

# GCSE (9-1)

## **Computer Science**

J276/01: Computer systems

General Certificate of Secondary Education

## Mark Scheme for June 2019

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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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
BP	Blank Page – this annotation <b>must</b> 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.
	Omission mark
BOD	Benefit of doubt
E	Subordinate clause/Consequential error
×	Cross
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
Р	Point being made
REP	Repeat
1	Slash
<b>~</b>	Tick

#### **Subject Specific Marking Instructions**

### LEVELS OF RESPONSE QUESTIONS:

#### For answers marked by levels of response:

- to determine the level start at the highest level and work down until you reach the level that matches the answer
- to determine the mark within the level, consider the following

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.

\*When only two marks are available (low mark band) only use Highest and Lowest mark guidance for 'best-fit'.

	AO2.1a	AO2.1b
High (thorough) (6 – 8 marks)	Precision in the use of 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 principles of computer science.	Understanding of concepts is consistently applied to context enabling a logical and sustained argument to develop. Examples used enhance rather than detract from response.
Middle (reasonable) (3 – 5 marks)	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 concepts are not always taken	Understanding of concepts is shown and is applied to context. There is clear evidence that an argument builds and develops through the response but there are times when opportunities are missed to use an example or relate an aspect of understanding to the context provided.
Low (basic) (1 – 2 marks)	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 understanding of key concepts 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.
0 marks	No response or no response worthy of credit.	No response or no response worthy of credit.

Question		n	Answer	Mark	Guidance
1	a	i	<ul> <li>1 mark for each completed word</li> <li>CPU stands for <u>Central Processing Unit</u>. It is the part of the computer that fetches and executes the <u>instructions</u> that are stored in (main) <u>memory</u>.</li> <li>The CPU contains the Arithmetic <u>Logic</u> Unit (ALU) and the <u>Control</u> Unit (CU).</li> </ul>	5 AO1 1a (5)	<ul> <li>Accept:</li> <li>RAM/registers in place of "memory"</li> <li>bod cache/MDR/CIR in place of memory</li> <li>'and Logic' in place of Logic</li> <li>ignore 'data' if they put 'data and instructions' but no mark for data on its own</li> <li>Do not award command for instructions</li> <li>Bod central processor unit</li> <li>Bod logical</li> </ul>
1	а	ii	<ol> <li>mark per bullet to max 2</li> <li>Dual core is 2 processors/cores // double the number of processors/cores</li> <li>Parallel processing can take place</li> <li> which means each processor can execute a separate instruction at the same time // each processor can run a different part of the program at the same time // each core can process instructions independently of each other</li> <li>which enables multitasking</li> <li>Some processes/software cannot be split between two processors so it does not increase the performance</li> </ol>	2 AO1 1b (1) AO2 1b (1)	<ul> <li>Needs the notion of the processors acting at the same time i.e. not just 'it can run twice as many instructions' without 'at the same time'.</li> <li>Do not award more instructions per second - this could be achieved by having a faster clock speed.</li> <li>Allow FDE for 'executing instructions'.</li> <li>Do not allow 'cores can split the tasks' – need to be how i.e. one task for each core to run at the same time.</li> <li>BOD run more than one program at once</li> </ul>

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				•	1	
1	а	III	1 mark per bullet to max 2	2	•	No mark for just defining cache as
			Cache stores frequently/recently/next to be used instructions/data	AO1		being fast memory or close to the
				1h(2)		
			•that can be accessed faster than accessing them from <u>RAM</u>	10 (2)		CPU.
			•which means more cache improves the performance of the CPU //			
			less cache decreases the performance of the CPU		•	No mark for cache is faster than
					-	DAM factor of what?
			I oo much cache can be detrimental			RAM - laster at what?
			as it will take longer to find the instructions in cache			
			5		•	Bod - More cache makes the
						processing faster
					•	Bod - More cache makes the
						computer run faster

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1	b	i	1 mark for each row			5 AO1 1a (5)	
				RAM	ROM		
			Stores data	~	~		
			The memory is volatile	$\checkmark$			
			Data will not be lost when the computer is turned off		~		
			Data is read-only, cannot be changed.		~		
			Stores currently running data and instructions	~			
1	b	ii	<ul> <li>1 mark</li> <li>RAM is volatile // Flat</li> <li>RAM is faster to acce memory is slower to</li> <li>RAM stores currently Flash memory stores</li> <li>RAM can be directly RAM before CPU</li> </ul>	sh memor ess/store access/st r running p files and accessed	ry is non-v data than ore data t orograms/ software by CPU /	tile sh memory // Flash RAM ructions/data/OS // ash data has to go to	<ul> <li>Accept description of volatile/non-volatile</li> <li>Bod - RAM is primary // Flash is secondary</li> </ul>
1	C	i	1 mark for any suitable exan e.g. Solid state drive // SSD // fla USB memory stick // USB dr Memory card // SD card	nple sh drive ive		1 AO1 1b (1)	<ul> <li>USB on its own is incorrect.</li> <li>Accept USB stick // memory stick</li> <li>Do not accept Hard drive, bod solid state hard drive</li> </ul>

1	С	11	Secondary	AO1 1b (1)	<ul> <li>Fi from (i) e.g. if RAM is given for 1ci then this answer must be primary.</li> <li>FT USB (NE 1ci) as secondary.</li> <li>If 1ci is NR or not an example of primary or secondary storage, then 0 for whatever is here.</li> </ul>
1	C		<ul> <li>Mark Band 3–High Level (6-8 marks)</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</li> <li>Mark Band 2-Mid Level (3-5 marks)</li> <li>The candidate is able to apply their knowledge and understanding of a range of considerations in relation to the question; the material is generally accurate but at times underdeveloped.</li> <li>The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed.</li> <li>Evidence/examples are for the most part implicitly relevant to the explanation.</li> <li>The candidate makes a reasonable attempt to discuss the impact on most areas, showing reasonable recognition of influencing factors.</li> </ul>	8 AO2 1a (4) AO2 1b (4)	<ul> <li>The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive:</li> <li>Indicative Content: <ul> <li>Portability</li> <li>Both are Small in size / portable and can easily be moved between Kerry's home and work</li> <li>Solid state can be smaller</li> <li>Solid state less likely to break</li> </ul> </li> <li>Poptical are not robust i.e. easily scratched/damaged while being moved</li> <li>Solid state has no moving parts so unlikely to break if dropped</li> <li>CDs have small capacity</li> <li>Depends on Kerry's files if they are small files e.g. text documents then a CD</li> </ul>

Mark Scheme		June 2019
There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.		might be large enough bit if there are lots large files e.g. videos/software then solid state may be more appropriate
(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.		<ul> <li><u>Cost</u></li> <li>Optical cost is small per GB</li> <li>Solid state can be reused more times because it's more durable so may be cost effective in the long term</li> </ul>
<b>0 marks</b> No attempt to answer the question or response is not worthy of credit		
1 mark for correct working e.g. 5*1024 // 5*1000 1 mark for 5120 MB // 5000 MB	2 AO2 1b (2)	
	Mark Scheme         There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.         Mark Band 1-Low Level (1-2 marks)         The candidate demonstrates a basic knowledge of considerations with limited understanding shown; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided.         The candidate provides nothing more than an unsupported assertion.         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.         O marks         No attempt to answer the question or response is not worthy of credit         1 mark for correct working         e.g.         5*1024 // 5*1000         1 mark for 5120 MB // 5000 MB	Mark Scheme         There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.         Mark Band 1-Low Level (1-2 marks)         The candidate demonstrates a basic knowledge of considerations with limited understanding shown; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided.         The candidate provides nothing more than an unsupported assertion. 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       2         No attempt to answer the question or response is not worthy of credit       2         1 mark for correct working       2         e.g.       5*1024 // 5*1000         1 mark for 5120 MB // 5000 MB       4

J276/	/01	Mark Scheme		June 2019
2	а	<ul> <li>1 mark per bullet to max 3</li> <li>e.g.</li> <li>He can place his files into <u>folders/directories</u></li> <li>He can (re)name files/folders</li> <li>He can move his files/folders</li> <li>He can copy/transfer/export files/folders</li> <li>He can delete his files/folders</li> <li>He can set permissions/access rights</li> <li>He can search for files</li> <li>He can view file details/extensions/file size/type</li> <li>He can sort files/folders</li> <li>He can open files/folders</li> </ul>	3 AO2 1a (3)	<ul> <li>Answers must be clear as to what the answer is applied to i.e. 'you can open it' - what is it?</li> <li>Mark first answer on each section.</li> <li>Do not award: <ul> <li>defragment</li> <li>view files</li> <li>download</li> <li>compression</li> <li>preview</li> <li>edit/read/write files</li> </ul> </li> <li>'Organise files' without what into - is not enough.</li> </ul>

J276/0	)1		Mark Scheme		June 2019
2	b	i	<ol> <li>mark per bullet to max 4</li> <li>e.g.</li> <li>Use an algorithm</li> <li>to remove repeated/unnecessary data</li> <li>Could use lossy/lossless</li> <li>lossless will not remove data permanently // lossless means original file will be restored</li> <li>lossy is permanent deletion // lossy means original file will not be restored</li> <li>Reduce number of pixels // reduce resolution</li> <li>Record the changes in the colour for each pixel</li> <li> instead of the colour</li> <li>Run length encoding</li> <li> record the colour and number of consecutive pixels of that colour</li> <li> instead of the colour of every pixel</li> <li>Decrease colour depth//decrease number of colours</li> </ol>	4 AO2 1a (2) AO2 1b (2)	<ul> <li>'lossy removes unnecessary data permanently' gets 3 marks, 1 for lossy, 1 for 'removes unnecessary data' if not already awarded and 1 for lossy = permanent</li> <li>Do not award 'not noticeable to the human eye', or 'keeps same/reduces quality' - this does not explain <b>how</b> the file is compressed.</li> <li>Do not accept information for data.</li> </ul>
2	b	ii	1 mark per bullet to max 2 E.g. Defragmentation software Encryption software Backup software Anti-virus Firewall Anti-spyware Disk checker/cleaner Auto-update Disk formatting	2 AO1 1a (2)	<ul> <li>Do not accept compression</li> <li>Accept anti-malware</li> </ul>
2	С	i	Smart watch	1 AO2 1a (1)	CAO

J276/	01	Mark Scheme		June	2019
2	С	<ul> <li>ii 1 mark per bullet for justification to max 2</li> <li>A smart watch is not a <u>general-purpose computer</u></li> <li> which means the smart watch has one/limited/specific/dedicated function(s)</li> <li>Smart watch has a microprocessor</li> <li> on a single circuit board</li> <li>It is a computer system that is built within the watch</li> <li>Runs firmware</li> <li>Smart watch has built-in OS // difficult to change/manipulate the OS/function</li> <li>Smart watch has few components all essential to its purpose</li> <li>Smart watch has specific hardware required to function i.e. speaker/headphones</li> </ul>	2 AO2 1b (2)	<ul> <li>Answers must be applied to scenario. Do not award generic definitions.</li> <li>Allow opposite reasons for why a laptop is not an embedded system but do not allow repeated points.</li> </ul>	

J276/01		Mark Scheme			June 2019
3	a i	<ul> <li>1 mark per bullet to max 3</li> <li>e.g.</li> <li>Malware could be put on the computer</li> <li>Data protection legislation states personal data must be protected / breaks Data protection legislation</li> <li> breach of privacy</li> <li> he could lose his job</li> <li>Delete files // change data</li> <li> so the important work is lost/changed</li> <li>Steal files/data/information // copy data/files/information // keylogger transmits data/files/information to third party</li> <li> use for illegal activities</li> <li> e.g. profit from the data // gain private information // leak information to the public</li> <li>Data could be locked</li> </ul>	3 AO2 1b (3)		
3	a ii	<ol> <li>1 mark for naming, 1 for description to max 2 per method e.g.</li> <li>Password</li> <li>No access without the password // description of strong password // limit attempts to guess // changing it regularly</li> <li>Limited attempts to get into laptop</li> <li>before laptop is locked</li> <li>Firewall</li> <li>Monitor incoming and outgoing transmissions // Stop unauthorised/unwanted incoming/outgoing transmissions/packets.</li> <li>Biometrics</li> <li>Need fingerprint/retina scan</li> <li>Do not leave laptop logged on/unattended</li> <li>So that other people cannot physical access it</li> <li>Physical security // keep in locked room</li> <li>So that people cannot physically access the laptop</li> </ol>	4 AO1 1a (2) AO2 1a (2)	<ul> <li>Do not accept encryption/anti-malware, this will not prevent unauthorised access.</li> <li>Do not accept penetration testing - it's a laptop, not a network.</li> <li>Login is NE for password</li> <li>Do not accept access rights - it's access to the laptop</li> </ul>	

J276	/01		Mark Scheme			June 2019
			<ul> <li>Do not connect laptop to network // standalone computer</li> <li>So that there are no network threats</li> <li>Two-step verification // two-factor authentication</li> <li>For example sending code to mobile phone</li> </ul>			
3	b	İ	<ol> <li>1 mark per bullet to max 2</li> <li>Uses an algorithm to</li> <li> jumble/scramble/mix up the data // turns it into cypher text // by example</li> <li>If it is accessed it cannot be understood // it is unintelligible</li> <li>Use of keys to encrypt/decrypt data</li> </ol>	2 AO1 1a (1) AO2 1b (1)	<ul> <li>'Need the key to understand the data' can get both MP2 and 3</li> <li>Cannot read the data // data is unreadable is NBOD</li> </ul>	
3	b	ii	<pre>1 mark for each completed piece of code message = input("Please enter your string") newMessage = "" messageLength = message.length for count = 0 to messageLength - 1// message.length - 1 ASCIIValue = ASC(message.subString(count,1) ASCIIValue = ASCIIValue + 1 if ASCIIValue &gt; 90 then     ASCIIValue = ASCIIValue - 26 endif     newMessage = newMessage &amp; CHR(ASCIIValue) next count</pre>	5 AO3 2b (5)	<ul> <li>For messageLength - 1         <ul> <li>in loop accept messageLength or message.length</li> </ul> </li> <li>Spelling must be exact, do not penalise case.</li> </ul>	

June 2019		Mark Scheme		/01	J276
work. Do around	1 AO3 2b (1) • Must logically work. Do not accept "" around	1 mark for suitable output e.g.	iii	b	3
not required.	Parentheses not require	<pre>output(newMessage) // print(newMessage)</pre>			
: = Message)	<ul> <li>Do not accept:</li> <li>newMessage = output (newMessage or similar</li> </ul>				
ıtput	Accept any output method				
ndidate hing extra it .e. a he program, ext in a able e.g. essage + is ok but essage is ssage) is	<ul> <li>Bod - if the candidate outputs something extra must be valid i.e. a variable from the progra or additional text in a string with suitable concatenation e.g. print (newMessage asciiValue) is ok bu print (newMessage the new message) i</li> </ul>				
ndidat hing e l.e. a he pro xt in a able e.g. ssage is ok	<ul> <li>Accept any output method</li> <li>Bod - if the candidat outputs something e must be valid i.e. a variable from the pro or additional text in a string with suitable concatenation e.g. print (newMessag asciiValue) is ok print (newMessag the new message not.</li> </ul>				

