 e.g.

• Easier to add more devices/users
• Can have more devices/connections/users // more scalable
• … without cost of purchase/install additional wired connections
• Devices are not fixed to one spot // devices can be moved // can connect from anywhere in (wireless) range
• …allowing people to use them where they are needed // can use where there is no physical connection
• Reduces risk of (additional) trailing wires
• Less potential damage to equipment/wires
• Connect wider range / more types of device // by example e.g. mobile phones/tablets
• … that don’t have ports / wired connections // that only have wireless connections
• It allows a backup network if the wired network fails
• (Due to each node acting as a repeater in the mesh) the network will have a greater range</td><td>3</td><td>MP1 is for easier to add more devices to the network.
MP2 is there can be more connections/nodes/devices than on a wired.
‘more devices can be added easily’ is MP1 on its own.

<u>Examiner’s Comments</u>

This question was often answered well with candidates identifying benefits of wireless connections, most commonly that devices could be moved around the youth centre and that some devices did not allow for wired connections as they do not have the required ports.</td></tr>
<tr><td></td><td></td><td>ii</td><td>1 mark per bullet to max 2 for each factor

<table><tr><th>Factor</th><th>How it affects the performance</th></tr><tr><td>Bandwidth</td><td>• More bandwidth = faster network/transmission BOD better performance
• …because more data is transferred simultaneously/per second</td></tr><tr><td>Number of users accessing the network at the same time</td><td>• More users = slower network/transmission BOD worse performance
• …because more data is transferred simultaneously // more traffic // the bandwidth is being shared/used // more bandwidth used // BOD more congestion / collisions</td></tr></table></td><td>4</td><td>Allow reverse of each.

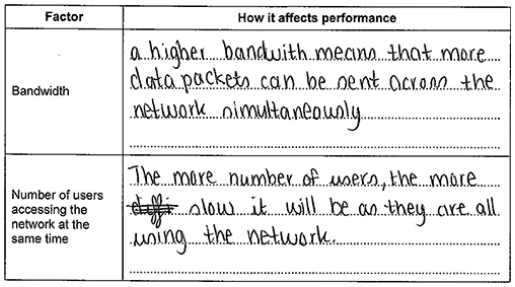
Do not award references to Internet speed alone.

Points need to reference more/less data in correct context.

<u>Examiner’s Comments</u>

The stronger responses clearly identified how the factor changed and the effect this had. Some responses did not identify the change, for example for bandwidth stating that there is a better performance of the network without identifying whether the bandwidth was higher or lower for this to happen.

Responses for bandwidth were often insufficient to explain how the performance was affected, for example that more data could be transmitted – but not at the same time. Some candidates gave a definition of bandwidth without identifying how it affects</td></tr>
</table>

Question	Answer/Indicative content	Marks	Guidance
			the performance. Responses for the number of users commonly identified that more users would equate to more data, or that more users would slow the network. Exemplar 2  Factor: Bandwidth — How it affects performance: a higher bandwith means that more data packets can be sent across the network simultaneously Factor: Number of users accessing the network at the same time — How it affects performance: The more number of users, the more ~~the~~ slow it will be as they are all using the network. This response for bandwidth has identified that more bandwidth means more data is transmitted simultaneously but has not given the effect of the performance. They have not identified that this in turn means that the performance will improve. The response for the number of users has been given a benefit of doubt mark for 'the more number of users, the more slow it will be'; 'the more slow' is given for the performance. Stronger terminology would have been slower transmission, slower performance, but this was considered as sufficient to demonstrate the understanding of the effect on the performance. The candidate has not explained this change on the performance, for example how it is not slower.

Question			Answer/Indicative content	Marks	Guidance
	d		1 mark each to max 5 e.g. • Can be expensive for large amounts of data / long term / hosting // may be ongoing subscription // no control over changing costs • May be limited amount of storage • No **control** over **security** // Need to rely on provider for security • May be hacked/stolen/intercepted/affected by a virus • May lose (personal) data // May lose access to data • May go against DPA/legislation // Data may be misused (by provider) • May not be clear where in the **world** the data is stored • Limited/No **control** over **access** • Company/cloud could go down • No **control** over **backup** // May not have (automatic) backups … • … data is not retrievable • Need internet access // no internet access means no data • … access speed depends on network/connection speed • Concerns over ownership of the data • Need to remember login details // may forget/lose login details • Users may need training	5	MP1 needs more than high cost, it needs identification of ongoing, cost for hosting etc. MP3 just poor/low security is NE Accept data may be sold as example of misuse. Examiner's Comments Candidates were often able to demonstrate a good understanding of the drawbacks of using the cloud. The most common responses included the need for a connection to the Internet to access the data. Stronger responses also identified that the youth centre would not have control of where or how the data was stored, for example that they would not have control over the security measures. Some candidates inaccurately stated that the cloud was less secure. This may be the case in some scenarios, but the cloud is not always less secure than other methods. The drawback of security is that the user does not have control over it. Misconception A Wi-Fi connection does not equate to an internet connection. Candidates often put that without access to Wi-Fi data the cloud could not be accessed. Data could still be accessed through any other connection to the internet.
	e	i	1 mark for router/modem	1	Examiner's Comments Many candidates were able to identify the use of a router or modem. Common incorrect responses included a network interface card, wires or a computer.

