<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>Input Device

Microphone…
…To allow the device to hear spoken requests.

Buttons…
…To turn the device off or on / To mute device / to put device in privacy mode

(max 1 device name, max 1 reason)

Output Device

Speaker…
…To play the device's responses

LEDs…
…To indicate the device is on/listening

Screen…
…To show visual information

(max 1 device name, max 1 reason)</td><td>4

AO1.2
(2)
AO2.1
(2)</td><td>Do not award "…listen out for the phrase "Hey Bertie"" Award any appropriate input / output device

<u>Examiner's Comments</u>

Virtually all candidates correctly named appropriate input and output devices. Fewer candidates went on to give appropriate reasons, many were too generic to be creditworthy at this level of study e.g. 'Speaker – to output the response'</td></tr>
<tr><td></td><td>b</td><td></td><td>– System software/software used to manage the device
– Which is built into the device itself
– Stored in the device's ROM/cannot be changed
– Specific to the hardware/purpose

(1 mark per -, max 2)</td><td>2

AO1.1</td><td><u>Examiner's Comments</u>

Most candidates demonstrated their understanding that an embedded operating system (OS) is specific to the hardware or purpose. Too many stated that an embedded OS is 'embedded in the device' which is insufficient at this level of study. The candidate must clearly demonstrate their understanding of what 'embedded' means.</td></tr>
<tr><td></td><td>c</td><td>i</td><td><table><tr><th>P</th><th>S</th><th>L</th></tr><tr><td>False</td><td>False</td><td>False</td></tr><tr><td>False</td><td>True</td><td>True</td></tr><tr><td>True</td><td>False</td><td>False</td></tr><tr><td>True</td><td>True</td><td>False</td></tr></table>
1 Mark for first 2 rows, 1 Mark for second 2 rows.</td><td>2
AO1.2</td><td>Accept any sensible representation of True or False

<u>Examiner's Comments</u>

Well answered by most candidates with some opting for a different representation of True / False in their response. These responses, where correct, were condoned but centres would best advise candidates to use the representations given in the context in future series.</td></tr>
</table>

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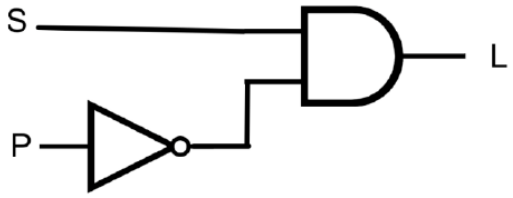
Question			Answer/Indicative content	Marks	Guidance
		ii	-P going into NOT Gate -S going into AND gate… -…NOT P going into AND gate, L coming out of it and no additional gates or connections. (1 per -, max 3)	3 AO3.1	 Examiner's Comments Generally, candidates responded well to this question, but some candidates used incorrect logic gate representations. Centres should remind candidates of the acceptable boolean algebra logic gate representations see specification appendix 5d.
	d		– more than one processing unit in a (single) processor – …which can independently process instructions **at the same time**.	2 AO1.1	Examiner's Comments Too many candidates defined a multi core processor as 'a processor with multiple cores' this is not creditworthy at this level of study. Candidates must demonstrate their understanding of a core being a processing unit within a processor.
			Total	13	

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Question			Answer/Indicative content	Marks	Guidance
2	a		(The process of) making a file smaller/take up less storage	1 AO1.1	
	b		Full answer CCCMMMCCCC – CCC – … followed by MMMCCCC (1 per -, max 2)	2 AO1.2	
	c		4C1O3L5C1M1O5C – 4C1O – Followed by 3L5C – Followed by 1M1O5C	3 AO1.2	Accept answer without 1s <u>Examiner's Comments</u> Well answered by most candidates, demonstrating clear understanding of Run Length Encoding as a method of compression.