J276	/01	Mark Scheme		June	e 2019
4	a	<ul> <li>1 mark per bullet</li> <li>Four laptops/computers, a server and printer present and clearly identifiable (positions do not matter)</li> <li>Switch as a device clearly identifiable</li> <li>all devices directly connected to the switch and only the switch (FT from MP2)</li> <li>e.g.</li> </ul>	3 AO2 1a (3)	<ul> <li>Printer may be connected to the server or to the switch.</li> <li>Accept PC for laptop</li> <li>If the candidates has given server/switch or switch/server in the centre, mark the first one in their list. If they give server/switch, they do not get MP2, but allow access to MP3.</li> </ul>	
4	a	<ul> <li>To connect the devices together</li> <li>Receives data/packets/traffic</li> <li>Direct/cond data/packets/traffic</li> </ul>	AO1 1a (1) AO2 1a (1)	Do not award information, penalise once.	
		<ul> <li>Direct/send data/packets/trainc only to its destination</li> <li>Creates/generates a list of devices connected to it as it receives signals</li> </ul>		switching out of context.	
		<ul> <li>Uses MAC addresses of devices connected to it</li> </ul>		Accept MP3 by example	

J276/01	Mark Scheme				
4 b	<ul> <li>i 1 mark per bullet to max 2</li> <li>Wireless transmission is slower than cabled</li> <li>More devices/users could be connected e.g. mobile phones // increase in traffic</li> <li>reducing bandwidth available for each user // insufficient bandwidth for users/demand</li> <li>Wireless can be limited by interference</li> <li>such as walls that disrupt the signal // from other wireless networks/users</li> </ul>	2 AO1 1b (1) AO2 1b (1)	•	Bod - wireless has less bandwidth	
4 b	<ul> <li>ii 1 mark per factor</li> <li>e.g.</li> <li>Bandwidth available</li> <li>Number of users (using the network at the same time)</li> <li>(Number of) data collisions</li> <li>Interference // by example e.g. walls</li> <li>Distance data has to travel // signal strength</li> <li>Amount of data being transferred</li> <li>Applications being used</li> <li>Server/CPU performance</li> <li>Using a hub instead of a switch</li> </ul>	2 AO1 1a (2)	•	Do not accept wireless/wired connections Bod answers such as cable length	

J276/01		Mark Scheme	June 201	
4	С	<ol> <li>1 mark per bullet to max 2</li> <li>Non-physical network</li> <li>A private network that runs on a public/existing network</li> <li>Combining 1+ physical networks into 1 logical network // 1+ logical networks on 1 physical network // partitioning part of physical network</li> <li>It uses software to separate the Virtual Network from the wider network</li> <li>Users in the Virtual Network can only access data in the Virtual Network</li> <li>Employees can log in / join the private network from any location</li> <li>Employees can access the server/documents from any location // only gives users of the Virtual Network access to the data</li> </ol>	2 AO2 1a (1) AO2 1b (1)	
5	a	<ul> <li>Ine connection is secured</li> <li>1 mark per bullet to max 5</li> <li>The website is hosted on a webserver</li> <li>The website/webserver has an IP address</li> <li>(Browser) sends URL to DNS</li> <li>URL has a linked IP</li> <li>DNS finds IP</li> <li>If DNS cannot find the IP it passes request to higher DNS</li> <li>if not found return error</li> <li>IP address sent back to the browser/computer</li> <li>(Browser) sends request to IP/webserver</li> <li><u>Webserver</u> processes request for the website/webpage</li> <li><u>webserver</u> sends the webpage/file/data to the user</li> </ul>	5 AO1 1b (3) AO2 1b (2)	<ul> <li>Do not award 'the IP goes to the webserver'</li> <li>Allow domain name in place of URL</li> <li>'DNS finds the IP of the URL it is given' gets 2 marks, 1 for URL has linked IP and 1 for DNS finds the IP</li> <li>MP 11 do not accept webserver <i>loads</i> the webpage on the user's computer</li> </ul>
5	b	<ul> <li>i 1 mark per bullet to max 2</li> <li>A layer can be removed/changed etc.</li> <li>without affecting any other layers</li> <li>Each layer has its own purpose // separates the purposes // self- contained</li> <li>so it does not need to consider what the other layers do</li> <li>so it can be programming individually</li> <li>Individual protocols are each smaller/simpler to manage</li> <li>Different layers can interface with different hardware</li> </ul>	2 AO1 1a (1) AO1 1b (1)	<ul> <li>Do not award descriptions of what the layers do - the question asks why layers are used.</li> <li>Do not award vague answers e.g. layers make it easier to work with</li> </ul>

J276/	J276/01 Mark Scheme			June				
5	b	ii	1 mark for each protocol. Task Sending an email from one mail server to another Transmitting a file from a client to a server Viewing a website using a web browser	Protocol SMTP // Simple Mail Transfer Protocol FTP // File Transfer Protocol HTTP // Hypertext Transfer Protocol HTTPS // Hypertext Transfer Protocol Secure	4 AO2 1a (4)	•	Mark first answer in each box	
6	а		<ul> <li>Downloading an email to your computer</li> <li>1 mark per bullet</li> <li>Benefits of not providing pl</li> <li>Less/no plastic/paper/r for packaging // less wa</li> <li>Less electrical power n</li> <li>No petrol used to distri</li> <li>smaller carbon footp</li> <li>Fewer disks need to be</li> <li>Fewer disks need to be</li> <li>Fewer factory emission</li> <li>Old versions will be thr</li> <li>Drawbacks of still creating</li> <li>Plastic/paper are used</li> <li>Increase in waste</li> <li>Old versions will be thr</li> <li>Uses petrol / creates e</li> </ul>	IMAP // Internet Message Access Protocol POP(3) // Post Office Protocol	2 AO2 1b (2)	•	Could be read as still physically creating but not putting in shops. Do not accept more use of computers/electricity to download.	

J276/	/01	Mark Scheme		June 20
6	b	<ol> <li>1 mark per bullet to max 2 for justification</li> <li>She can sell it for a fee</li> <li>Protects/copyrights her source code</li> <li>so it can't be copied/modified/redistributed</li> </ol>	2 AO2 1b(2)	Accept in reverse for why open source is not appropriate, but do not award same MP twice

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**OCR Customer Contact Centre** 

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# GCSE (9-1)

## **Computer Science**

J276/01: Computer systems

General Certificate of Secondary Education

## Mark Scheme for June 2019

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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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
BP	Blank page
<b>^</b>	Omission mark
BOD	Benefit of doubt
×	Cross
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
REP	Repeat
/	Slash
	Tick
TV	Too vague
0	Zero (big)
SEEN	Noted but no credit given

Question		n	Answer		Mark	Guidance
1	(a)	(i)	<ul> <li>1 mark per bullet to max 2.</li> <li>Height/amplitude of waveform</li> </ul>	is sampled/measured	2 AO1 1b (2)	Do not accept frequency Do not accept unrealistic sample rates (e.g. once per
			<ul> <li>Converted to / stored as binary</li> <li>Sample / measurements taken set interval / by sensible exam second)</li> </ul>	/digital at a <b>regular interval</b> pple (eg 44,000 times p	/ ber	second).
1	(a)	(ii)	<ol> <li>mark per bullet to max 1.</li> <li>number of samples taken per s period</li> <li>How <u>often/regularly</u> a sample is</li> </ol>	<b>second / per time</b> s taken	1 AO1 1a (1)	Accept reference to Hertz (Hz) as time period.
1	(a)	(iii)	1 mark per tick to max 2.         The file size of the digital recording will be smaller         The file size of the digital recording will be larger         The quality of playback of the digital recording will be better.         The quality of playback of the digital recording will be worse.	Tick (✓) <b>two</b> boxes	2 AO1 1b (2)	If 3 ticks given, max 1 mark If 4 ticks given, 0 marks.
	(b)	(i)	<ol> <li>mark per bullet to max 3.</li> <li>Image made of / split up into</li> <li>Each pixel given a binary code</li> <li>which represents the colour</li> <li>Each colour is given a different</li> <li>Metadata stored alongside the</li> </ol>	<b>pixels</b>  of that pixel <b>t/unique</b> binary code. image	3 AO1 1b (3)	<ul> <li>BP1 needs idea of picture made up of pixels, not just mention of the word "pixel"</li> <li>Not enough to say "each colour is given a binary code", must have the idea of this being unique or different for each different colour.</li> <li>Accept examples of metadata such as height/width, geolocation, etc. Do not accept file size/file name.</li> </ul>

1	(b)	(ii)	<ul> <li>1 mark per bullet to max 2.</li> <li>Computers consist of transistors / switches / logic circuits / gates</li> <li>which only have two values / on or off / 1 or 0 / open or closed</li> </ul>	2 AO1 1b (2)	Only give BP2 if BP1 given. BP1 must refer to <b>hardware</b> that switches between two states. Do not accept processor for this.
1	(b)	(iii)	<ul> <li>1 mark per bullet</li> <li>2 marks max for advantages</li> <li>2 marks max for disadvantages</li> <li>Advantages</li> <li>File size is reduced / gets smaller // image contains less data</li> <li>so quicker to upload / download / load / transfer</li> <li>takes up less storage space // space on the web server</li> <li>less (mobile) data usage</li> <li>permanent reduction</li> <li>Disadvantages</li> <li>Quality of image is reduced (compared to original)</li> <li>because data is lost / removed // by example (eg fewer colours / lower resolution)</li> <li>reduction is permanent / not reversible</li> </ul>	4 AO2 1b (4)	Do not accept "size" to mean "file size" for advantage. "Data is permanently removed" gets 2 marks for a disadvantage

2	(a)	<ul> <li>1 mark per bullet to max 4, 1 mark per row</li> <li>10</li> <li>6</li> <li>6</li> <li>2</li> </ul>	4 AO2 1b (4)	Correct Answer Only Do not accept "X", "Y", etc.
2	(b)	<ul> <li>1 mark per bullet to max 6.</li> <li>Inputs two value (as X and Y)</li> <li>Compares if X is larger than Y</li> <li>Outputs Y*X only when <u>False</u></li> <li>Compares if X is less than 12</li> <li>Outputs X only when True <u>and X &gt; Y</u></li> <li>Outputs Y only when False <u>and X &gt; Y</u></li> </ul>	6 AO3 2b (6)	Question specifically asks for pseudocode. Outputs should only be given if they occur with the right condition(s). <u>Example algorithm</u> input x input y if x > y then if x < 12 then print x else print y end if else print y*x end if Variables do not have to be called x and y. Accept equivalent comparisons (e.g. if X <= Y) Allow FT for outputs from incorrect comparisons where a sensible attempt has been made.



2	(c)		<ol> <li>mark per bullet to max 4, 2 mark max per method</li> <li>Compiler         <ul> <li>translates code in one go / all at once</li> <li>produces an executable file // does not need to be compiled again</li> </ul> </li> <li>Interpreter         <ul> <li>translates code line by line.</li> <li>will be interpreted / translated every time it is run.</li> </ul> </li> </ol>	4 AO1 1b (4)	Mark first method only in each section
3	(a)	(i)	<ul> <li>1 mark per bullet to max 1</li> <li>An error that results in incorrect output / unexpected result</li> <li>Contains an error but still runs / doesn't crash</li> </ul>	1 AO1 1b (1)	Do not accept examples of logic errors.
3	(a)	(ii)	<pre>if num MOD 2 == 0 then if num MOD 2 = 0 then</pre>	1 AO3 2b (1)	<pre>Important point is that &gt;= is changed to == or =. Accept alternatives that produce the same result (e.g. &lt;=0, &lt;1, !=1, etc.) Ignore any casting (e.g. using int() to convert to a number) Accept other minor changes to the line as long it logically works. Accept versions of MOD from high level languages (e.g. Python : if num % 2 == 0)</pre>

3	(b)	(i)	<ul> <li>1 mark per bullet to max 1</li> <li>An error in the grammar of the program // error that breaks the rules of the programming language</li> <li>Contains an error but will not run / translate / execute</li> </ul>	1 AO1 1b (2)	<b>Do not</b> accept examples of syntax error (e.g. misspelling).
3	(b)	(ii)	<pre>print("odd")</pre>	1 AO2 1b (1)	Must include quotes (single or double). Do not penalise spelling mistakes in message. Accept sensible alternatives to "odd" Accept alternatives for print / output as long as spelling is accurate
4	(a)	(i)	<ol> <li>mark per bullet to max 2</li> <li>Removing / hiding / obscuring unnecessary detail</li> <li>Focusing on the important detail</li> <li>Simplifies the problem // reduces complexity // Easy to solve / understand</li> </ol>	2 AO1 1a (1) AO1 1b (1)	Accept answers relating to using fewer computational resources Must be the programmer making the decision.
4	(a)	(ii)	<ol> <li>1 mark per bullet to max 1</li> <li>Suitable example of what can be focused on (e.g. player name, match results, goals scored)</li> <li>Suitable example of what to remove/hide (anything relevant that is not results/goals scored)</li> <li>Suitable example of a simplification made</li> </ol>	1 AO2 1a (1)	Mark first answer only Allow any suitable example of abstraction as long it is relevant to the system. Allow either first name or surname to be removed as an example, but do not allow both to be removed.