<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 for each row.

<table><tr><th>IPv4 address</th><th>Valid (✓)</th><th>Invalid (✓)</th></tr><tr><td>192.154.21.2</td><td>✓</td><td></td></tr><tr><td>258.0.0.3</td><td></td><td>✓</td></tr><tr><td>56.1.2.66.1</td><td></td><td>✓</td></tr><tr><td>251.58.3.7</td><td>✓</td><td></td></tr></table></td><td>4</td><td>Do not award rows with 2 ticks.

Allow Xs in place of ticks in either/both columns.

<u>Examiner’s Comments</u>

Candidates were often able to correctly identify whether several of the addresses were valid or invalid, most commonly that the last one was valid.

Candidates often incorrectly stated that 192.154.21.2 was invalid and that 56.1.2.66.1 was valid.</td></tr>
<tr><td></td><td></td><td>iii</td><td>1 mark each to max 4

• Browser checks cache for matching IP address
• URL/domain is sent to DNS
• DNS looks for URL/domain to find matching IP
• …in table/database/files/lists (of URL/domain and IPs)
• If not found the request is transferred to higher-level DNS
• DNS returns IP address to computer/browser
• An error is returned/sent if the IP address cannot be found</td><td>4</td><td>MP3 – award for the use of the DNS converting URL to IP

MP5 accept another/larger for higher-level

MP6 needs to be computer/browser, do not award user on its own.

<u>Examiner’s Comments</u>

Some candidates were able to give a detailed description of each step in the process of converting a URL to an IP. These responses were often logical and described the URL being transmitted to the DNS, that then looked for the corresponding IP in its database and returned this to the computer.

Some candidates inaccurately identified that the URL was transmitted to a web server instead of a DNS.

Some responses lacked the detail to meet the mark points, for example identifying that data was transmitted to the DNS without what the data contained. Some responses identified the IP being transmitted back to the user, instead of to the user’s computer or web browser; the user does not receive the IP.

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

Question	Answer/Indicative content	Marks	Guidance
			the client would enter the URL / web address into the browser. If the URL is then looked up on a domain name table. If the URL/ web address is not found, it is looked up on the domain name table again until it is found. If the URL/ web address is found, it is converted into the IP address using DNS. This candidate identifies that the URL is looked up on a domain name table, which gains MP4 but does not identify how the URL arrives with the DNS. The candidate also describes it being looked up again if it is not found. This does not identify that it goes to another, or higher level, DNS – looking up the URL in the same table will give the same result. The final statement identifies that the URL is converted into IP using the DNS which is awarded for MP3, that the DNS has looked for the URL to find that IP address.

Question			Answer/Indicative content	Marks	Guidance
	f		1 mark for legislation Data Protection Act (2018) // DPA // GDPR // Data protection 1 mark each for steps to max 3 e.g. • Identify data protection officer • Keep data secure/safe (from unauthorised access) • … by example // installing firewall // usernames and passwords // access rights // physical security // encrypt • Do not share/sell (without consent) • Don't store without consent • Only keep relevant data • … do not collect data from users that is not required • Do not store the data for longer than needed • Make sure the data remains accurate / up-to-date • Only use for purpose collected // Data must not be misused • … state purpose for collection • Do not store/share with countries with lower levels of protection • Change/delete data when requested … • … permanently/securely • Provide data for users when they request to see it • Notify individuals of data breaches • Must use data lawfully/fairly • Staff need to be trained in principles	4	If no legislation, wrong legislation, unclear legislation still award up to max 3 marks for description of DPA. Accept answers listing what needs to be done e.g. data must be up-to-date (without the specific step that will be followed to do this)? MP2 is stopping unauthorised access. MP4 is the company actively giving the data willingly to someone else. <u>Examiner's Comments</u> Responses often correctly identified the data protection act or GDPR as being the legislation. Some identifications were descriptions of legislation, for example to keep data secure, instead of the actual name of the legislation. Candidates commonly identified the need to keep the data secure and often gave a suitable method for this such as encrypting the data. Some responses also gave detailed steps that the youth centre would need to follow, such as allowing access when requested, deleting data when no longer needed, making sure that the data is kept up to date and not sharing the data without consent. Some candidates inaccurately identified the Computer Misuse Act or Copyright Designs and Patents Act, which are not followed when storing user's data.
			Total	33	

<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>5</td><td>a</td><td></td><td>1 mark for 2000000MB (last one)</td><td>1</td><td><u>Examiner's Comments</u>

Candidates were often able to correctly identify 2 000 000 as the correct response.</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>2-digit hexadecimal</th></tr><tr><td>38</td><td>00100110</td><td>26</td></tr><tr><td>78</td><td>01001110</td><td>4E</td></tr><tr><td>156</td><td>10011100</td><td>9C</td></tr><tr><td>215</td><td>11010111</td><td>D7</td></tr></table></td><td>4</td><td>Correct answers only – binary must be 8 bits.