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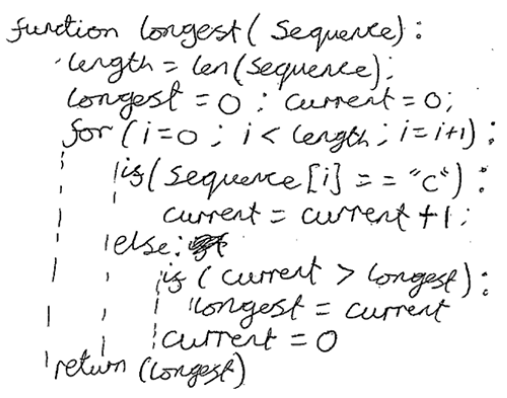
Question			Answer/Indicative content	Marks	Guidance

	d		– Correct function name and parameter AND the function returns a value.
			– Use of a loop to correctly iterate through the sequence
			– Adds one to a running total when a C is encountered
			– when character changes from a C if running total is > maximum, overwrites maximum…
			– …correctly reset running total
			1 mark per -, max 5
				5
				
				AO3.2
					E.g.
					function longest(sequence)
					currentRun = 0
					biggestRun = 0
					for i = 0 To sequence.length - 1
					if sequence.substring(i, 1) = = "C" then
					currentRun = currentRun + 1
					else
					if currentRun > biggestRun then
					biggestRun = currentRun
					end if
					currentRun = 0
					endif
					next i
					return biggestRun
					endfunction
					
					<u>Examiner's Comments</u>
					
					It was pleasing to see more candidates than in previous series offering a response to this type of question. Many candidates scored well. There were two common errors. Firstly, some candidates correctly declared a function as required but then did not return a value from that function, this is a fundamental knowledge requirement at this level of study. Secondly, some candidates wrote fully functioning code to return the longest sequence of any character rather than the longest sequence of Cs. Hence, not addressing the question. Candidates should be reminded to read the question carefully, particularly where questions require them to write code / algorithms. See exemplar 1 which scored full marks.
					
					Exemplar 1
					
					 
					function longest(Sequence):
					length = len(sequence);
					longest = 0 ; current = 0;
					for (i=0 ; i < length ; i=i+1) :
					if(sequence[i] = = "C") :
					current = current + 1 ;
					else:
					if (current > longest) :
					longest = current
					current = 0
					return (longest)

			Total	11	

Question			Answer/Indicative content	Marks	Guidance
3	a		<table><tr><th>Input</th><th>Output</th></tr><tr><td>1</td><td>1</td></tr><tr><td>2</td><td>4</td></tr><tr><td>3</td><td>9</td></tr></table> 1 per row, max 3	3 AO3.3	
	b		Squares a number / multiplies a number by itself	1 AO3.3	<u>Examiner's Comments</u> Many candidates achieved full marks on part (a) and went on to achieve the mark on part (b). Those who did not score well on part (a) could not determine the purpose of the program and therefore did not achieve the part (b) mark.
	c		– The value <u>16</u> is copied to the MAR – The contents of the of the ACC (i.e. 9) are copied to the MDR – The value <u>9</u> is copied to location <u>16/count</u> 1 per -, max 2	2 AO2.2	<u>Examiner's Comments</u> It is encouraging that many more candidates are appropriately applying their response to the scenario, in this type of question, than in previous series. However, there are still some candidates giving a description of the order of data movement between registers without referring to the data or address values / labels given in the question. Candidates should be reminded to refer to the values given in this type of question in their response.
	d		Interrupt	1 AO1.1	cao
	e		– Immediate addressing… – …operand is the value to be used. – Indirect Addressing… – …operand is the memory location holding a value representing the memory location to be used. – Indexed Addressing… – …Operand is added to contents of Index Register to get memory location of value needed. (1 mark for naming addressing mode, 1 mark for correct description)	2 AO1.1	<u>Examiner's Comments</u> Many candidates correctly cited another mode of addressing outlined in the specification but descriptions invariably lacked clarity, with the exception of Immediate Addressing.
			Total	9	

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Question			Answer/Indicative content	Marks	Guidance
4	a		One from – read / written to, using a laser – read / written onto a reflective surface – data is stored using pits and lands Plus example – Eg. Blu-Ray / CD (1 per - , max 2)	2 AO1.1	Accept legacy media such as laserdisc and videodisc. Do not accept DVD variants (DVD-R, DVD-RW etc)
	b		– Cheap to produce / buy – Capacity big enough to hold film – Robust enough to be used over long periods / moved around – Portable – Does not need an internet connection (1 per - , max 1)	1 AO1.1	Examiner's Comments Many candidates achieved full marks on both part (a) and (b) demonstrating their understanding of optical media.
	c		A program that enables communication between an operating system and a (hardware) device.	1 AO1.1	Examiner's Comments Many candidate responses were too generic for this level of study, stating that the device driver allows communication between the device and the 'computer' or 'computer system' rather than 'operating system'.
	d		Advantages – Can access film (and indeed entire library) from anywhere with an internet connection – No physical storage needed – No risk of films being stolen / damaged/lost – Optical / disk player hardware not required to play film Disadvantage – Reliant on having an (fast enough) internet connection. – Need enough storage for download – Reliant on servers of the company providing the connection. – People like having a physical copy – If the company providing the stream goes out of business, copy is lost. (1 per -, max 4. If only advantages or disadvantages, max 3)	4 AO1.2	Examiner's Comments Most candidates achieved at least one advantage and one disadvantage mark. Most commonly citing access to the internet renders the film(s) accessible from anywhere. Although some candidates referred to 'on line' access which is not creditworthy.