4	(b)	1 mark per bullet, mark in pairs. Max 2 per point.	4	Mark first answer only in each section
			AO2 1a (2)	
		e.g.	AO2 1b (2)	For validation, allow one example of a type of validation
		Input sanitisation		(e.g. type check, range check)
		<ul> <li>cloaning up input data / romoving upwanted data</li> </ul>		(
		•cleaning up input data / removing unwanted data		a question so allow other sensible examples such as
		•by example (e.g. removing special characters /		e.g. question so allow other sensible examples such as
		preventing SQL injection)		audit logging, encryption of data
		Validation		Do not allow "data is correct" as expansion for validation –
		<ul> <li>checking whether input data should be allowed / is</li> </ul>		validation checks that data is sensible or follows rules,
		sensible / follows criteria		NOT that it is correct.
		• by example (e.g. goals cannot be less than 0)		
				Planning for contingencies and anticipating misuse are
				not examples by themselves, but discussion of these may
		Verification		fit under other points $-e \alpha$ input sanitisation validation
		… checking whether data has been entered correctly		
		<ul> <li>by example (e.g. double entry / visual check)</li> </ul>		
		, , , , , , , , , , , , , , , , , , ,		
		Authentication		
		onsuring only allowed / authorized users can gain		
		access		
		<ul> <li>by example (e.g. usernames /passwords)</li> </ul>		
		Maintainable code		
		<ul> <li>to allow other programmers to understand the code</li> </ul>		
		• by example(e.g. comments indeptation meaningful		
		variable names)		
		valiable flatties)		
	1			

4	(c)	1 mark per bullet to max 3	3	Correct answer only.
		• count	AO3 2b (3)	Accept alternatives to adding 1 to variable (e.g. $+=$ 1 /
		<ul> <li>= nogoalscount + 1</li> </ul>		++)
		• nogoalscount		Panalisa spalling and only ET for further mistakes. Do
				not penalise case.
				Accept sensible messages printed out alongside nogoalscount
5	(a)	1 mark per bullet to max 2	2	Award working mark independently of final answer but working must be correct (e.g. $(16 \times 10) + 3$ )
		• 163		working <u>must</u> be concer (e.g. (10 × 10) + 5)
		Correct working shown.		
5	(b)	1 mark per bullet to max 2	2	Award working mark independently of final answer but
		• 91	AO1 1b (2)	<u>must</u> be correct (e.g. 1+2+8+16+64 // correct binary beadings with correct binary underneath)
		Correct working shown.		
5	(c)		1	Correct answer only
		• 9	AO1 1b (1)	Do not accept 3 <sup>2</sup> or 3 x 3
5	(d)	1 mark per nibble to max 2	2	Mark from right to left.
		• 1101 1101	AO1 1b (2)	

## Mark Scheme

### June 2019

5	(e)	1	1 mark per missing	bit		4	Accept T / True
			A	В	Q		
			0	0	0		
			0	1	1		
			1	0	1		
			1	1	1		
					1	1	

6	(a)	(i)	<ul> <li>1 mark per bullet to max 6</li> <li>Function <u>ticketprice()</u> defined</li> <li> that accepts <u>two</u> parameters and has <u>no other inputs</u></li> <li>Works out total ticket price for adult (eg adult * 19.99)</li> <li>Works out total ticket price for children (eg child * 8.99)</li> <li>Adds on correct booking fee</li> <li><u>Returns</u> the calculated value.</li> </ul>	6 AO3 2b (6)	Bullet points 3, 4, 5 can be awarded even if no mention of a function / parameters (for example, if candidate has inputted the number of tickets needed. Do not award return value if no attempt at a function. Return mark can be given if a good attempt made at calculating the total, even if this is incorrect. Allow 2.50 booking fee to be per order or per ticket Ticket prices must be stored appropriately if needed. example algorithm function ticketprice (numadult, numchild) price = (numadult * 19.99) + (numchild) * 8.99) + 2.50 return price end function Allow alternatives in high level languages (e.g. def in Python). Allow return as assigning the value to the name of the function (VB syntax)
6	(a)	(ii)	<ul> <li>1 mark per bullet to max 2</li> <li>Real</li> <li>Returned value may not be a whole number / may have a decimal point in</li> </ul>	2 AO2 1a (1) AO2 1b (1)	Allow String <u>only</u> if matching justification shows understanding (e.g. £ sign attached, message returned alongside value).

	(1)	(1)	4	4	Made Cartana and
6	(a)	(1)	1 mark per bullet to max 1		Iviark first answer only
				AU2 10 (1)	
			Check that the code is valid / real		
			Check it has been entered / sent / received correctly.		
			Makes it harder for people to make up discount codes		
6	(c)	(i)	Not in order / sorted	1	Mark first answer only
				AO2 1b (1)	
6	(c)	(ii)	Linear (search)	1	Mark first answer only
	. ,	. ,		AO1 1b (1)	Allow other valid searching algorithms as long as they
					work on an unsorted list (e.g front and back search)
6	(d)	(i)	1 mark per bullet to max 2	2	The variable records whether a swap has taken place: it
		()	- F	AO2 1b (2)	does <b>no</b> t perform the swap.
			• Elag / record whether a swap has taken place or not		
			<ul> <li>checked as condition to decide whether to repeat</li> </ul>		
<b>^</b>	(-1)	(::)	A mente nen hellette mene O	0	De net erent "erete numbers"
6	(a)	(11)	1 mark per bullet to max 2	2	Do not accept "sorts numbers"
				AO2 1b (2)	
			• Swaps		"swaps numbers" meets BP1. Explanation of which values
			•values of queuesize[p] and queuesize[p+1]		in the array are swapped meets BP1 and BP2.
			•when queuesize[p] is larger than		
			queuesize[p+1]		Do not accept direct word for word repetition from the
			using a temporary variable //doesn't overwrite numbers		<pre>program (e.g. temp = queuesize[p] ), question asks</pre>
			//explanation of process		for an explanation.
					Explanation of temporary variable must be logically
					correct.
L					
6	(d)	(iii)	1 mark per bullet to max 2.	2	Mark first answer only
---	-----	-------	---	------------	--
				AO2 1a (1)	
			Comments	AO2 1b (1)	Do not accept indentation (already done)
			to enable programmers to understand the purpose of		
			• to enable programmers to understand the purpose of		Accept "show what each line does" for comments
			each line / section		Accept show what each line does for confinents.
			<ul> <li>by example (e.g. on line 4 add the comment)</li> </ul>		
			<ul> <li>Naming variables sensibly</li> </ul>		
			• to enable programmers to understand the purpose of		
			•by example (e.g. change identifier p to)		
			Modularise		
			to allow reuse / makes easier to test / reduces errors		
			• by example (e.g. create as a function)		
6	(d)	(iv)	1 mark per bullet to max 2.	2	Accept "insert". Do not penalise spelling.
-	()	()		AO1 1a (2)	
			- Insortion (cort)		Do not accept hubble sort (given in previous questions)
					Do not accept bubble soit (given in previous questions)
			Merge (sort)		
					Do not award searching algorithms
					Allow other <u>valid</u> sorting algorithms.
					(e.g. guick sort, heap sort, shell sort, selection sort, radix
					sort bucket sort tim sort comb sort pigeonhole sort
					etc.)
					cic.,

## Mark Scheme

<b>^</b>	(-)	4 moule non buillet to move 0	0	Anoure con he in one outshele formet (including
6	(e)	T mark per bullet to max 8.	8	Answers can be in any suitable format (including
			AO3 26 (8)	pseudocode, flowchart, etc). If flowchart used, accept any
		Input height		sensible shapes.
		<ul> <li>Accepts riders &gt; / &gt;= 140 with suitable message</li> </ul>		
		<ul> <li>Rejects riders &lt; / &lt;= 120 with suitable message</li> </ul>		Do not penalise for lack of initialisation of variables.
		Checks if height between 120 and 140		
		If True input whether accompanied		Loop must repeat until 8 riders allowed, not just loop 8
		Suitable output message for True AND False		times.
		Correctly counts number of riders in all coses of		
		<ul> <li>Correctly counts number of nders in all cases of basis allowed to ride (de not none line countied to a</li> </ul>		Do not credit asking whether accompanied if in the wrong
		being allowed to ride (do not penalise candidates		place.
		for counting or not counting accompanying adults)		
		<ul> <li>Attempt to loop based on 8 riders allowed</li> </ul>		<b>Condition for BP4 may be</b> $120 < h < 140$
				Example algorithm
		Some checks for rider height may be implicit (e.g. using		
		ELSE after checking other heights). If the answer		while riders <8
		logically works to produce the correct output, it should		input height
		be marked as correct.		if height >= 140 then
				output "allowed"
		Loop will almost certainly be condition controlled		riders = riders + 1
		(WHILE/DO UNTIL) to gain BP8: count controlled		elif height >=120 then
		(FOR) loop requires significant manipulation to work		input withadult
		successfully.		if withadult == "ves"
				output "allowed"
				nidera – ridera – 1
				riders - riders + r
				else
				output "not allowed"
				end lī
				else
				output "not allowed"
				end if
				endwhile

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# GCSE (9-1)

## **Computer science**

Unit **J276/01**: Computer science

General Certificate of Secondary Education

## Mark Scheme for June 2018

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<b>^</b>	Omission mark
BOD	Benefit of doubt
×	Cross
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
REP	Repeat
1	Slash
>	Tick
TV	Too vague
0	Zero
SEEN	Noted but credit not given

#### Subject Specific Marking Instructions

## LEVELS OF RESPONSE QUESTIONS:

#### For answers marked by levels of response:

- to determine the level start at the highest level and work down until you reach the level that matches the answer
- to determine the mark within the level, consider the following

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. \*When only two marks are available (low mark band) only use Highest and Lowest mark guidance for 'best-fit'.

	AO2.1a	AO2.1b
High (thorough) (6 – 8 marks)	Precision in the use of 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 principles of computer science.	Understanding of concepts is consistently applied to context enabling a logical and sustained argument to develop. Examples used enhance rather than detract from response.
Middle (reasonable) (3 – 5 marks)	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 concepts are not always taken	Understanding of concepts is shown and is applied to context. There is clear evidence that an argument builds and develops through the response but there are times when opportunities are missed to use an example or relate an aspect of understanding to the context provided.
Low (basic) (1 – 2 marks)	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 understanding of key concepts 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.
0 marks	No response or no response worthy of credit.	No response or no response worthy of credit.

Question			Answer	Mark	Guidance
1	(a)	i	<ul> <li>1 mark per bullet to max 2</li> <li>For long term/permanent/non-volatile storage // storing when the device is turned off</li> <li>To store the videos / data / files</li> <li>For transferring the videos (to another device)</li> </ul>	2 AO2 1a (1) AO2 1b (1)	Do not award capacity. Bullet 3 – portable is not enough, needs application. Bullet 2 – must identify the data is stored. For videos accept data or any other term that signifies the data is being stored/transferred e.g. photos/images. Accept any alternative for transfer e.g. sending/exporting.
1	(a)	ii	<ul> <li>1 mark per bullet to max 4 Max 3 if only stating features</li> <li>e.g.</li> <li>Portable</li> <li>Lightweight</li> <li>e.g. device needs to be carried</li> <li>Small physical size</li> <li>e.g. can fit in a small camera</li> <li>Durable</li> <li>No moving parts</li> <li>e.g. device is moved so may be dropped // won't be damaged when moving around</li> <li>Reliable</li> <li>e.g. needs to work when out in the 'field'</li> <li>Sufficient/large capacity</li> <li>Videos are large file size // store more videos</li> <li>Fast access/read/write speed</li> <li>e.g. the device will retrieve the videos without delay</li> <li>Efficient power consumption</li> <li>e.g. run on battery // longer battery life</li> </ul>	4 AO1 1b (1) AO2 1a (1) AO2 1b (2)	<ul> <li>Award marks for why solid state is most appropriate, not why others aren't.</li> <li>Award descriptions of portable/durable etc., not looking for key words.</li> <li>Do not just allow can transfer data elsewhere.</li> <li>Fastest without quantifying read/write speed is not enough.</li> <li>Allow: quietest and expansion.</li> <li>Do not award cost.</li> <li>Small on its own is insufficient as it could mean physical or memory size.</li> </ul>

Que	Question		Answer	Mark	Guidance
1	(b)	i	1 mark for working, 1 mark for answer • 1024(1000) / 100 // 10*100 = 1000 • = 10 (videos)	2 AO2 1a (1) AO2 1b (1)	Final answer must be 10, not 10.24
1	(b)		<pre>1 mark per bullet to max 6 Output asking for file size (in megabytes) Taking number of MB as input Multiplying by 1024 or 1000 Multiplying by 1024 or 1000 (may be same line as bullet 3, this must be the final value with no further changes) Outputting the final bytes value in an appropriate message output "Please enter the file size in megabytes" input numberMB numberKB = numberMB * 1024 (or 1000) numberBytes = numberKB * 1024 (or 1000) output "There are " &amp; numberBytes &amp; " bytes in " &amp; numberMB &amp; "MB"</pre>	6 AO3 2b (6)	Award bullet 5 even if bullets 3 and 4 are wrong. Do not award if outputting the original input value. Bullet 4 must be the final calculation to get the mark. If there are any further calculations, or changes to the final bytes value then bullet 4 cannot be awarded. Input = value is incorrect, variable must be on left. Bullet 6 is dependent on bullet 5. Input must be stored e.g. user input – no mark Outputs must have "" around strings, variable identifiers must not have "". If bullet 5 is not given because the variable is in "", still award bullet 6 if correct. Bullet 3 and 4, could be multiplying by 1,000,000 or 1,048,576 (award both bullets). numberMB = input ("Enter the file size") would get both bullets 1 and 2. Concatenation is not required for the final bullet. input ("Filesize") will get 1 mark for outputting File size, it will not get the input as there is no variable.

Question			Answer	Mark	Guidance
Ques 1	tion (c)	i	<ul> <li>Answer <ol> <li>mark per bullet to max 3 <ol> <li>e.g.</li> <li>Incremental:</li> <li>Only the changes need to be backed up</li> <li>The software/OS/settings are unlikely to have changed between backups</li> <li>Small number of files likely to be used/edited between backups</li> <li>Take less time to backup</li> <li>Each backup will take less memory space to store</li> </ol> </li> <li>Full: <ul> <li>Backup all the data/files and software</li> <li>It might not take a significant time to back up entire system</li> <li>He might only have a small number of files to be backed up each time</li> <li>Safer as have more past versions to revert to</li> <li>User may have changed settings on computer</li> </ul> </li> </ol></li></ul>	Mark 3 AO2 1a (1) AO2 1b (2)	Guidance         Discussion must match the backup given.         Either method is acceptable, marks are awarded for the justification.         Allow marks for why the other is not appropriate.         If there is no method given, or both, then read the answer and mark their justifications. It must be clearly given which method each point refers to.
			<ul> <li>Safer as have more past versions to revert to</li> <li>User may have changed settings on computer</li> <li>Faster to restore the backup</li> <li>Needs to do a full before he can do an incremental</li> </ul>		

## Mark Scheme

Ques	Question		Answer	Mark	Guidance
1	(c)	ii	1 mark for naming program, 2 for description of use	3	Must be appropriate to scenario.
			e.g.	AO1 1a (1)	
			Encryption software	AO1 1b (1)	For encryption, no mark for 'it encrypts data'
			Scramble/encode/mix up data	AO2 1b (1)	
			so it cannot be read/understood if intercepted/stolen		Do not award: any form of backup or device driver.
			Defragmentation		
			Move free space together		Do not award: encryption stops data being
			Move files together		stolen.
			E.g. Faster access to files		
					Do not award: brand names. But read
			(Data) compression		description.
			Reduce the file size of files // makes files smaller		Mark program first. If incorrect 0 marks. If
			To use less storage space		wording is not clear, or terminology not exact
			Faster transmission		but it can be understood marks can be
			To store more files		awarded for description of use.
			Anti-virus / anti-malware		Defragmentation – do not award marks for
			To help protect computer/data against viruses/malware		describing a fragmented disk this is a NAO
			• To scan the computer to look for/guarantine/remove		
			viruses/malware		
			Disk analysis and repair		
			Scan disk and look for faults		
			Prevent loss of data due to faulty disk		
			· · · · · · · · · · · · · · · · · · ·		
			Auto-update		
			Checks Internet for new versions of software/OS		
			Downloads and installs without user interaction		
			Firewall		
			Examine ingoing and outgoing traffic		
			To help restrict/prevent unauthorised access		
			over a network/external source		

Question		Answer Ma		Guidance
1 (d)	)	<ol> <li>mark per bullet to max</li> <li>Allows free distribution // other people can use/edit his work</li> <li>Other people can redistribute his work</li> <li>Can choose to restrict other people to be able to use/edit/share the videos</li> <li>Work is still copyrighted // others cannot claim it as their own</li> <li>No-derivative</li> <li>William can set that if others edit it they cannot redistribute it with the edits</li> <li>attribution</li> <li>Can insist e.g. on having his name on it if re-used // referencing // must be credited</li> <li>Can insist on non-commercial use // others cannot sell/profit from his work // personal use only</li> </ol>	3 AO1 1b (1) AO2 1a (1) AO2 1b (1)	"People need to ask to use it" is not enough.

