GCE

Computer Science

H446/01: Computer systems

Advanced GCE

Mark Scheme for June 2019

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
^	Omission mark
BOD	Benefit of the doubt
C	Subordinate clause / consequential error
✗	Incorrect point
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	No benefit of doubt given
P	Point being made
REP	Repeat
✓	Correct point
TV	Too vague

0	**Zero (big)**
BP	**Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.**
L1	**Level 1**
L2	**Level 2**
L3	**Level 3**

Subject-specific Marking Instructions

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper and its rubrics
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

USING THE MARK SCHEME

Please study this Mark Scheme carefully. The Mark Scheme is an integral part of the process that begins with the setting of the question paper and ends with the awarding of grades. Question papers and Mark Schemes are developed in association with each other so that issues of differentiation and positive achievement can be addressed from the very start.

This Mark Scheme is a working document; it is not exhaustive; it does not provide ‘correct’ answers. The Mark Scheme can only provide ‘best guesses’ about how the question will work out, and it is subject to revision after we have looked at a wide range of scripts.

The Examiners’ Standardisation Meeting will ensure that the Mark Scheme covers the range of candidates’ responses to the questions, and that all Examiners understand and apply the Mark Scheme in the same way. The Mark Scheme will be discussed and amended at the meeting, and administrative procedures will be confirmed. Co-ordination scripts will be issued at the meeting to exemplify aspects of candidates’ responses and achievements; the co-ordination scripts then become part of this Mark Scheme.

Before the Standardisation Meeting, you should read and mark in pencil a number of scripts, in order to gain an impression of the range of responses and achievement that may be expected.

In your marking, you will encounter valid responses which are not covered by the Mark Scheme: these responses must be credited. You will encounter answers which fall outside the ‘target range’ of Bands for the paper which you are marking. Please mark these answers according to the marking criteria.

Please read carefully all the scripts in your allocation and make every effort to look positively for achievement throughout the ability range. Always be prepared to use the full range of marks.

LEVELS OF RESPONSE QUESTIONS:

The indicative content indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance.
Using 'best-fit', decide first which set of BAND DESCRIPTORS best describes the overall quality of the answer. Once the band is located, adjust the mark concentrating on features of the answer which make it stronger or weaker following the guidelines for refinement.

- **Highest mark:** If clear evidence of all the qualities in the band descriptors is shown, the HIGHEST Mark should be awarded.
- **Lowest mark:** If the answer shows the candidate to be borderline (i.e. they have achieved all the qualities of the bands below and show limited evidence of meeting the criteria of the band in question) the LOWEST mark should be awarded.
- **Middle mark:** This mark should be used for candidates who are secure in the band. They are not 'borderline' but they have only achieved some of the qualities in the band descriptors.

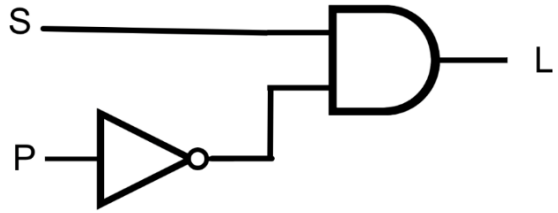
Be prepared to use the full range of marks. Do not reserve (e.g.) high Band 3 marks 'in case' something turns up of a quality you have not yet seen. If an answer gives clear evidence of the qualities described in the band descriptors, reward appropriately.

	AO1	AO2	AO3
High (thorough)	Precision in the use of question terminology. Knowledge shown is consistent and well-developed. Clear appreciation of the question from a range of different perspectives making extensive use of acquired knowledge and understanding.	Knowledge and understanding shown is consistently applied to context enabling a logical and sustained argument to develop. Examples used enhance rather than detract from response.	Concerted effort is made to consider all aspects of a system / problem or weigh up both sides to an argument before forming an overall conclusion. Judgements made are based on appropriate and concise arguments that have been developed in response resulting in them being both supported and realistic.
Middle (reasonable)	Awareness of the meaning of the terms in the question. Knowledge is sound and effectively demonstrated. Demands of question understood although at times opportunities to make use of acquired knowledge and understanding not always taken.	Knowledge and understanding applied to context. Whilst clear evidence that an argument builds and develops through response there are times when opportunities are missed to use an example or relate an aspect of knowledge or understanding to the context provided.	There is a reasonable attempt to reach a conclusion considering aspects of a system / problem or weighing up both sides of an argument. However the impact of the conclusion is often lessened by a lack of supported judgements which accompany it. This inability to build on and develop lines of argument as developed in the response can detract from the overall quality of the response.
Low (basic)	Confusion and inability to deconstruct terminology as used in the question. Knowledge partial and superficial. Focus on question narrow and often one-dimensional.	Inability to apply knowledge and understanding in any sustained way to context resulting in tenuous and unsupported statements being made. Examples if used are for the most part irrelevant and unsubstantiated.	Little or no attempt to prioritise or weigh up factors during course of answer. Conclusion is often dislocated from response and any judgements lack substance due in part to the basic level of argument that has been demonstrated throughout response.