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Question			Answer/Indicative content	Marks	Guidance
	e		– High resolution videos take up large amounts of memory / RAM – Due to the large number of pixels that need to be represented – When streaming, the data being sent is time sensitive/sufficient data (i.e. the next chunk of video) needs to be received and processed within a given amount of time – Otherwise there will be pauses/buffering. – Compression reduces the amount of data that needs to be sent/bandwidth needed – Compression reduces the cost/data usage for those with download limits (1 per -, max 3)	3 AO2.2	<u>Examiner's Comments</u> Generally, candidates correctly stated that buffering would be reduced. Some candidates stated that high resolution films are very large but did not then explain why it is important to compress them for streaming. Candidates should be reminded to address the question fully in their response.
			Total	11	

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Question			Answer/Indicative content	Marks	Guidance
5	a		tuple / record / list	1 AO2.1	Don't accept array Examiner's Comments Many candidates cited a suitable structure but some incorrectly cited an array. This demonstrates a clear misconception or lack of understanding that an array can only hold one type of data.
	b		228	1 AO2.1	cao

	c		– Removes/ignores characters up to and including first dot
			– Removes/ignores characters including and after second dot
			– Converts characters in variable to uppercase
			– Totals the ASCII values of the relevant characters.
			
			Up to 1 mark for…
			– Sensible variable names.
			– Sensible indentation
			– Useful comments.
			
			NB Don't penalise twice. If candidate hasn't removed/discounted the right characters they may lose mark points 1 and / or 2. They can still access mark points 3 and 4
			
			(1 per -, max 5)
				5
				AO3.2
					function hash(siteName)
					//remove up to and including first dot.
					firstDot=locate(siteName,".")
					siteName=siteName.substring(firstDot+1,
					siteName.length-firstDot -1)
					
					//remove second dot and after
					secondDot=locate(siteName,".")
					siteName=siteName.substring(0,
					secondDot)
					siteName=upper(siteName)
					value=0
					for i=0 to siteName.length-1
					
					value=value+asc(siteName.substring(i,1))
					next i
					return value
					endfunction
					
					Examiner's Comments
					
					Candidates who used the three functions given in the question tended to score well. Those candidates who opted not to use the given functions and used language specific functions, in many cases, did not utilise them correctly, hence, losing credit. Centres should advise candidates to utilise functions given in the stem of the question in their response. In addition, the question stated that candidates will be given credit for the readability of their code. Centres should also advise candidates to use appropriate variable names, indent code where appropriate and comment code to aid readability.

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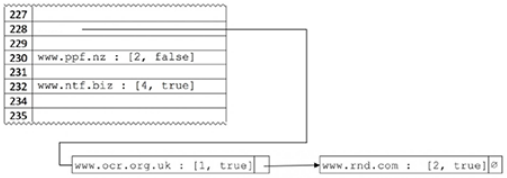
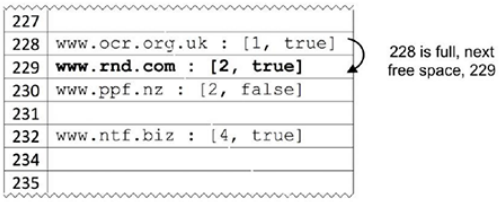
Question			Answer/Indicative content	Marks	Guidance
	d		– rnd.com would cause a collision with ocr.org.uk / would has to the same position as ocr.org.uk (228) – Linear probing could be used – Move through the structure one space at a time – …to find the next free space/229 – Chaining could be used – Each location points (to the start of) a <u>linked</u> list. – The new item is added to the end of the linked list / free. – points to an overflow area – The new item is stored with the other values in the same area Accept a separate or annotated diagram showing a method on given example (1 per -, max 4)	4 AO1.2	Example diagrams Chaining  Linear Probing  <u>Examiner's Comments</u> It was pleasing to see that many candidate responses did refer to the given example. Where this was evident, the candidate scored well. Candidates who did not refer to the example, gained little to no credit on the question.