Question			Answer		Mark	Guidance	
2	(a)		<ol> <li>1 mark for LAN</li> <li>1 mark per bullet for justification to max 2</li> <li>Small distance/geographical area by example e.g. same building/house</li> <li>Connected by own hardware/infrastructure // not connecting through Internet // no hired/third-party infrastructure // dedicated connection</li> </ol>			3 AO2 1a (2) AO2 1b (1)	Do not allow – in a local area, local needs to be quantified in some way. No marks for WAN.
2	(b)		1 mark per row		5	0 mark for row with >1 tick	
			Description	Ethernet	Wifi	AO1 1a (5)	
			A wired connection	✓			
			More likely to be affected by interference		<ul> <li>✓</li> </ul>		
			Data can be transmitted at a faster speed	✓			
			Wireless transmission		$\checkmark$		
			Shorter transmission range before data is lost		✓		
2	(c)	i	<ol> <li>1 mark per bullet to max 2</li> <li>Directs packets/data to destination // directs packets/data in a network</li> <li>Receives packets/data from the network/Internet</li> <li>Forwards packets/data to other computers on the network/Internet</li> <li>Connects (different) networks together // e.g. joins home network to Internet</li> <li>Has (public) IP address for LAN</li> <li>Designates (private) IP addresses to network nodes</li> </ol>		2 AO1 1a (1) AO1 1b (1)	<ul> <li>Controls flow of data as BOD for bullet 1.</li> <li>Bullet 1 needs to refer to the router directing the destination e.g. it is making a decision/choice on where to send it.</li> <li>Bullet 4 - it has to be referring to the connection between the Internet and home network, or forwarding of data between them. Just referring to accessing Internet is not enough.</li> <li>Do not allow information for data/packets</li> </ul>	

### Mark Scheme

#### June 2018

Question			Answer	Mark	Guidance
2	(c)	ii	1 mark per item to max 2	2	Accept modem, power line adapter,
			e.g.	AO1 1a (2)	Ethernet jack
			Wireless access point / WAP		Must be an item of network bardware
			Wireless network interface card / WNIC / wi-fi card		
			Bridge		
			Switch		
			• Hub		
			Repeater // wireless extender/booster		
			Server		
2	(d)	1	Domain Name Server // DNS.	1	Allow Server/service/system
2	(4)	ii	1 mark for each letter in the correct place	AOT 1a (1)	
2	(0)	"	1 The request is put into packets	AO1 1b (5)	
			2 <b>E</b>		
			3 The packets are sent across the network		
			4 <b>D</b>		
			5 <b>A</b>		
			6 If they have not arrived:		
			7 A timeout is sent to request the packets are resent		
			8 If they have arrived:		
			9 <b>B</b>		
			10 <b>C</b>		

Que	estion	Answer	Mark	Guidance
2	(e)	1 mark for naming threat, 1 for description, 1 for prevention. Max 3 per threat	9 AO1 1b (3) AO2 1a (3)	Must be relevant to home use i.e. not denial of service, SQL injection.
		<ul> <li>Virus / trojan / worm / malware</li> <li>Piece of software/code/a program that replicates itself // causes damage e.g. editing/deleting files</li> <li>Running anti-virus/anti-malware software // don't download from unknown sources // don't click on unknown links</li> </ul>	AO2 10 (3)	Do not allow backup as a prevention – it does not prevent the threat occurring. Do not allow encryption for stopping a hacker. Description must do more than repeat the threat.
		<ul> <li>Spyware / malware / keylogger</li> <li>Piece of software/code/a program that records actions/key presses and sends this data to a third party for analysis</li> </ul>		Read whole response to threat, identify threat first (may not be at the start and may be within description), then look for description.
		<ul> <li>Running anti-spyware/anti-malware software/firewall</li> <li>Data interception / passive</li> </ul>		If no threat identified, then no mark for prevention.
		<ul> <li>Data is sent to another device and is intercepted by a third party</li> <li>Encryption</li> </ul>		Allow any example of hacking for hacker e.g. cracking (password), active. But only once.
		<ul> <li>Phishing</li> <li>An e-mail has a link that when clicked directs the user to a fake website that collects personal data</li> <li>Network policy // firewall</li> </ul>		Only award malware once, for virus or spyware e.g. virus identified, then malware identified both can be awarded. Virus, then malware, then spyware, would get a repeat for final spyware.
		<ul> <li>Pharming</li> <li>A piece of code installed that redirects user to fake website that collects personal data</li> <li>Anti-malware // firewall</li> </ul>		<ul> <li>Allow:</li> <li>Ransomware</li> <li>Prevents access to your files unless a ransom is paid</li> <li>Aptivinue/firewall</li> </ul>
		<ul> <li>Hacker</li> <li>Person attempting to gain unauthorised access to the network/computers/ data/files // unauthorised access and then deleting/editing data/files</li> </ul>		• Anti-virus/Inewan

Quest	ion	Answer	Mark	Guidance
		<ul> <li>Firewall // strong password // biometrics // penetration testing</li> </ul>		
		<ul> <li>Brute force attack</li> <li>Person/software using every combination of passwords to gain access</li> <li>Firewall//strong passwords</li> </ul>		
		<ul> <li>Social engineering</li> <li>Person being the weak point of the system // by example e.g. any example of deception</li> <li>e.g. Strong passwords // check validity of sources</li> </ul>		

Question	Answer	Mark	Guidance
Question 3*	Answer         Mark Band 3–High Level (6-8 marks)         The candidate demonstrates a thorough knowledge and understanding of a wide range of considerations in relation to the question; the material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate is able to weigh up both sides of the discussion and includes reference to the impact on all areas showing thorough recognition of influencing factors. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.         Mark Band 2-Mid Level (3-5 marks)         The candidate demonstrates reasonable knowledge and understanding of a range of considerations in relation to the question; the material is generally accurate but at times underdeveloped.         The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate makes a reasonable attempt to discuss the impact 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.         Mark Band 1-Low Level (1-2 marks)	Mark 8 AO2 1a (4) AO2 1b (4)	Guidance         The following is indicative of possible         factors/evidence that candidates may refer to         but is not prescriptive or exhaustive:         Indicative Content:         Inhabitants         • Connection with the rest of the world         • Access to more information         • Up-to-date with news         • E-commerce         • Communication with people         • Can be used in schools/for education         • Cost (Devices and connection)         Businesses         • Sell products to wider audience//more customers         • Purchase items from wider range/more places         • Competitive prices         • Tourism can be advertised         • Online bookings for hotels         Ethical issues         • Access to inappropriate/illegal content         • Lead to social pressure to be online and get technology         • Cost         • Introduces digital and social divide         • Threats
	The candidate demonstrates a basic knowledge of considerations with limited understanding shown: the material		Social media

### Mark Scheme

#### June 2018

Question	Answer	Mark	Guidance
	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.		<ul> <li>Unwanted images and videos of people may be put online</li> <li>Risk of threats e.g. phishing/pharming/virus</li> </ul>
	<b>0 marks</b> No attempt to answer the question or response is not worthy of credit		

Ques	tion	Answer	Mark	Guidance
4	(a)	<ul> <li>1 mark per bullet to max 2 per register</li> <li>MAR // memory address register</li> <li>Stores the address/location where data will be read/written/accessed/fetched         <ul> <li>// address/location of data/instruction being             </li> <li>processed</li> <li>// address/location of data/instruction next to be             </li> </ul> </li> </ul>	4 AO1 1a (2) AO1 1b (2)	<ul> <li>MAR stores address is not enough for description MDR stores the data is not enough for description</li> <li>Allow: <ul> <li>Current instruction register // IR</li> <li>Stores the instruction currently being processed</li> </ul> </li> <li>Accept MBR // Memory buffer register for MDR</li> </ul>
		<ul> <li>MDR // memory data register</li> <li>Stores the data/instruction that is fetched/read from memory         <ul> <li>// stores the data that is to be written to memory             // stores the data/instruction from the address in the MAR             // data/instruction next to be processed</li> </ul> </li> </ul>		
		<ul> <li>Program counter</li> <li>Stores the address/location of the next instruction to be run         // stores the address/location of the current         instruction being run</li> <li>Accumulator</li> </ul>		
		Stores the result of manipulation/process/calculation		
4	(b)	<ul> <li>1 mark per bullet to max 2</li> <li>The number of FDE cycles run per given time/second // the frequency that the clock 'ticks'</li> <li>3.8 billion cycles/instructions</li> <li>per second</li> </ul>	2 AO1 1b (1) AO2 1a (1)	Do not award: how fast the computer is // speed of CPU 3.8 = 3,800,000,000

Question			Answer	Mark	Guidance	
4	(c)		<ol> <li>mark per bullet to max 3         <ol> <li>a.g.</li> <li>Software may be designed to run on 1 core and not multiple cores</li></ol></li></ol>	3 AO1 1b (1) AO2 2b (2)	Allow marks for other components that could affect the speed e.g. secondary storage access speed, onboard GPU. Award description of concurrent processing.	
4	(d)	i	<ol> <li>mark per bullet to max 3</li> <li>VM is used when RAM is full</li> <li>part of the secondary storage used as (temporary) RAM/VM</li> <li>Data from RAM is moved to the secondary storage/VM (to make space in RAM)</li> <li>RAM can then be filled with new data</li> <li>When data in VM is needed it is moved back to RAM</li> </ol>	3 AO2 1a (1) AO2 1b (2)	Many candidates are giving disadvantages of VM, or that the computer can now run more programs, which are NAQ	
4	(d)	11	<ol> <li>1 mark per bullet to max 2</li> <li>More RAM will improve the performance of the computer // More RAM will speed up the access to data</li> <li>Excessive use can cause disk thrashing</li> <li>which decreases performance</li> <li>VM is slower to access than RAM direct (because it has to go back to RAM first)</li> <li>Moving data between RAM and VM takes processor time</li> </ol>	2 AO2 1b (2)	Do not award: VM is slower, without quantifying slower at what	

Question Answer Mark		Mark	Guidance		
5	(a)		<ul> <li>An agreement / set of rules / standard</li> <li>for how computers should communicate // how data is sent/received/transmitted on a network</li> <li>Example of what could be agreed in the protocol (e.g. speed / error checking / etc.)</li> </ul>	2 AO2 1b (2)	Do not award set of instructions for bullet 1
5	(b)	(i)	<ol> <li>mark for protocol, 1 mark for description</li> <li>FTP / file transfer protocol</li> <li>Uses a client-server model // sends from client to server // sends from server to client</li> </ol>	2 AO2 1b (2)	If protocol wrong, no mark for description
5	(b)	(ii)	<ol> <li>mark for protocol, 1 mark for description         <ul> <li>e.g.</li> <li>HTTPS / hyper text transfer protocol secure</li> <li>Encrypts the connection/data // Uses SSL/secure socket layer</li> </ul> </li> </ol>	2 AO2 1b (2)	If protocol wrong, no mark for description
5	(c)		<ol> <li>1 mark for IMAP, 1 mark for SMTP.</li> <li>IMAP</li> <li>Retrieves/accesses/downloads (a copy of an) e-mail</li> <li>Allows synchronisation/management of account</li> <li>SMTP:</li> <li>Sends/forwards/transmits e-mail</li> </ol>	2 AO1 1b (2)	Marks are for IMAP retrieving, SMTP sending. At this stage do not worry about where they are going. Question does not refer to email, so response must in some way refer to email/message. Sends/receives data is not enough.

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# GCSE (9-1)

## **Computer science**

Unit J276/02: Algorithms and programming

General Certificate of Secondary Education

## Mark Scheme for June 2018

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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
BP	Blank page
	Highlight
	Off page comment
<b>^</b>	Omission mark
BOD	Benefit of doubt
×	Cross
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
REP	Repeat
1	Slash
<ul> <li>Image: A set of the /li></ul>	Tick
TV	Too vague
0	Zero (big)
SEEN	Noted but no credit given

Question			Answer		Guidance
1	(a)		<ul> <li>1 mark per bullet, max 3</li> <li>String</li> <li>Integer / Int</li> <li>Boolean</li> </ul>	3	Accept text / varchar for string. Do not accept character. Do not accept number/numeric for integer Accept yes/no, true/false for Boolean.
1	(b)	(i)	<ol> <li>1 mark per bullet, max 2 if not in correct order or additional statements given.</li> <li>SELECT StudentName</li> <li>FROM conduct</li> <li>WHERE Points &lt; 0</li> </ol>	3	Capitalisation does not affect the mark. Spellings of fields, tables must be correct. Ignore brackets. Ignore quotes around StudentName, Conduct or Points. Mark quotes around 0 in WHERE clause as incorrect. StudentName must not include space Accept <= -1 or equivalent for 3 <sup>rd</sup> bullet point.
1	(b)	(ii)	* / star / asterisk	1	Wildcard (*) must be clearly identified as the answer. Do not allow any other SQL statements alongside this unless this is given as an example.
1	(c)		<ul> <li>1 mark per bullet, max 4</li> <li>Selection(IF) used</li> <li>Comparing studentdata[3]</li> <li>with "TRUE" or "FALSE" // TRUE or FALSE</li> <li>Correct outputs ("sent" and "not sent")</li> </ul>	4	<pre>Example algorithm if studentdata[3] == "TRUE" then     print "sent" else     print "not sent" end if Bullet point 3 can only be awarded If an attempt is made at identifying studentdata (e.g. with the wrong index or no index). Do not allow simply comparing anything with True / False. Bullet point 3 can be implicit.</pre>

Question			Answer	Mark	Guidance		
					Capitalisation not important.		
					"Sent" and "not sent" do not have to be exactly this – can be alternative message conveying same idea.		
2	(a)	(i)	• 2, 3, 4	1	All three numbers needed in the correct order (with no other numbers) for mark.		
2	(a)	(ii)	• 15	1	Accept 3 x 5		
2	(b)		1 mark per bullet, max 2	2	Ignore spelling.		
			<ul> <li>Sequence</li> <li>Iteration / loops / repetition</li> </ul>		Do not allow examples (eg FOR loop / WHILE loop)		
2	(c)	(i)	1 mark per bullet, max 2	2	Do not accept "will change" for bullet point 4.		
			<ul> <li>A (name/identifier for a) memory location</li> <li>used to (temporarily) holds/contains/stores data / value // is assigned a value</li> <li>that can be changed / possible to change (while the program is running)</li> </ul>		Do not allow "holds/stores <u>something</u> " or "holds/stores <u>information</u> " for bullet point 2. Do not accept name / identifier without reference to a memory location. Do not accept "a value given a name" or equivalent.		
2	(c)	(ii)	1 mark per bullet, max 2	2	Ignore capitalisation.		
			<ul> <li>k</li> <li>p</li> <li>m</li> </ul>		Correct answer only. Do not allow other code in answer.		
3	(a)	(i)	<ul> <li>1 mark per bullet, max 2</li> <li>AND / conjunction</li> <li>NOT / negation</li> </ul>	2	Allow Boolean notation.		