	Assessment Objective
AO1	Demonstrate knowledge and understanding of the principles and concepts of computer science, including abstraction, logic, algorithms and data representation.
AO1.1	Demonstrate **knowledge** of the principles and concepts of abstraction, logic, algorithms, data representation or other as appropriate.
AO1.2	Demonstrate **understanding** of the principles and concepts of abstraction, logic, algorithms, data representation or other as appropriate.
AO2	Apply knowledge and understanding of the principles and concepts of computer science including to analyse problems in computational terms.
AO2.1	Apply knowledge and understanding of the principles and concepts of computer science.
AO2.2	Analyse problems in computational terms.
AO3	Design, program and evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions.
AO3.1	Design computer systems that solve problems.
AO3.2	Program computer systems that solve problems.
AO3.3	Evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions.

Question			Answer	Marks	Comments
1	a		**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)	4 AO1.2 (2) AO2.1 (2)	Do not award "…listen out for the phrase "Hey Bertie"" Award any appropriate input/output device
	b		– 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)	2 AO1.1	

<table>
<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</td></tr>
<tr><td></td><td></td><td>ii</td><td>-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)</td><td>3

AO3.1</td><td> 
</td></tr>
<tr><td></td><td>d</td><td></td><td>– more than one processing unit in a (single) processor
– …which can independently process instructions at the same time.</td><td>2

AO1.1</td><td></td></tr>
<tr><td>2</td><td>a</td><td></td><td>(The process of) making a file smaller/take up less storage</td><td>1

AO1.1</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td>Full answer CCCMMMCCCC

– CCC
– ... followed by MMMCCCC
(1 per -, max 2)</td><td>2

AO1.2</td><td></td></tr>
</table>

<table>
<tr><td></td><td>c</td><td></td><td>4C1O3L5C1M1O5C

– 4C1O
– Followed by 3L5C
– Followed by 1M1O5C</td><td>3

AO1.2</td><td>Accept answer without 1s</td></tr>
<tr><td></td><td>d</td><td></td><td>– 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</td><td>5

AO3.2</td><td>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</td></tr>
<tr><td>3</td><td>a</td><td></td><td><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</td><td>3

AO3.3</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td>Squares a number / multiplies a number by itself</td><td>1
AO3.3</td><td></td></tr>
<tr><td></td><td>c</td><td></td><td>– 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</td><td>2