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Question	Answer/Indicative content	Marks	Guidance
e	**Mark Band 3–High Level (9-12 marks)** The candidate demonstrates a thorough knowledge and understanding of storing and retrieving data from hash tables and linked lists. 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 argument which results in a supported and realistic judgment as to which data structure is suitable. 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 (5-8 marks)** The candidate demonstrates reasonable knowledge and understanding of storing and retrieving data from hash tables or linked lists; 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 come to a conclusion showing some recognition of influencing factors that would determine which data structure is suitable. 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 (1-4 marks)** The candidate demonstrates a basic knowledge of storing and retrieving data from hash tables or linked lists; the material is basic and contains some	12 AO1.1 (2) AO1.2 (2) AO2.1 (3) AO3.3 (5)	Searching of a Linked list involves starting at the first node and following the pointers until either the desired value is found, or the end of the list is reached, meaning the item isn't in the list. The bigger the linked list grows, the longer it takes to search. If a linked list doubles in size it will, on average, take twice as long to search. A list of size n takes on average n/2 checks. In Big O this is O(n), or linear complexity. Searching of a hash table requires the key to be hashed and the correct location accessed. The time this takes is largely dependent on the time to create the hash. If we ignore collisions, the time to find an item will stay the same regardless of the size of the white list. In other words it has O(1) or constant complexity. Unfortunately as the white list grows collisions become more likely. Linear probing and chaining means that once a location has been found the time taken grows linearly with the number of collisions that have occurred for that location, Nonetheless this is still going to perform significantly better than a linked list. If items are added to the end of the linked list then if the location of the last node is stored, that location can be ready made to point at the new item. The time to add items is constant. If they are added in some sort of order then the time to add items grows linearly due to the time spent searching for the right position. (Storing in order has the advantage that it is if an item isn't in the list this can be deduced once its location is passed, rather than waiting until the end.) Adding items to a hash table involves hashing the key and placing it in the correct location. This takes a constant amount of time.. ..unless there are collisions then there is

Question			Answer/Indicative content	Marks	Guidance
			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. 0 marks No attempt to answer the question or response is not worthy of credit.		an overhead which grows with the number of collisions for that location. Overall a hash table is likely to be the best option (assuming it has enough space and a good hashing algorithm which produces a hash quickly and with few collisions). It will give very consistent performance even as the whitelist grows. *NB Big O Notation isn't necessary for full marks as it is paper 2 content (though many of the more able candidates are likely to include it). The question is assessing candidate's knowledge of traversing and adding to the two data structures and their ability to analyse this to determine their suitability for the scenario.* <u>Examiner's Comments</u> Candidates were assessed on the quality of their extended response in this question. Most candidates correctly cited direct access as the main advantage of hash tables and access times as the disadvantage of linked lists. The level of discussion varied with most candidate responses being given Level 2.
			Total	23	

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Question			Answer/Indicative content	Marks	Guidance
6	a		– A program with one purpose / piece of system software – …used for the upkeep / maintenance of the system (1 per -, max 2)	2 AO1.1	Examiner's Comments This question was well answered with most candidates correctly stating that a utility is used for system maintenance.
	b		– Application performs tasks for the user (rather than computer). – Performs generic (rather than specific) tasks	1 AO1.2	Examiner's Comments This question was generally well addressed by candidates with most demonstrating understanding that applications perform tasks for the user as opposed to the computer.
	c		– Extreme programming is a software development methodology. – Focus is on good quality code – It is an agile paradigm – it is designed to allow development to respond to changing user requirements. – Involves paired programing – Program is regularly reviewed / iterative process. Suited to this scenario as… – Types of virus/threat is continually changing/updating – In order to detect virus effectively there needs to be an emphasis on code quality. (1 per – Max 4. If no reason given for it being suitable for scenario, max 3)	4 AO1.1 (2) AO2.1 (2)	Examiner's Comments Most candidates correctly stated that extreme programming is both agile and utilises paired programming. Fewer candidates discussed its focus on high quality code.
	d		– Allows them to run the update on a number of different systems / OSs – …without needing multiple physical machines. – They can put viruses on the VM to test if the update can catch them – …but protect the physical machine from the virus / the VM can quickly be reset to its original state. (1 per -, Max 3)	3 AO2.2	Examiner's Comments Many candidate responses described the virtual machine rather than explaining why they would be used in this scenario. Candidates should be reminded to apply their knowledge to the scenario when the question requires them to do so.