Question		Answer				Mark	Guidance	
3	(a)	(ii)	<b>A</b> 0 1 1	B         0         1         0         1         1         1	Q 1 1 1 1 0		4	1 mark per row
3	(b)		<ul> <li>1 mark per bulle</li> <li>A</li> <li>B</li> <li>OR gate wit</li> <li>Logic system labelled input</li> </ul>	et, max 2	/ NOT gate <b>on</b> h no other gate	— Q B input es, with	2	First mark can be awarded if candidate has either a NOT gate from B, or an OR gate with two inputs anywhere in their answer. Second mark is only awarded of the logic system as shown is given with no other additional gates. Correct logic diagrams needed for OR and NOT, including circle on NOT. Use professional judgement. Ignore labelling. No need to label Q output.

## Mark Scheme

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Question			Answer		Guidance	
4	(a)	(i)	1 mark per filled gap, max 3	3	Ignore capitalisation.	
			01 function librarycode(title, <b>year</b> )		Allow <b><u>librarycode =</u></b> for 3 <sup>rd</sup> mark – this is an equivalent	
			02 parta = title.substring(0, $\underline{3}$ )		Basic).	
			03 partb = year.substring(2, 2)			
			04 <u>return</u> parta.upper + partb			
			05 endfunction			

Question			Answer	Mark	Guidance
4	(a)	(ii)	<ul> <li>1 mark per bullet, max 6</li> <li>Input title <u>and</u> year from user</li> <li>Open backgodes tot</li> </ul>	6	<pre>Example algorithm title = input("enter title") vear = input ("enter vear")</pre>
			<ul> <li>Open <u>bookcodes.txt</u></li> <li>Call the librarycode() function</li> <li> with the two parameters that match input values</li> <li> write out code obtained to the text file</li> <li>Close text file</li> </ul>		<pre>year = Input ( enter year ) code = librarycode(title, year) myFile = openWrite("bookcodes.txt") myFile.writeLine(code) MyFile.close()</pre>
					Note, pseudocode shown above is an example – candidates may answer very differently, but award marks if intention can be seen.
					Bullet points 3,4 and 5 could be done in one line: myFile.writeLine(librarycode(title, year))
					Do not award bullet point 3 if candidate is <u>defining</u> the function rather than calling it.
					Allow bullet point 2 (opening text file) if correctly referred to during write operation.
					Bullet point 3 must include brackets () to signify it is the function being called or indication that is being called.
4	(b)	(i)	<ul><li>1 mark per bullet, max 2.</li><li>Function returns a value</li></ul>	2	Allow "does not" for second mark if intention is clear (ie if it is obvious that the "not" refers to not returning a value).
			Procedure does not return a value		Allow discussion of now returned value in a function can be used (e.g. to assign to a variable or to use this returned value in some way).

## Mark Scheme

## Mark Scheme

Question			Answer	Mark	Guidance
4	(c)	(i)	<ul> <li>1 mark per bullet, max 4.</li> <li>List split into individual elements (may be done over several steps or just as a starting point)</li> <li>Merge individual elements into sorted lists of size 2</li> <li>Merge lists of size 2 into sorted lists of size 4</li> <li>Merge lists of size 4 into final sorted list.</li> </ul>	4	Candidates can describe how the merge sort would work rather than showing output values at each stage. Ignore intermediate steps. Do not give final mark for simply showing the list sorted. Must have the (correct) idea of where it being merged from previous lists. Candidates' answers describing / showing other sorting algorithms (e.g. bubble sort, insertion sort) are worth 0 marks. [POE12] [BAC97] [FLY77] [JAV16] [TAL86] [AND18] [ZAR09] [HOP86] [BAC97 FOE12], [FLY77] JAV16], [AND18 TAL86], [HOP86 ZAR09] [BAC97 FLY77 JAV16, POE12], [AND18 HOP86 TAL86 ZAR09] [AND18, BAC97, FLY77, HOP86, JAV16, POE12, TAL86, ZAR09]
4	(c)	(ii)	<ol> <li>mark per bullet, max 2.</li> <li>Faster/quicker (to sort)</li> <li>for large lists // for lists that are more unordered</li> <li>Has a consistent running time (for a lists of same length)</li> <li>doesn't depend on how ordered original list is</li> </ol>	2	<ul> <li>Accept (correct) reference to big O notation for 2<sup>nd</sup> mark on either mark point although this is beyond scope of GCSE specification.</li> <li>Allow "more efficient" for BOD on first bullet point.</li> </ul>
5	(a)	(i)	• 1000 0100	2	1 mark per nibble. Mark right to left.
5	(a)	(ii)	• B 5	2	1 mark per hex digit

Question			Answer	Mark	Guidance
5	(a)	(iii)	<ul> <li>1 mark per bullet, max 1.</li> <li>00001101</li> <li>Divides by 4</li> </ul>	1	Accept 001101 / 1101. Allow any number of leading zeros.
5	(a)	(iv)	<ul><li>1 mark per bullet, max 2.</li><li>Left shift</li><li>one place</li></ul>	2	Do not accept answers that simply show the number shifted.
5	(b)	(i)	a 1100001 e 1100101	2	1 mark per row. Correct answer only. Do not allow leading zeros.
5	(b)	(ii)	<ol> <li>mark per bullet, max 2.</li> <li>Extended ASCII uses more bits // ASCII uses fewer bits</li> <li>Extended ASCII can represent more characters // ASCII can represent fewer characters</li> <li> by example (e.g. extended ASCII can represent European symbols / other languages)</li> </ol>	2	<ul> <li>Allow numbers (e.g. ASCII has 7 bits, Ex. ASCII has 8 bits) for either bullet point but these must be realistic.</li> <li>Bullet point 1 and 2 must be a comparison (e.g. "ASCII is 7 bits" is not enough on its own).</li> <li>Do not accept answers that are technically wrong (e.g. "ASCII does not contain symbols such as ?, !, #")</li> </ul>
6	(a)		Will loop infinitely     Will not loop infinitely       ✓     ✓       ✓     ✓       ✓     ✓	4	1 mark per row. More than one tick in a row = 0 marks for that row.

Question			Answer	Mark	Guidance
6	(b)		1 mark per bullet, max 3.	3	Example algorithm
			<ul> <li>FOR loop used</li> <li>That outputs the counter variable</li> <li>loops 10 time</li> </ul>		<pre>for i = 1 to 10     print i next Do not accept WHILE loop for first mark, although other marks can be accessed. No need for next If candidate manually increments counter within FOR loop, do not award bullet point 3. Accept pseudocode that suggests looping 10 times, even if this may not function correctly in a specific language.</pre>
7	(a)	(i)	<pre>1 mark per bullet, max 2.     else     print (``unknown")</pre>	2	Accept logically correct equivalents for else (e.g. elseif a!="LAN" and/or a !="WAN"). Do not allow elseif on its own Accept other keywords for print (e.g. "output") as long as the intention is clear. Accept other messages as equivalent to "uknown" (e.g. "not known " / "error")) Message to be printed must be in quotes. Allow "else then".

## Mark Scheme

Question			Answer	Mark	Guidance
7 (	(a)	(ii)	<ol> <li>mark per bullet, max 2.</li> <li>aimed at humans//understandable by humans / programmers</li> <li>English like structure / syntax</li> <li>Must be translated/compiled/interpreted (before it can be run)</li> <li>Allows programmer to deal with the problem instead of considering the underlying hardware // an abstraction from the hardware // hardware independent // portable</li> </ol>	2	<ul> <li>Allow examples of keywords (eg IF / ELSE / WHILE) as 2<sup>nd</sup> bullet point.</li> <li>Do not award marks for naming languages such as Java , Python, etc.</li> <li>Do not award marks for stating what a high level language isn't (i.e. describing what low level code is).</li> <li>Do not allow "easy to use"</li> <li>Do not allow 'has to be converted' without into what i.e machine code etc.</li> </ul>
7 (	(b)		<ol> <li>mark per bullet, max 4.</li> <li>e.g.</li> <li>Editor</li> <li>to enable program code to be entered/edited</li> <li>Error diagnostics / debugging</li> <li>to display information about errors (syntax / runtime) / location of errors</li> <li> suggest solutions</li> <li>Run-time environment</li> <li>to enable to the program to be run</li> <li> check for run time errors / test the program</li> <li>Translator / compiler / interpreter</li> <li>to enable to code to be executed / run</li> </ol>	4	One mark for identifying, one mark for describing. Accept description of a tool without (or with incorrect) naming of the tool. Allow sensible descriptions which go across pairs or name other tools sensibly (e.g. editor / highlighting syntax) Allow any sensible tool that an IDE provides (e.g. auto documentation, help tools, pretty printing etc.)
### J276/02

Question	Answer	Mark	Guidance
	<ul> <li>Breakpoints</li> <li>to stop/pause program execution at a specific point</li> <li>Watch window</li> <li>to check contents of variables</li> <li>Stepping</li> <li>to execute program line by line</li> <li>Syntax completion</li> <li>suggests/corrects code</li> <li>Keyword highlighting / colour coding keywords / pretty printing</li> <li>colours command words / variables</li> </ul>		
8	<ul> <li>1 mark per bullet, max 6.</li> <li>Initialisation of A, B and C as zero.</li> <li>Allows input (of anything) from the user</li> <li>Incrementing A, B and C depending on input</li> <li>Repeats bullet points 2 and 3</li> <li>stopping only when "END" is entered</li> <li>Prints out all 3 individual counts <u>and</u> prints calculated total count</li> </ul>	6	<pre>Example algorithm acount = 0 bcount= 0 ccount= 0 vote = "" while vote != "END" vote = input("enter A, B or C") if vote == "A" then acount = acount + 1 elseif vote == "B" then bcount = bcount + 1 elseif vote == "C" then ccount = ccount + 1 end if endwhile print acount print bcount print ccount</pre>

Quest	Question		Answer	Mark	Guidance
					Do not penalise for missing initialisation of variable used in the while loop or total (if used)
					Comparison with value inputted MUST be a string (e.g. if vote == A) is incorrect as A here is a variable, not a string.
					Answer can be any recognised algorithm – pseudocode, flowcharts, structured English, etc. Mark on whether the bullet points on the left hand side have been met. Does not have to match algorithm above.
					4 <sup>th</sup> bullet point (repeat) can be given for any sensible attempt at iteration.
					Use professional judgement on where loops end (WHILE / END WHILE or indentation).

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# **Computing (Pilot)**

General Certificate of Secondary Education

Unit A451: Computer systems and programming

# Mark Scheme for January 2011

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Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Que	estion	Expected Answer	Mark	Additional Guidance
1	(a)	<ul> <li>To carry out the processing on the computer/To (fetch and) execute instructions'</li> </ul>	[1]	"control" the computer is too vague
	(b)	<ul> <li>3MHz. Two from</li> <li>3MHz is the clock <u>speed /</u> how fast the processor is</li> <li>Indicates how many instructions may be processed in each second</li> <li>Indicates how many clock cycles per second</li> </ul>	[2]	
		Quad core         • The computer has <u>4 cores</u> •which are independent processors within the CPU .	5 [2]	
2	(a)	<ul> <li>Two from:</li> <li>To share the printer</li> <li>To share the internet connection</li> <li>To share files</li> <li>To communicate with each other eg by email</li> </ul>	[2]	
	(b)	<ul> <li>Bus "line" shown</li> <li>Terminators shown at each end of bus</li> <li>3 computers attached to bus</li> <li>Printer attached to bus or to a computer</li> <li>Internet connection connected to Router or to a computer</li> <li>Network adapters are needed on each computer</li> <li>Router needed to share the Internet connection</li> <li>Cables needed to connect the different devices</li> </ul>	[6]	Do not accept hub/switch unless there is a clear indication that there is a logical bus IN the hub/switch

Que	stion	۱	Expected Answer										Mark	Additional Guidance	
3	(a)		•	128 + 1 151	6 + 4	+2+	- 1							[2]	(accept valid alternative method)
	(b)		Mark • •	1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	or: bble co nibble s an o use th	0 0 1 orrec e cor verflo ne res	1 0 1 t with rect ow sult >	0 1 1 • carr	1 0 1 ries s /canr	1 0 1 howr	1 0 1 n e rej	present	ed in	[3]	Accept 9 bit answers
4										RC	M	RAI	1		
			Pro cur	grams a rently in u	and use ar	data e loa	whi ded	ch here	are			~			
			All pov	the conte ver is turr	ents a ned of	re Ic f.	ost w	hen	the			~			
			lt is who	s used to en it is sw	boot /itcheo	up ti d on.	he co	ompu	uter	~	/				
			1 ma	irk per co	rrect ı	ow								[3]	

Question	Expected Answer	Mark	Additional Guidance
5 (a)	Software created especially for a user/the restaurant	[1]	Do not accept "for a specific purpose" unless candidate indicates that there is a user who determines the purpose.
(b)	<ul> <li>Two from:</li> <li>Appropriate software may not exist</li> <li>Existing software may not do exactly what restaurant wants</li> <li>Existing software may not be compatible with restaurant's hardware</li> <li>Existing software may contain additional features (more complex and expensive)</li> </ul>	[2]	
(c)	<ul> <li>High Level Response(5/6): A good discussion of open source software including reference to at least of 2 of ethical, financial or quality implications, discussing both merits and limitations; There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> <li>Medium Level Response (3/4) clear understanding of open source software; at least 1 of ethical, financial or quality implications; mainly one-sided (for or against); There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> <li>Low level response (0/2): They may be an attempt to define open source software, but little or no attempt to discuss the implications, or discussion contains several factual errors; Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> </ul>		

Question	Expected Answer	Mark	Additional Guidance
	<ul> <li>Points to be made include:</li> <li>Open source – licence-free, the restaurant will make the software and its source code available for others to use/improve.</li> <li>Financial implications include: no need to pay for license, can reuse/adapt free open source software which is similar BUT loss of development costs/software will be available to competitors</li> <li>Quality implications include: large community of open source developers can see and comment on code or can be consulted/ software has to conform to certain standards to be released under public licence BUT open source code is used as is, with no guarantees,</li> <li>Ethical implications include: Open source encourages "open culture" values - free sharing, collaboration BUT restaurant is a business trying to make a profit.</li> </ul>	[6]	
6	Input device: Joystick To control the CCTV cameras to zoom/tilt/pan as they allow precise movements (in 2 axis) Keyboard To type commands into the system to perform complex control tasks Key presses can be used to control the cameras Output device: Monitor/Array of monitors Show the output of cameras Showing multiple cameras at a time		Allow follow through if a device has the correct use even if it is not identified as the correct type. (e.g. Joystick as output device) Reason has to relate has to relate to stem