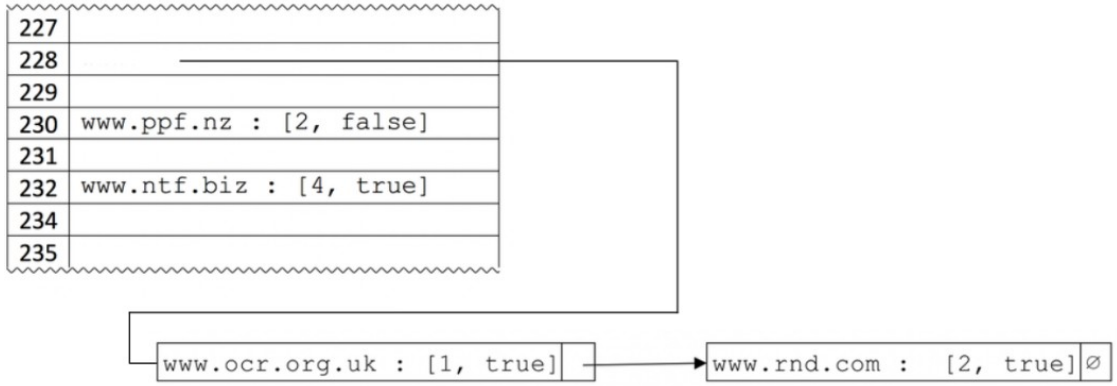
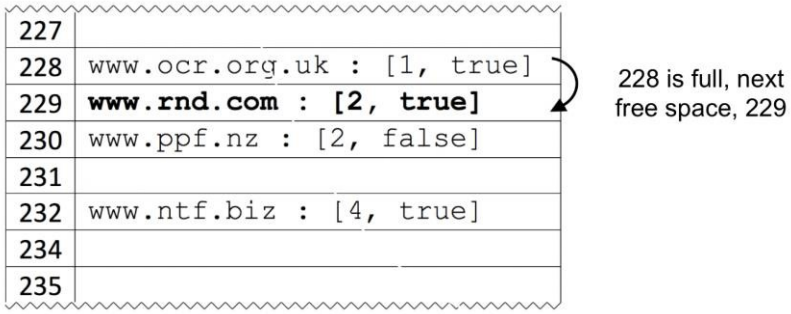
AO2.2</td><td></td></tr>
</table>

	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	
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	
	c		A program that enables communication between an <u>operating system</u> and a (hardware) device.	1 AO1.1	

	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	

	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	
5	a		tuple / record / list	1 AO2.1	Don't accept array
	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

	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 linked 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 

	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	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 an overhead which grows with the number of collisions for that location.

			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 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.		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.*
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	
	b		– Application performs tasks for the user (rather than computer). – Performs generic (rather than specific) tasks	1 AO1.2	
	c		– Extreme programming is a software	4	

			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)	AO1.1 (2) AO2.1 (2)	

	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	
	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	
	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	

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)	
	b	i	– A device which provides a central point of control/access	1 AO1.1	
		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)	
	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)	

	d		– Consistency – Isolation – Durability (1 mark per -, max 3)	3 AO1.1	
	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	
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)

	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	
	g		Syntax analysis	1 AO1.1	
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)**	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.

			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 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.		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).

			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.		
10	a		5E	1 AO1.2	
	b		155 (1 mark for first two digits, 1 mark for final digit)	2 AO1.2	
	c		11010111 (1 Mark for the left most 1, 1 mark for the remaining 7 bits)	2 AO1.2	
	d		1121 0~~22022~~ 0~~1001001~~- 00101111 00011010 1 mark for correct answer 1 mark for valid method	2 AO1.2	
	e		– Exponent is 3 – Mantissa becomes 0100.11 – Which is 4.75. (accept 4¾) (1 per -, max 3)	3 AO1.2	
	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)

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	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 assets will be pre-prepared. A basic

			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 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.		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.

	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	

	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

Question	Assessment Objectives							Total
	AO1.1	AO1.2	AO2.1	AO2.2	AO3.1	AO3.2	AO3.3	
1a		2	2					4
1b	2							2
1ci		2						2
1cii					3			3
1d	2							2
2a	1							1
2b		2						2
2c		3						3
2d						5		5
3a							3	3
3b							1	1
3c				2				2
3d	1							1
3e	2							2
4a	2							2
4b	1							1
4c	1							1
4d		4						4
4e				3				3
5a			1					1
5b			1					1
5c						5		5
5d		4						4
5e*	2	2	3				5	12
6a	2							2
6b		1						1
6c	2		2					4
6d				3				3
6e				2				2
6f			2					2
7a	2		1					3
7bi	1							1
7bii			1	1				2

7c	1		1					2
7d	3							3
7e		2						2
8a							1	1
8b		1						1
8c		1						1
8d		1						1
8e						2		2
8f				3				3
8g	1							1
9*	2	2	2				3	9
10a*m*		1						1
10b*m*		2						2
10c*m*		2						2
10d*m*		2						2
10e*m*		3						3
10f*m*		4						4
11a*	2	2	2				3	9
11b							2	2
11c						2		2
	30	43	18	14	3	14	18	140

*** = extended response**

***m* = mathematical content**

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