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Question			Answer/Indicative content	Marks	Guidance
	e		– FCFS means jobs are completed in the order they arrive – ineffective in catching viruses / the virus may run first – …the virus checker may never run / take a long time to start running – the virus checker may be continuously running… – …this will temporarily stall the system / all other processes have to wait. (1 mark per -, max 2)	2 AO2.2	Examiner's Comments Those candidates who demonstrated a clear understanding of 'First Come First Served' scheduling scored well on this question. Some candidates incorrectly referred to priorities and interrupts in their responses which gained no credit.
	f		– The computer would not be able to boot / load the OS – Or set up its initial configuration / hardware checks – Making the computer unusable (1 mark per -, max 2)	2 AO2.1	Examiner's Comments This question was well attempted by most candidates.
			Total	14	

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Question			Answer/Indicative content	Marks	Guidance
7	a		– Ensuring that changes are consistent across a database – if a record is removed all references to it are removed – A foreign key value must have a corresponding Primary key value in another table. – In this case, a user being removed will result in their reviews being removed / a restaurant being removed will result in its reviews being removed. (1 mark per -, max 2 marks for explanation)	3 AO1.1 (2) AO2.1 (1)	Examiner's Comments In general, this question was poorly attempted by most candidates on two counts. Firstly, many candidates could not clearly explain the term 'referential integrity'. Secondly, some examples incorrectly stated that when a review is deleted, the corresponding User / Restaurant needs to be deleted.
	b	i	– A device which provides a central point of control / access	1 AO1.1	Examiner's Comments Many candidates did not clearly define the term. Candidates should be reminded that they must clearly express fundamental definitions at this level of study.
		ii	– Client side processing can be modified – And can sometimes be disabled on the browser – To prevent malicious code (such as an SQL injection / XSS) – To prevent a non-validated review (one with a score of over 5) being sent to the server (1 mark per -, max 2)	2 AO2.1 (1) AO2.2 (1)	Examiner's Comments Again, many candidates did not clearly explain the importance of a server-side check in this scenario.
	c		– A transaction / review can only fully complete or not complete / cannot partially complete – In this case, it should not be possible for the review to be added without the (average) rating being updated. (1 mark per -, max 2)	2 AO1.1 (1) AO2.1 (1)	Examiner's Comments This question was generally well attempted by most candidates. Those who did not gain credit referred to atomic being the lowest level of detail which is incorrect in this context.
	d		– Consistency – Isolation – Durability (1 mark per -, max 3)	3 AO1.1	Examiner's Comments Well attempted by most candidates. In general, candidates either scored three or zero marks.

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Question			Answer/Indicative content	Marks	Guidance
	e		Advantage – More characters can be represented – may include foreign alphabets – may include emojis Disadvantage – Reviews take up more storage (4 times their previous storage size). (1 mark max for advantage, 1 mark max for disadvantage.)	2 AO1.2	Examiner's Comments Some candidates' advantages/disadvantages were not clear enough to gain credit e.g. 'disadvantage – reviews take up more space' is not sufficient at this level of study. Candidates should clearly demonstrate understanding that 'reviews take up more storage'.
			Total	13	

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Question			Answer/Indicative content	Marks	Guidance
8	a		30 goes into 100 3 times/3	1 AO3.3	
	b		integer	1 AO1.2	
	c		Boolean	1 AO1.2	
	d		String	1 AO1.2	
	e		– Calculates remainder – Displays remainder (1 mark per -, max 2)	2 AO3.2	remainder = 100 – (num*count) print(remainder) OR remainder=(100 MOD num) print(remainder) <u>Examiner's Comments</u> Although most candidates gained credit for correctly outputting their calculated remainder, many lost marks for an incorrect calculation.
	f		– The comments such as those on the first line, (and whitespace) are removed. – Variable names / identifiers like 'count' are added to a symbol table. – Reserved words / statement components are tokenized. For example 'WHILE' (1 mark per -, max 3)	3 AO2.2	<u>Examiner's Comments</u> This question was poorly attempted by most candidates. Although, many explained what happens during Lexical Analysis few went on to refer to examples from the given code, hence not gaining credit. Candidates should be reminded that they must refer to examples when the question requires them to do so.
	g		Syntax analysis	1 AO1.1	<u>Examiner's Comments</u> Most candidates correctly stated 'Syntax Analysis' as the next stage of compilation.
			Total	10	