Que	estion	Expected Answer	Mark	Additional Guidance
		<ul> <li>Printer</li> <li>To print hard copy images from the recordings</li> <li>eg to be used as evidence</li> </ul>		
		<ul> <li>Storage device</li> <li>hard disk drive with large capacity</li> <li>to record feed from all cameras</li> <li> simultaneously</li> <li> allows direct access to any part of the recording</li> <li>rewritable large optical drive/removable flash storage</li> <li>to save recordings (eg for a given day)</li> <li>for archiving purposes</li> </ul>		
		Other valid answers will be accepted. (1 mark for naming the device and up to 2 for explaining why needed)	[9]	
7	(a)	<ul> <li>A real world object</li> <li> about which data is stored in a database</li> <li>Corresponds to tables in the database</li> </ul>	[2]	
	(b)	<ul> <li>Primary Key: PupilNumber</li> <li>It is a <u>unique identifier</u></li> <li>Two pupils cannot have the same PupilNumber</li> <li> but they can have the same surname, firstname or ClassCode</li> <li>1 for primary key + any other 2 bullet points</li> </ul>	[3]	

Que	estion	Expected Answer	Mark	Additional Guidance
	(c)	<ul> <li>ClassCode is used here as a <u>foreign key</u></li> <li>To link CLASS and PUPIL</li> <li>Using the ClassCode, all the class details can be retrieved from the Class table</li> <li> otherwise the class details will have to be rewritten everytime/to avoid data redundancy</li> </ul>	[3]	Explanations must link the two entities. e.g. "To find out in which class a pupil is" or "to create lists of students by class" is too vague as it does not require the ClassCode in CLASS to be the same as in PUPIL.
8	(a)	<ul> <li>An error in the rules/grammar of the language</li> <li>Any suitable example</li> </ul>	[2]	"A spelling error" is acceptable as an example but not as a definition of syntax error. So e.g. "A spelling error such as ED IF instead END IF" is worth 1 mark only.
	(b)	<ul> <li>Error messages/translator diagnostics</li> <li>Produced when translating/by the compiler</li> <li> or on the fly while writing code</li> <li>Attempts to tell you what the error is</li> <li>And indicate where the error is/line numbers/underlines</li> <li>Editor</li> <li> allows you to enter the corrected code</li> </ul>	[4]	Translator includes compiler/interpreter
9		<ul> <li>High Level Response(5/6): A good understanding with detailed descriptions of the role of both software and hardware in social networking; There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> <li>Medium Level Response (3/4); some awareness shown of the impact of software and hardware in social networking, with good descriptions of one of these; There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> </ul>		

Question		Expected Answer	<u>Mark</u>	Additional Guidance
		Low level response (0/2): There may be some discussion of social networking but with little or no reference to developments in hardware or software; Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.		
		<ul> <li>Points may include:</li> <li>Hardware: Computers faster &amp; more capable of high speed Internet access – allows video and voice communication; large server farms and cheaper storage enables the infrastructure behind large social networking websites; convergence of computers with other digital technology (eg phones, television sets) allows continuity of networking over several formats.</li> <li>Software: Open standards and increased use of server side software (eg php) allow social networking sites to operate across all platforms. Open protocols allow several clients to use the same services or allow software to be written to allow different services to sync with each other; coexist. Software increasingly easier to use and easily adopted by younger generation.</li> </ul>	[6]	
10 (	(a)	<ul> <li>Each character is given a numeric code</li> <li>Including symbols, digits, upper and lower case</li> <li>This code is then stored in binary</li> <li>Each character takes 1 byte</li> <li>Text is stored as a series of bytes (1 per character)</li> <li>Some codes are reserved for control characters (eg TAB, Carriage Return)</li> </ul>	[3]	
	(b)	All the characters which are recognised/can be represented by the computer system	[1]	

### Mark Scheme

Que	estion	ו	Expected Answer	Mark	Additional Guidance
		(c)	<ul> <li>Unicode has a much larger character set</li> <li> and can represent many more characters/characters from all alphabets</li> <li>Because unicode uses 16 bits</li> <li> and ASCII uses fewer/7/8 bits</li> </ul>	[2]	
11	(a)		• 0 • 12 • 4	[3]	
	(b)		Test data :1 1 3/1 1 4/1 1 5/1 1 6/2 2 5/2 2 6Expected output:-1-2-3-4-1-2Award one mark for correct test data, and one mark for the correct corresponding outcome.	[2]	Accept dice in different order
	(c)		<ul> <li>Two from:</li> <li>A data structure/collection of several variables</li> <li>Under one name</li> <li>Each individual variable is given an index</li> <li>by which it is referred within the array</li> </ul>	[2]	
	(d)		<ul> <li>Data type: Integer</li> <li>Reason: A dice roll is always a whole number (between 1 and 6)</li> <li>Size: 3</li> <li>one element is needed for each dice</li> </ul>	[4]	Accept size of array in bits/bytes = 3 * size of an integer if this is clear in the response.

Question	Expected Answer	Mark	Additional Guidance
(e)	Example BEGIN RollTheDice i = 1 WHILE i <= 3 DiceRoll(i) = Random No END WHILE END Award marks for: Using a loop i (or equivalent) initialised correctly correct end condition for loop/loops the required number of times Correct use of i (or equivalent) in DiceRoll(i)	[4]	
	Total	[80]	

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# Computing

General Certificate of Secondary Education

Unit A451: Computer systems and programming

# Mark Scheme for January 2012

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### Annotations

Used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
٨	Omission mark
BOD	Benefit of doubt
С	Subordinate clause/Consequential error
Cross	Cross
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
Р	Point being made
REP	Repeat
/	Slash
Tick	Tick
TV	Too vague
ZERO	Zero (big)

C	Questic	on	Answer		Guidance
1	(a)		<ul> <li>A 1-page text document: Kilobyte(s)</li> <li>A 10-min movie clip: Megabyte(s)</li> <li>A person's surname: Byte(s)</li> </ul>	3	Allow abbreviations
	(b)		<ul> <li>Multiply by 1024/1000</li> <li>2048/2000 (GB)</li> </ul>	2	
2	(a)		<ul> <li>Eg</li> <li>Allows more than one program to run (apparently) at the same time</li> <li> by sharing processor time / resources between the programs</li> <li>Enables the user to be more productive</li> <li> Good example of a situation where multitasking is required (eg cut from browser and paste in word processor)</li> <li>(1 mark for valid point &amp; 1 for expansion)</li> </ul>	2	
	(b)		<ul> <li>e.g.:</li> <li>Providing a user interface</li> <li>Providing a platform for applications</li> <li>Memory management</li> <li>File/disk management</li> <li>Peripheral management / providing a platform for hardware</li> </ul>	2	
3	(a)	(i)	<ul> <li>A <u>name/symbol</u> which represents a value in a program</li> <li> points to a memory location</li> <li> and the value be changed (while the program is running)</li> </ul>	2	

Q	uesti	ion	Answer		Guidance
		(ii)	<ul> <li>ORIGIN</li> <li>Data type: String</li> <li>Reason: Consists of characters</li> <li>Size</li> <li>Data type: Integer</li> <li>Reason: Consists of <u>whole</u> numbers</li> </ul>	4	Accept equivalent data types (for string: text, char, alphanumeric etc, for integer: byte, long, int etc but not number) Do not award a correct reason referring to a wrong data type e.g. Because you can't have half sizes, it must be real.
	(b)		<ul> <li>Dress A: 14</li> <li>Dress B: 10</li> <li>Dress C: 12</li> </ul>	3	
4	(a)		TRUEFALSEThe internet is the same as the World-Wide Web✓The internet is a Local Area Network✓The internet is a network between many networks✓One mark per correct row✓	3	

Question	Answer	Marks		Guidance
			Content	Levels of response
(b)	<ul> <li>Points to be made include:</li> <li>How DNS servers are used: <ul> <li>DNS servers have a database of IP addresses</li> <li>Constantly updated by other DNS servers</li> <li>When you request an address(URL), the DNS server looks up the URL and returns the IP address, or searches for the address from other DNS servers</li> </ul> </li> <li>Advantages</li> <li>People do not need to remember IP addresses</li> <li>Easily upgradable (eg IPv4 toIPv6) without all web addresses needing to be the same</li> <li>As long as you are connected to a DNS server you can have access to all the addresses</li> </ul>	6	Content	<ul> <li>High Level Response (5-6): A detailed description of how DNS servers are used, and an explanation of the main advantages. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> <li>Medium Level Response (3-4): A limited description of how DNS servers are used and either one advantage explained or two advantages identified. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> <li>Low Level Response (0-2): There may be an attempt to describe how DNS servers are used but the description is incomplete and/or contains factual errors. An advantage may be identified. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> </ul>

A451

### Mark Scheme

Q	uesti	ion	Answer		Guidance
5	(a)		Must be Need not be	5	
			included included		
			The names of the people in ✓ the picture		
			The width of the picture in <ul> <li>pixels</li> </ul>		
			The number of bits used for <ul> <li>each pixel</li> </ul>		
			The number of people in the view view view view view view view vie		
			The colour of each pixel		
			1 mark per correct row		
	(b)	(i)	The concentration of pixels	1	Not just the number of pixels or picture quality
		(ii)	<ul> <li>(The higher the resolution) more pixels are required for the picture</li> <li> which will increase the size of the bitmap file. (Accept lower resolution → fewer pixels, smaller size)</li> </ul>	2	
6	(a)	(i)	eg • Existence check • Male / Female (or similar) allowed • And no other entry possible	2	
		(ii)	eg <ul> <li>Range check</li> <li>Must be a (real) number</li> <li>Must be positive</li> </ul>	2	

### Mark Scheme

Question	Answer	Marks	Guidance
(b)	<ul> <li>It is used as foreign key (in this table)</li> <li> the primary key <u>of the DOG table</u></li> <li>to link the two tables</li> <li>allows us to find the details of the Dog to which each job relates / do not need to re-enter dog details for each job</li> </ul>	3	Not simply "to identify dog but if they refer to the JOB table, i.e. "to identify the dog that a job refers to" then this is the same as the 4 <sup>th</sup> bullet
(c)	• 36, 37, 39 (correct answer only)	1	
(d)	<ul> <li>There is a date</li> <li>There is a title</li> <li>Jobs are grouped/sorted appropriately (eg by dog, time or job type)</li> <li>Each job includes the Dog Name</li> <li>Each job includes the Dog ID</li> <li>Each Job includes the Job type</li> <li>Each job includes details</li> </ul>	6	
7 (a)	<ul> <li>The following are just examples. Give max 2 marks per technology either 1 mark for naming the technology and 1 for expansion, or 2 marks for explaining in detail without naming.</li> <li>For example: <ul> <li>Swipe card / Smart card technology / RFID cards</li> <li> can allow pupils to register themselves</li> <li> can allow pupils to be located</li> </ul> </li> <li>Electronic registers/ centralised attendance database <ul> <li> immediately updated</li> <li> can send messages (eg via email / SMS to parents) to inform of absence</li> </ul> </li> </ul>	4	

C	Questi	on	Answer	Marks	Guidance
			<ul> <li>Virtual learning environment</li> <li> homework set is recorded online</li> <li> whether homework is completed is recorded on line</li> <li> parents can be given access to this information</li> </ul>		
	(b)	(i)	<ul> <li>eg:</li> <li>Available now / the school will not have to wait</li> <li>Recommendations available / can see it working in other schools</li> <li>Tried and tested / less likely to contain bugs (given how critical the application is)</li> <li>Costs less than custom-written / as the school does not pay for the full cost of development.</li> <li>More (third party) support / documentation</li> </ul>	2	
		(ii)	<ul> <li>eg:</li> <li>May contain features which the school does not need</li> <li>May not contain features which the school needs</li> <li>May not be compatible with school's hardware</li> <li>May not be compatible with school's processes</li> <li>Developer not available to make adjustments necessary</li> </ul>	2	

Question	Answer	Marks	Guidance
(C)	<ul> <li>Points may include:</li> <li>The school should take reasonable steps to ensure that only authorised people can access pupils' personal data</li> <li> ensure school network is safe from hackers eg strong passwords/firewalls</li> <li> expressly seek permission from the pupil to pass data to third parties (eg when providing references)</li> <li>Any images in which students can be identified cannot be used without students'/parents' permission</li> <li> to comply with child protection legislation</li> <li>accept answers about any relevant areas of legislation (eg data protection, freedom of information, child protection, copyright and licensing etc)</li> </ul>	6	<ul> <li>High Level Response (5-6): A detailed explanation of different measures the school will take to address legal issues, clearly identifying the issues. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> <li>Medium Level Response (3-4) A limited explanation of some measures the school will take with some reference to legal issues. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> <li>Low Level Response (0-2): They may be an attempt to state some measures or identify some legal issues. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> </ul>

### Mark Scheme

Q	uesti	on	Answer	Marks	Guidance
8	(a)		<ul> <li>Stores parts of the operating system <u>currently used</u> by the computer</li> <li>Stores programs that <u>are currently running</u></li> <li>Stores data that are currently used by the computer</li> </ul>	2	
	(b)	(i)	<ul> <li>A section of the hard disk is used</li> <li> to store items in RAM which are not being currently used</li> </ul>	2	
		(ii)	Used to allow more programs / data to be loaded when the RAM is insufficient	1	
		(iii)	<ul> <li>The computer will be able to multitask more programs</li> <li> as there is more memory for programs/data to be loaded into.</li> <li>Programs will run faster</li> <li> due to less use of virtual memory.</li> </ul>	2	
9	(a)		<ul> <li>Coins(4) = 50</li> <li>Coins(10) = 0</li> <li>(correct answers only)</li> </ul>	2	
	(b)	(i)	• The program is written to do something other than what the programmer intended	1	
		(ii)	<ul> <li>It will only reset the first 9 elements / will not reset the 10<sup>th</sup> element</li> <li>After setting Coins(9) = 0, i will become10</li> <li> and the loop will stop</li> <li>It should be UNTIL i &gt; 10 / or other working correction</li> </ul>	2	

	_		
Question	Answer	Marks	Guidance
(c)	<pre>Example: i = 1 total = 0 REPEAT total = total + Coins(i) i = i + 1 UNTIL i&gt;10 or Coins(i)=0 OR: total = 0 FOR i = 1 to 10 total = total + Coins(i) NEXT i Award marks for: Initialising the total (Using a loop which) correctly starts from element 1  to element 10 / to the first 0 element  each element is correctly added to the total  the iterator i (or equivalent) is correctly updated in the loop.</pre>	5	Note that the FOR loop meets the requirements of bullets 2,3 and 5. If a candidate makes a sequence of 10 assignments they can get maximum of 4 marks (for bullets 1,2,3,4).