<u>Examiner's Comments</u>

Candidates were often able to correctly convert the numbers between the different bases.</td></tr>
<tr><td></td><td>c</td><td></td><td>1 mark for working all 3 carries.
1 mark for binary answer
e.g.

<table><tr><td></td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>+</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td></td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td></td><td></td><td>1</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td></tr></table></td><td>2</td><td>Do not award conversion to denary as the only working.

<u>Examiner's Comments</u>

Candidates often gained the correct final answer. Some candidates did this by converting the binary numbers into denary and then converting the result back, which did not gain the working mark for binary addition. Some candidates did not include the final carry in their working, only showing two carries and writing the final carry direct into the position of the most significant bit.</td></tr>
<tr><td></td><td>d</td><td></td><td>1 mark for 00011101 (first one)</td><td>1</td><td><u>Examiner's Comments</u>

Candidates were often able to correctly identify the result of the shift.</td></tr>
<tr><td></td><td>e</td><td></td><td>1 mark each

• Left shift
• 3 places</td><td>2</td><td>No marks for contradictions e.g. "shifting to left or right"

<u>Examiner's Comments</u>

Candidates commonly identified that a left shift was required. Fewer candidates identified the correct number of positions with common errors including four or eight positions.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>10</td><td></td></tr>
</table>

Question			Answer/Indicative content	Marks	Guidance
6	a		1 mark for any 1 correct binary code 2 marks for all 3 correct binary codes in the correct order with no additional bits / addition 01010000 01001111 01010000	2	BOD 7-bit ASCII codes if correct Accept answer vertically and horizontally Examiner's Comments Candidates were often able to correctly convert one of the characters into ASCII. Some candidates attempted to add together the binary values for the three characters to give one 8-bit value.
	b		1 mark for benefit • Can represent more/a wider range of characters • Can represent characters from all/many/different languages // by example • Can store emojis 1 mark for drawback • Larger file size // double the file size of ASCII // more data/binary per character // more storage/bits used // requires more/additional processing • Additional characters are not backward compatible to ASCII // some characters will not be recognised when documents are read/opened in computers that only have ASCII	2	Award any correct point in benefit/drawback Examiner's Comments Candidates were often able to identify that there were more characters in Unicode than ASCII. This was conveyed in a variety of ways, for example that more languages could be used, or by example such as Unicode allows for emojis. Some candidates were also able to identify a drawback as it requires more memory or storage for the final file. Some candidates inaccurately gave the reverse, thinking that Unicode had fewer bits and therefore less characters than ASCII.

Question			Answer/Indicative content	Marks	Guidance
	c		1 mark for register with purpose • Program counter // PC **Stores** the **address** of the **current/next** instruction to be fetched // **stores** the **address** of the instruction for the **current/next** FE **cycle** • Memory address register // MAR **Stores** the **address** of the **current/next/required instruction/data** // **stores** the **address** of **data/instruction** about **to be fetched/executed** // **stores** the **address** where **data/instruction** (in MAR) **is going to be stored** // **stores** the **address** of **instruction/data being decoded/executed** • Memory data register // MDR **Stores** the **data/instruction** fetched from memory // **stores data/instruction** to be stored in memory // stores the **data/instruction** located in the **memory** location in the **MAR** • Accumulator // ACC **Stores** the **result** of calculations // **stores data currently** being processed / by example // **stores** the result from the ALU	2	Careful that the purpose is not an action such as fetches, takes, retrieves. Accept “points” to/at in place of stores Accept • Current instruction register//CIR//Instruction register//IR Stores the instruction currently being executed BOD memory buffer register for MDR. Accept memory address, memory data without ‘register’. Examiner’s Comments Many candidates were able to identify registers that are in the CPU, most commonly the MAR and MDR. Some candidates inaccurately identified other components of the CPU such as the ALU and CU. Candidates were often able to gain the mark for a description of the MDR. Some candidates inaccurately identified the MAR or the PC as storing data instead of the address of the data. Candidates who gave the accumulator sometimes gave a response that it stored the calculations instead of the result of the calculations.
			Total	6	