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Question	Answer/Indicative content	Marks	Guidance
9	**Mark Band 3–High Level (7-9 marks)** The candidate demonstrates a thorough knowledge and understanding of the effect of computers on the environment. 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 provides a thorough discussion which is well balanced. Evaluative comments are consistently relevant and well-considered. 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 (4-6 marks)** The candidate demonstrates reasonable knowledge and understanding of the effect of computers on the environment; 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 provides a sound discussion, the majority of which is focused. Evaluative comments are for the most part appropriate, although one or two opportunities for development are missed. 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 (1-3 marks)** The candidate demonstrates a basic knowledge of the effect of computers on the environment; the material is basic and contains some inaccuracies. The	9 AO1.1(2) AO1.2(2) AO2.1(2) AO3.3(3)	The materials and fuel used in producing and transporting computers has an environmental impact. Digital devices have short life spans and are quickly disposed of… They often end up in landfill or are sent to less economically developed countries to be dismantled due to the value of some of the materials inside them. These devices are often made up of toxic materials (such as mercury) These can harm people disposing of the waste and damage / pollute the area in which they are buried / burned. People have many digital devices. These all need powering / charging. This means there is an increase in demand for electricity. Which means an increase in fossil fuel being burned. Computers are being used to automate the use of things like central heating. This can reduce electricity consumption Computers have encouraged a paperless approach… ..both in the workplace and in terms of companies sending bills to homes This has the potential to reduce the use of paper and as such destruction of trees. Developments in digital storage has reduced the need for physical media to be produced (e.g. CD, DVDs etc) This reduces the need for using plastics. Computers have allowed people to work from home / communicate from afar… This means they don't have to commute / travel, reducing traffic and pollution. Computers can analyse data which can be used in improve efficiency – data mining (appropriate example). <u>Examiner's Comments</u> Candidates were assessed on the quality of their extended response in this question. The negative impacts of computers on the environment were

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Question			Answer/Indicative content	Marks	Guidance
			candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides a limited discussion which is narrow in focus. Judgments if made are weak and unsubstantiated. 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 marks No attempt to answer the question or response is not worthy of credit.		generally well addressed by most candidates with fewer citing a balanced range of positive impacts. The level of discussion therefore varied with most candidate responses being given Level 2.
			Total	9	

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Question			Answer/Indicative content	Marks	Guidance
10	a		5E	1 AO1.2	Examiner's Comments Although this question was well answered by most candidates, in some cases, incorrect workings rendered an incorrect hexadecimal answer. Candidate should be reminded to double check their workings.
	b		155 (1 mark for first two digits, 1 mark for final digit)	2 AO1.2	Examiner's Comments A relatively high proportion of candidates presented their answer to this question in binary as opposed to denary, hence, losing credit. Candidates should be reminded to read the question carefully.
	c		11010111 (1 Mark for the left most 1, 1 mark for the remaining 7 bits)	2 AO1.2	Examiner's Comments Some candidates demonstrated confusion between sign and magnitude and two's complement binary representation of negative number.
	d		1121 0~~2202~~2 0~~1001001~~- 00101111 00011010 1 mark for correct answer 1 mark for valid method	2 AO1.2	Examiner's Comments Many candidates achieved full marks on this question. Those who did not, generally did not show evidence of binary subtraction. Converting the binary numbers to denary, carrying out the subtraction and converting the result back to binary does not evidence binary subtraction.
	e		– Exponent is 3 – Mantissa becomes 0100.11 – Which is 4.75. (accept 4¾) (1 per -, max 3)	3 AO1.2	Examiner's Comments This question was better attempted than similar questions in previous series. Most candidates clearly demonstrated the 'floating' of the point the correct number of places.