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# Computing

General Certificate of Secondary Education

Unit A451: Computer systems and programming

# Mark Scheme for January 2013

#### Mark Scheme

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It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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### Annotations

Annotation	Meaning
	Omission mark
1111	Benefit of the doubt
	Subordinate clause / consequential error
×	Incorrect point
	Expansion of a point
	Follow through
HAG	Not answered question
	No benefit of doubt given
	Point being made
1142	Repeat
1	Slash / half-mark
<b>~</b>	Correct point
17	Too vague
0	Zero (big)

G	luestion	Answer										Mark	Guidance
1	(a)	Corre	ect ans	wer:								2	
				1	1	0	1	1	0	0	0		
			+	0	1	1	0	0	0	0	0		
			(1)	0	0	1	1	1	0	0	0		
		Awar • •	d <i>mark</i> 1 1 1 0 0 0 foi	ts for 0 0 0 r bits	: for b 7 an	its 5 d 6.	to 0						
	(b)	•	there i one by	is an ⁄te.	over	flow/a	a carı	y left	t ovei	r aftei	r the	ot fit into 1	
2		•	html: o jpg: in mp3: s pdf: do	define nage: soun ocum	e con s/pho d/auc nents	ntent/ otos dio/m	layou usic f	t of v iles	veb p	ages	/links	4	Do not accept "text files" for pdf – candidates must indicate that there is some additional formatting / layout if they use "text" "Media files" is too vague for jpg or mp3

Quest	Question				Inswer	Marks	Guidance
3 (a)		• 1 • 0 (r	espectiv	vely)		2	
(b)		Correct           p           0           1           0           1           0           1           0           0           1           0           1           0           1	q 0 0 1 1 <i>marks fc</i> Correct m Output of	<ul> <li>(NOT p) AND q</li> <li>0</li> <li>0</li> <li>1</li> <li>0</li> <li>1 for 0 1</li> <li>0 for 1 1.</li> </ul>	0 1, 1 1 or 1 1, 0 1)	3	

-----

Question			Answer	Marks	Guidance	
4	(a)		•	To store the files/eg operating system Even when the system is switched off/which must be non-volatile.	2	

Question	Answer	Marks	Guidance				
			Content	Levels of response			
(b)	<ul> <li>Points may include:</li> <li>Magnetic: <ul> <li>Tend to be large capacity, relatively cheap</li> <li>Sensitive to movement of system due to moving parts</li> <li>Used as main storage for computers, eg to store OS.</li> </ul> </li> <li>Solid state <ul> <li>Relatively expensive so tend to be of smaller capacity</li> <li>No moving parts so not sensitive to movement</li> <li>Used when portability is important transferring files, USB keys or as m ain storage for PDAs, mobile computers</li> <li> as a result, portable magnetic formats (eg floppy disks) are no longer used in favour of solid state storage.</li> </ul> </li> </ul>	6	Examples may have been used to clarify points but are not required for the levels.	<ul> <li>High Level Response (5–6 marks) <ul> <li>A detailed description of characteristics of both solid state and magnetic devices. Examples, if used, will be appropriate. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> </ul> </li> <li>Medium Level Response (3–4 marks) <ul> <li>A limited description of characteristic(s) of a solid state and/or magnetic devices. Examples, if used, are weak and do not follow from the points being made. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> </ul> </li> <li>Low level Response (1–2 marks) <ul> <li>An attempt to describe the characteristic(s) of magnetic or storage. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> </ul> </li> <li>No response or response not worthy of credit (0 marks)</li> </ul>			

Question	Answer	Marks	Guidance
5 (a)	<ul> <li>eg</li> <li>Can share files/can work collaboratively on same files</li> <li>Can share hardware resources/suitable example</li> <li>Can access their files from any computer/classroom</li> <li>Can work together from different computers using instant messaging</li> <li>Centralised deployment of software to all computers</li> </ul>	2	
(b)	<ul> <li>eg</li> <li>Passwords protected user accounts</li> <li> to ensure that only authorised people can access the network.</li> <li>Network policy restrictions eg students only allowed to log in during school hours, from certain computers</li> <li> ensures that attempts to enter in the system are likely to be genuine.</li> <li>Different levels of access/each user can only access the files they need</li> <li> prevents accidental damage to files.</li> <li>Firewall</li> <li> to prevent unauthorised access /hacking into the network.</li> </ul> Marks in pairs. Award one mark for a correctly identified measure and another mark for an appropriate expansion <u>explaining</u> how this measure improves security	4	Filtering / censoring is not answering the question (unless candidates explain that web sites known to pose a security threat – e.g. because they are known to distribute viruses – are filtered)

Question		on	Answer	Marks	Guidance
6	(a)	(i)	<ul> <li>The height/amplitude of the sound wave is measured</li> <li> at regular intervals</li> <li> and converted to binary.</li> </ul>		Remember to transfer marks between (i) and (ii) if necessary many candidates may make this point in their answer to part (ii)
		(ii)	<ul> <li>If the interval is smaller/if you sample more often you have more data to store</li> <li> so larger file</li> <li>but the sound reproduced is closer to the original</li> <li>so better quality.</li> </ul>	3	Accept the converse ie if you sample less often you have a smaller file etc as long as the explanation is correct
Question	Answer	Marks		Guidance	
----------	---	-------	---------	--	
			Content	Levels of response	
7	<ul> <li>Points may include:</li> <li>Advantages</li> <li>Computer system is more systematic than human will not forget some patients/give consistent results</li> <li>Software can be deployed in several departments</li> <li>Easier to analyse records and measure the performance of the hospital.</li> </ul>			<ul> <li>High Level Response (5–6 marks)         <ul> <li>A good understanding with detailed descriptions of both advantages and the need for reliability. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> </ul> </li> <li>Medium Level Response (3–4 marks)         <ul> <li>A description of some advantages of the system and the need for reliability but one may be limited. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> </ul> </li> </ul>	
	<ul> <li>Reliability</li> <li>Critical application, lives may be at stake if there are errors in the program</li> <li>Loss of data/loss of power or any system down time can have adverse effects.</li> </ul>			Low Level Response (1–2 marks) There may be an attempt to describe the advantages or the need for reliability but this is vague and some of the statements made are inaccurate. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.	

A451

Q	uesti	on		٩	Inswer	Marks	Guidance
8	(a)		eg Circuit o elect resul	only needs to check for ricity flowing or not flow ting in more reliable cir	r two states/uses switches wing/on or off/1 and 0 rcuits.	2	
	(b)	(i)	<ul> <li>Each ch</li> <li>Each le</li> <li>number</li> </ul>	racter is assigned a <u>unique</u> character code er is converted to its character code (which is a binary		1	
		(ii)	• 0100 00	011 0100 0001 0100 0	00 0010.		Correct answer only but spaces don't matter
		(iii)	<ul> <li>ASCII u</li> <li> and s</li> <li>many</li> <li>(eg Unio</li> <li>ASCII d</li> </ul>	ses 8 bits so can only represent 2 more characters are no code 16bits). loes contain characters	8 bits an only represent 255/256 distinct characters e characters are needed for coping with all languages e 16bits). contain characters used in some languages		Accept answers referring to 7 bits are equally valid
9	(a)		<ul> <li>The erre</li> <li>But it do program</li> <li>A reaso</li> </ul>	e error does not prevent program running t it does not produce the expected output/it does not do what the ogrammer intended. reasonable example		2	
	(b)		Correct answ	Expected outcome	Reason for test checks the output is the next three	6	Only award the mark for Reason for test, if the Expected outcome is correct enough to justify the reason given
			A	BCD	letters in the list checks the output goes back to the beginning of the list		
			Н	Error message	Not a valid/existing note		
			1 mark per bo	)X	•		

Q	uestion		Answ	ver		Marks	Guidance
10	(a)	<ul> <li>eg</li> <li>Provides interfaces between user and computer/Determines look and feel of the computer</li> <li>Provides a platform for software to run</li> <li>Manages peripherals used by the system</li> <li>Manages memory.</li> </ul>		2			
	(b)	Utility	Used for security	Used for disk organisation		4	
		Antivirus	✓				
		Defragmenter		$\checkmark$			
		File transfer		✓			
		Firewall	✓				
	(c)	<ul> <li>The source</li> <li>The custom</li> <li>The custom licence/rest</li> </ul>	code is distributed with er can modify the sourcer er can redistribute the rictions)	n the software ce code source code (with th	ne same	2	

G	uestio	Answer	Marks	Guidance	
11	(a)	<ul> <li>A persistent</li> <li> and structured/organised store of data</li> <li>Allows data to be queried/interrogated.</li> </ul>	2	Candidates will typically describe the properties of persistence and organisation in their own words.	
	(b)	eg Email address • Must contain an @ sign • Must contain a full stop (after the @ sign). Gender • Must be one of Male, Female, (Other). Password • Must have a given minimum length • Must contain a non-letter.	3	Accept any suitable validation for the field given. Do not accept checking that the email address is genuine/real, but accept checking that the email address does not belong to another registered member Do not accept a length check for gender Do not accept entering the password twice	
	(c)	<ul> <li>Avoids data repetition/redundancy/inconsistency</li> <li> with the personal details of the user</li> <li> a user can have more than one picture/one to many</li> <li>The primary key of the USER is stored in the PICTURE table</li> <li>Where it is a foreign key.</li> </ul>	4		

Q	uesti	on	Answer	Marks	Guidance
12	(a)		<ul> <li>eg</li> <li>Editor</li> <li>Allows Jim to enter the program code</li> <li>Colour coding keywords</li> <li>Auto-completes code as you type.</li> <li>Compiler</li> <li>Transforms the written source code into machine code.</li> <li>Debugging tools</li> <li>Highlights errors in the code</li> <li>Suggests possible solutions.</li> <li>(2 marks per tool)</li> </ul>	4	Do not accept me spell check
	(b)		<ul> <li>50</li> <li>250.</li> </ul>	2	

Question	Answer	Marks	Guidance
(c)	eg INPUT TeddyBears INPUT Hours PerTeddyBear = 2 * TeddyBears PerHour = 5 * Hours IF PerTeddyBear > PerHour THEN OUTPUT PerTeddyBear ELSE OUTPUT PerHour END IF Award marks for: Inputting teddybears and hours 2 * number of teddy bears 5 * hours Comparing the two answers Outputting the piece rate if it is greater Outputting the hour rate if it is greater.	6	If correctly calculated but not output give benefit of doubt once

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# **Computing (Pilot)**

General Certificate of Secondary Education

Unit A451: Computer systems and programming

### Mark Scheme for June 2011

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Question	Expected Answer	Mark	Rationale/Additional Guidance
1 (a)	<ul> <li>Storage: device used to store data (in binary format for processing later)</li> <li>Input: device used to enter data into the computer</li> <li>Output: device used to present information/the result of processing to the user</li> </ul>	[3]	
(b)	<ul> <li>Handheld device</li> <li>Solid state</li> <li>Quick access (for instant on)/not sensitive to being moved around while used</li> <li>Main file server</li> <li>Magnetic</li> <li>Very Large capacity/relatively cheap</li> <li>School production</li> <li>Optical</li> <li>Cheap/Portable/Universally readable by a most computers and dedicated video disc players</li> </ul>	[6]	Mark second column only if second row is correct

A451	Mark Schem	e	June 201
(c)	High Level Response (5/6): A good understanding with detailed descriptions of a range of relevant input as well as output devices; The information will be presented in a structured and coherent form. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.		
	Medium Level Response (3/4); awareness of relevant input and output devices with either a range with descriptions although these may be weak for some devices; The information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.		
	Low level response (0/2): Some relevant devices may be listed with few if any descriptions; Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.		
	<ul> <li>Points may include: Input devices:</li> <li>Puff-suck switch: allows mobility impaired users to control eg clicking a mouse, by sucking or blowing through a tube</li> <li>Simplified/concept keyboards eg for Braille, or larger keys</li> <li>Eye tracking input – Camera is used to follow the users eye movements and use these to control eg movement of mouse on screen.</li> <li>Output device:</li> <li>Braille printer – print documents on paper in braille as raised bumps. Some braillers have plastic bumps which can be raised or lowered by software, so output does not have to be on paper.</li> <li>Text to speech</li> </ul>		
	Screen magnifiers	[6]	

2

### A 4 E 4

<ul> <li>A Database Management System/I the database</li> <li>May use SQL/allows database to b</li> <li>Provides facilities for creating table data/viewing data/reporting</li> <li>Allows data structure to be indeper program</li> <li>Allows relationships to be created to tables/Maintains integrity</li> <li>Provides security features/levels of</li> <li>(b)</li> <li>Form:         <ul> <li>An <u>input</u> screen</li> <li>Allowing chosen data items to be dedited</li> <li>Uses texboxes/drop down lists/che</li> <li>When edited, the changes are updatatabase</li> <li>Suitable example from shop eg ent Report:</li> <li>An <u>output</u> of the data in a database</li> <li>An apshot of the data at a given ti</li> </ul> </li> </ul>	Mark Rationale/Additional Guidance
<ul> <li>(b)</li> <li>Form:         <ul> <li>An <u>input</u> screen</li> <li>Allowing chosen data items to be d edited</li> <li>Uses texboxes/drop down lists/che</li> <li>When edited, the changes are upda database</li> <li>Suitable example from shop eg ent Report:                 <ul> <li>An <u>output</u> of the data in a database</li> <li>An <u>output</u> of the data at a given ti</li> </ul> </li> </ul> </li> </ul>	Jsed to manage     Accept other relevant points.       e queried     s/inserting       dent of the     access
<ul> <li>Of specified fields/Laid out in a spe</li> <li>Aggregates may be calculated and</li> <li>Suitable example from shop eg we</li> <li>Up to 2 marks for description and 1 mark</li> </ul>	splayed and kboxes etc ited in the er new products me/when printed cified format displayed ekly sales for example

A451		Mark Schem	е	June	e 2011
(C)	(i)	<ul> <li>Supplier = Killey's.</li> <li>Answer: 0003, 0006</li> <li>award 1 mark if both answers present and no others</li> <li>Price &gt; £1.00 OR Supplier = Hill Farm</li> <li>Answer: 0001, 0002, 0004, 0008</li> <li>Award 1 mark if 0001, 0002, 0004 are all in answer</li> <li>Award 1 mark if 0002 and 0008 are in answer</li> <li>Award 1 mark if 0002 is not repeated and there are no extra answers</li> </ul>	[4]	Accept eg 3, 6 or product names, or any other response where the records selected is clear.	
		<ul> <li>Discontinued = False</li> <li>AND</li> <li>Quantity Left &lt; Reorder Level</li> </ul>	[3]	Accept algebraically equivalent forms	

Qu	estion	ו	Expected Answer		Mark	Rationale/Additional Guidance
3	(a)	(i)	<ul> <li>HyperText Mark-up Language</li> <li>Text file containing the text to be</li> <li> uses tags which indicate how to</li> <li> location of pictures/other elem</li> <li> and hyperlinks to other location</li> </ul>	displayed to display it ents to include ns/URLS	[2]	Accept other valid answers
		(ii)	<ul> <li>Web browser used to interpret th data correctly</li> <li>Because it is an open/accepted s</li> <li> data will display correctly on al</li> <li> which conform to the standard</li> </ul>	e file and display the standard Il browsers	[2]	
	(b)		FileA high resolution image of the band to use as your desktop background.Sheet music of their songs ready to be printed in the correct format for guitar players.A short video extract from their latest concert tour.A compressed collection of 200 plain text files containing the lyrics of all their songs.An audio recording of a song from their future album.	File FormatJPGPDFMPEGZIPMP3	[5]	
			(1 mark per row)		[5]	

A451 (C) (i) • • • • • •		Mark Schem		June 201	
		<ul> <li>It reduces the size of the file which needs to be transmitted</li> <li>Shortens download time</li> <li>Reduces Internet traffic (and hence probability of lost packets)</li> <li>Allows multimedia files to be streamed</li> </ul>			
	(ii)	<ul> <li>In lossy compression, when the data is uncompressed it is not exactly the same as the original</li> <li>But the difference is so small that it cannot normally be noticed</li> <li>Eg music files(mp3), large resolution images for displaying on small screens.</li> <li>In lossless compression, when the data is uncompressed it is restored completely to the original file</li> <li>Eg compressed text files.</li> <li>(1 mark per bullet, but maximum of 3 if no examples given).</li> </ul>	[4]	Accept any valid examples	