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Question			Answer/Indicative content	Marks	Guidance
	f		– In fixed point is 1010.11 – Mantissa becomes 1.01011 – Exponent of 3 / 11 – Giving answer of 101011 011 (1 per -, max 4)	4 AO1.2	For MP3 any number of leading 0s is valid (including none) Examiner's Comments Many candidates did not convert the original denary number to the correct fixed-point binary representation. Others who did convert to fixed point correctly did not go on to represent their floating-point solution in as few bits as possible.
			Total	14	

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Question			Answer/Indicative content	Marks	Guidance
11	a		**Mark Band 3–High Level (7-9 marks)** The candidate demonstrates a thorough knowledge and understanding of the technologies required for web development. 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 provides a thorough discussion which is well balanced. Evaluative comments are consistently relevant and well-considered. 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 (4-6 marks)** The candidate demonstrates reasonable knowledge and understanding of the technologies required for web development; 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 provides a sound discussion, the majority of which is focused. Evaluative comments are for the most part appropriate, although one or two opportunities for development are missed. 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 (1-3 marks)** The candidate demonstrates a basic knowledge of the technologies required for web development; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply	9 AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	HTML… ..they understand how to write (i.e. define the structure of) web pages. CSS.. … they understand how to define the formatting of websites. JavaScript... ..they understand how to write client side code …allowing them to add interactivity to the website Understanding of HTML/CSS and JavaScript is essential for the role. Without knowing HTML it is impossible to handcode webpages. Whilst WYSIWYG tools exist these often produce inefficient code and at any rate it will be necessary at some point to hand tweak the code. *(As the role is 'programmer' it is reasonable to expect that the site will be coded.)* CSS is nearly as essential. Whilst HTML can be used for a lot of the formatting, this is considered bad practice. CSS will allow them to make consistent looking sites. JavaScript is also essential as most websites have an interactive element (e.g. validation of forms) Knowledge of Server-side processing / PHP/ASP etc… …allowing them to write dynamic websites. This is important if the company wants to produce websites with content that changes Databases… …allowing them to allow websites to store and retrieve data. Some knowledge of databases will be useful if writing dynamic sites. This will largely be focussed around SQL. Photo editing… …allowing them to prepare images for the website. This is less essential as in many cases the

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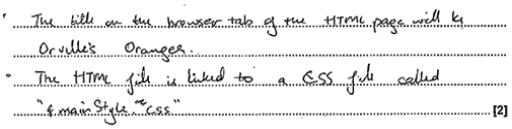
Question			Answer/Indicative content	Marks	Guidance
			acquired knowledge and understanding to the context provided. The candidate provides a limited discussion, which is narrow in focus. Judgments if made are weak and unsubstantiated. The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. **0 marks** No attempt to answer the question or response is not worthy of credit.		assets will be pre-prepared. A basic knowledge (e.g. resizing would be expected). Knowledge of software engineering practices… …allowing them to work as part of a team when building the website. The importance of this will depend on the size of the team working on the site. May mention more advanced technologies e.g. AJAX, SOAP, JSON etc. <u>Examiner's Comments</u> Candidates were assessed on the quality of their extended response in this question. Most candidates correctly cited HTML, CSS and JavaScript as the basic technological requirements. The level of discussion varied with many extending their response to include other appropriate technologies. This question was generally well answered by most candidates.
	b		– The head contains information about the page and needed to set the page up – Orville's Oranges is displayed in the title bar / tab of the page. – The page is linked to the style sheet mainStyle.css (1 per -, max 2)	2 AO3.3	<u>Examiner's Comments</u> Explanations were, in many cases too superficial for this level of study. See exemplar 2 which shows the level of detail required in the explanation to gain credit. **Exemplar 2**  • The title on the browser tab of the HTML page will be Orville's Oranges. • The HTML file is linked to a CSS file called "$mainStyle.css" [2]

Question			Answer/Indicative content	Marks	Guidance

	c		.offer{
			border-style: solid;
			border-color: orange;
			}
				2
				AO3.2
					Accept div. offer
					Accept hex / RGB codes that would provide a shade of orange.
					Closing ; is optional
					
					<u>Examiner's Comments</u>
					
					It was evident that some candidates did not have the required awareness of the CSS class and property definitions outlined in the specification appendix 5d. Those candidates who did, generally scored well on this question.

			Total	13	

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