### Mark Scheme

Que	estior	า	Expected Answer		Rationale/Additional Guidance
4	(a)	(i)	A       B       P         0       0       0         0       1       1         1       0       0         1       1       0         1       mark per correct row	[3]	
		(ii)	<ul> <li>A B input into an AND gate</li> <li>Result from AND gate put through a NOT gate (to give P)</li> </ul>	[2]	Accept use of NAND gate for 2 marks Award 1 mark for diagram of (NOT A) AND (NOT B)
5	а		<ul> <li>Antivirus</li> <li>Scans the computer <u>periodically</u></li> <li>To check if any software has been installed which contains code that may harm the computer</li> <li>Removes/quarantines these programs / notifies the user</li> <li>Prevents these programs from being installed</li> <li>Protects the computer by preventing important files (eg the boot sector or operating system) from being changed</li> </ul>	[2]	
	b		<ul> <li>Disk defragmenter</li> <li>Moves (parts of) of files around so that all parts of a file are stored together (allowing files to be accessed more quickly)</li> <li>Free space is collected together (allowing large files to be saved easily)</li> </ul>	[2]	

Que	estior	า	Expected Answer		Rationale/Additional Guidance
6	(a)		<ul> <li>6 * 16 (= 96) / 10 (for A)</li> <li>106</li> </ul>	[2]	
	(b)		0110 1010 (1 mark per nibble)	[2]	
	(c)		3D (1 mark per digit)	[2]	Award 1 mark if candidate makes a sensible attempt to convert to denary and then hex but makes an arithmetic error in the process.
	(d)		<ul> <li>Hex numbers are shorter/more memorable than equivalent binary numbers</li> <li> and can easily be converted to and from binary</li> <li> as each hex digit corresponds to 4 binary digits (accept diagram)</li> </ul>	[2]	Do not accept "uses less memory" and similar as being the same as "shorter"
7	(a)	(i)	<ul> <li>Constant: Pi</li> <li>Variables: WheelSize, Circumference</li> </ul>	[2]	
		(ii)	<ul> <li>The value of a constant is set when the constant is declared</li> <li>The value of a variable is set while the program is running</li> <li>The value of a constant cannot be changed once the program is running/can only be set at design time</li> <li>A variable has no value at design time</li> <li>Marks in pairs</li> <li>An integer is a whole number</li> <li>A real number can include decimal fractions</li> </ul>	[2]	
			A real number can include decimal fractions	[2]	

Expected Answer	Mark	Rationale/Additional Guidance
High Level Response (5/6): A good understanding with detailed descriptions of the measures and policies, explaining how they help privacy and security; The information will be presented in a structured and coherent form. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.		
Medium Level Response (3/4); some appropriate measures and policies with weak descriptions; The information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.		
Low level response (0/2): There may be some measures and policies mentioned but descriptions are incomplete or may contain inaccuracies; Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.		
<ul> <li>Points may include:</li> <li>Physical security measures – computers/servers in locked rooms, lock down cables for laptops</li> <li>Firewalls – allow only authorised access to the network / only authorised users/programs to share data out of the network</li> <li>User groups/access levels – different users are given rights to different data according their responsibility/need to protect privacy</li> <li>Passwords enforced. Should be strong and changed regularly. Ensures privacy and protects files being accessed by malicious hackers</li> <li>Encryption of data on network</li> <li>WiFi access security if they use WiFi</li> <li>Get employees to sign an acceptable use policy as part</li> </ul>		
I Holf Fit Taken I Holt 9 1	<ul> <li>Expected Answer <ul> <li>High Level Response (5/6): A good understanding with detailed descriptions of the measures and policies, explaining now they help privacy and security; The information will be presented in a structured and coherent form. There will be few, f any, errors in spelling, grammar and punctuation. Technical erms will be used appropriately and correctly.</li> <li>Wedium Level Response (3/4); some appropriate measures and policies with weak descriptions; The information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> <li>Low level response (0/2): There may be some measures and policies mentioned but descriptions are incomplete or may contain inaccuracies; Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> <li>Points may include: <ul> <li>Physical security measures – computers/servers in locked rooms, lock down cables for laptops</li> <li>Firewalls – allow only authorised access to the network / only authorised users/programs to share data out of the network</li> </ul> </li> <li>User groups/access levels – different users are given rights to different data according their responsibility/need to protect privacy</li> <li>Passwords enforced. Should be strong and changed regularly. Ensures privacy and protects files being accessed by malicious hackers</li> <li>Encryption of data on network</li> <li>WiFi access security if they use WiFi</li> </ul> </li> </ul>	Expected Answer         Mark           High Level Response (5/6): A good understanding with detailed descriptions of the measures and policies, explaining now they help privacy and security; The information will be presented in a structured and coherent form. There will be few, f any, errors in spelling, grammar and punctuation. Technical erms will be used appropriately and correctly.           Wedium Level Response (3/4); some appropriate measures and policies with weak descriptions; The information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.           Low level response (0/2): There may be some measures and policies mentioned but descriptions are incomplete or may contain inaccuracies; Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.           Points may include:         •           •         Physical security measures – computers/servers in locked rooms, lock down cables for laptops           •         Firewalls – allow only authorised access to the network / only authorised users/programs to share data out of the network           •         User groups/access levels – different users are given rights to different data according their responsibility/need to protect privacy           •         Passwords enforced. Should be strong and changed regularly. Ensures privacy and protects files being accessed by malicious hackers           •         Encryption of data on network           •         WiFi access security if they use WiFi

Question	Expected Answer	Mark	Rationale/Additional Guidance
	data at risk of corruption/abide by data protection legislation/do not give the data to third parties etc.	[6]	
9	Example: BEGIN Input RealAge IF RealAge <= 2 DogYears = RealAge * 12 ELSE ExtraYears = RealAge - 2 DogYears = 24 + ExtraYears * 6 END IF END Award marks for an algorithm which: Allows real age to be input If age <=2, multiply real age by 12 If age >2 Works out extra years (real age - 2) multiply by 6 adds 24 (for the first 2 years)	[5]	
	Total	[80]	

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# GCSE

### Computing

General Certificate of Secondary Education

Unit A451: Computer systems and programming

## Mark Scheme for June 2012

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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.

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

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Annotation	Meaning
^	Omission mark
BOD	Benefit of doubt
С	Subordinate clause/Consequential error
Cross	Cross
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
P	Point being made
REP	Repeat
/	Slash
Tick	Tick
TV	Too vague
ZERO	Zero (big)

C	Question		Answer			Marks	Guidance
1	(a)		Screen USB Port Speaker (1 mark per row)	is an output device ✓	is <b>not</b> an output device ✓	3	
	(b)		<ul> <li>e.g</li> <li>Touch screen</li> <li> respond to fingers</li> <li> for example a soft</li> <li> eg converts hands</li> <li>Hardware buttons</li> <li> a small number and</li> <li> for most common</li> <li> eg bring up menu etc</li> <li>Microphone</li> <li> captures user's s known patterns for condition</li> <li> can be made to les</li> <li>Camera</li> <li> used to capture us games</li> <li> used to capture te</li> </ul>	s / stylus on spe ware keyboard writing to text round the edge commands / next / previou peech and anal ommands hition for typing earn new commands ser's image / fo ser's movement xt for processin	ecified icons of the tablet is / play / pause lyses it to match documents ands / macros or webcam ar webcam and s input to	4	Not Keyboard or onscreen keyboard Not mouse (but accept an in-built pointer device e.g. touchpad)

Question		Answer		Guidance
		<ul> <li>Accelerometer / tilt sensor</li> <li> used to determine the position in which the tablet is held</li> <li>to change screen orientation automatically (eg movie image)</li> <li> used as in input to games</li> <li>(1 mark for identifying device and 1 mark for use)</li> </ul>		
2	(a)	• Bus	1	
	(b)	Router / Modem / ADSL adapter	1	
	(c)	<ul> <li>e.g.</li> <li>Controls access to the network / verify passwords entered on any computer</li> <li>Provides files to the other computers on the network</li> <li>Installs software on workstations</li> <li>Make the printer accessible to the other computers</li> <li>Controls the access of computers to the Internet/to each other</li> <li>Stores, delivers and sends emails for all users on the network</li> </ul>	3	Accept short descriptions eg domain controller, file server etc. Do not accept simply "manages or monitors or controls printer/Internet/devices…". The candidate should clearly be referring to users/workstations accessing these.
	(d)	<ul> <li>All computers have equal status/no server controlling</li> <li>To share data/files/devices between each other</li> </ul>	2	
3		1 1 1 1	4	

Question		Answer				Marks	Guidance
4		AVI BMP JPG MP3 (one mark p	image file ✓ ✓ v ver row)	sound file	video file ✓	4	
5		<ul> <li>System cleanup         <ul> <li>(Searches for and) deletes files/programs which are no longer used</li> <li> eg deletes temporary files / installation files</li> <li> deletes settings / registry values which are no longer used</li> </ul> </li> <li>Automatic update         <ul> <li>Checks on the (software manufacturer's site on the) Internet for newer versions of programs which are installed</li> <li>If found it download / installs the software</li> </ul> </li> </ul>			grams which are llation files which are no rer's site on the) ams which are ftware	4	
6	(a)	0011 0111 (1 mark per	nibble)			2	
	(b)	37 (1 mark per	digit)			2	Allow ft from (a)

Q	uestion	Answer		Guidance	
7	(a)	<ul> <li>Fetches <u>instructions</u> (from memory)</li> <li>Fetches <u>data</u> (from memory)</li> <li>Decodes <u>instructions</u></li> <li>Executes <u>instructions</u></li> </ul>	2		
	(b)	<ul> <li>Clock Speed:</li> <li>The higher the clock speed the faster the CPU will run</li> <li>Represents the number of fetch execute cycles / instructions the CPU can process in a given time Cache size</li> <li>the more cache the CPU has the less time is spent accessing memory / programs run faster</li> <li>cache is faster than memory/ built into the CPU/contains frequently accessed data</li> <li>(max 2 each)</li> </ul>	4		
8	(a)	<ul> <li>Username: 2012johnsonm</li> <li>year 2012, surname: Johnson, initial m</li> <li>As there are no other johnsons (so the answer to the decision will be NO)</li> </ul>	3	Username must be spelt correctly, but accept 12johnsonm	
	(b)	<ul> <li>The pupil joined in 2010</li> <li>The pupil's surname is Ali</li> <li>The pupil's initial is M</li> <li>There were (at least) 3 other pupils called M. Ali <u>in</u> <u>the same year</u></li> </ul>	4		
9	(a)	Database management system	1		

Question	Answer	Marks	Guidance
			Content Levels of response
(b)	<ul> <li>Points may include:</li> <li>Features <ul> <li>Provides a set of tools for accessing/maintaining the database, eg to define/create tables, run queries or define reports</li> <li>The application is independent from the data base itself</li> <li>Provides data integrity control (eg integrity checks, validation checks)</li> <li>Controls access to data, including security and multiple user access</li> </ul> </li> <li>Why desirable <ul> <li>These can be set up before hand by expert and used by end user</li> <li>Separating application and database means the database can be accessed separately by other means eg a desktop application and web application accessing the same data / other suitable example</li> </ul> </li> <li>Data is protected from corruption eg by multiple access</li> </ul>	6	High Level Response (5-6)A good understanding with detailed descriptions of the role of both the features of a DBMS and an explanation of its desirability. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.Medium Level Response (3-4) A description of the features of a DBMS and an explanation of its desirability, but one may be limited. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.Low Level Response (0-2) There may be an attempt to describe the features of a DBMS and/or its benefits but this is vague and some of the statements made are inaccurate. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.
	<ul> <li>The application is independent from the data base itself</li> <li>Provides data integrity control (eg integrity checks, validation checks)</li> <li>Controls access to data, including security and multiple user access</li> <li>Why desirable</li> <li>These can be set up before hand by expert and used by end user</li> <li>Separating application and database means the database can be accessed separately by other means eg a desktop application and web application accessing the same data / other suitable example</li> <li>Data is protected from corruption eg by multiple access</li> </ul>		<ul> <li>grammal and pullicitation. Fectors will be used appropriately correctly.</li> <li>Medium Level Response (3-4 A description of the features of DBMS and an explanation of its desirability, but one may be lim There may be occasional errors spelling, grammar and punctua Technical terms will be mainly</li> <li>Low Level Response (0-2)</li> <li>There may be an attempt to de the features of a DBMS and/or benefits but this is vague and s the statements made are inacco Information will be poorly express and there will be a limited, if an of technical terms. Errors of grapunctuation and spelling may t intrusive.</li> </ul>

Q	uesti	on	Answer		Guidance
10	(a)		<ul> <li>So that computers can be based on logic circuits.</li> <li> ( each part of the circuit) can be in one of two states</li> <li> 0 and 1/true or false</li> </ul>	2	Mention of 0/1 without the right context is too vague for a mark.
	(b)		<ul> <li>The instruction consists of an operator/op code</li> <li> and an operand</li> <li>both stored as bit patterns</li> <li>(op code) from a given instruction set</li> <li>Each op code has a unique bit pattern</li> </ul>	3	
11	(a)		<ul> <li>eg</li> <li>In high level code Instructions use words</li> <li>In machine code instructions are in binary code</li> <li>High-level code is designed to be read by human programmers</li> <li>Machine code is to be read/executed by the computer</li> <li>High level code can be portable/translated for different machines</li> <li>Machine code is specific to a particular machine (marks in pairs)</li> </ul>	4	Do not accept high level needs to be translated (as this is in the question)
(b) (i)		(i)	<ul> <li>Translates one line of HL code at a time</li> <li> and executes it</li> <li> stops when it finds an error</li> <li> can be resumed</li> </ul>	2	
		(ii)	• Compiler	1	

Qı	uestion	Answer	Marks	Guidance			
				Content	Levels of response		
	(c)	<ul> <li>Points may include:</li> <li>Programmers need to understand each other's code</li> <li> so need clear commenting / consistent formats eg for variable names</li> <li> suitable examples</li> </ul>	6		<b>High Level Response (5-6)</b> A detailed explanation why standards are needed with relevant examples. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.		
		<ul> <li>Programmers need to ensure that their code will work with the code written by others</li> <li> agree clear interfaces between modules</li> <li> and stick to agreed interfaces/ protocols</li> <li> suitable examples</li> </ul>			Medium Level Response (3-4) Some explanation of standards needed with examples but a limited explanation of why they are needed. Examples may not be wholly relevant. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.		
		<ul> <li>The success of one programmer's work depends on the others</li> <li> so a need for professionalism</li> <li> suitable examples</li> </ul>			Low Level Response (0-2) There may be a vague description of standards but with no or little explanation of why needed and/or examples. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.		

Question		on	Answer	Marks	Guidance
12	(a)		Sequence Iteration Selection	3	
	(b)		A number which can contain a fractional part A whole number	2	Not rounded off
	(c)		<pre>EXAMPLE: INPUT Distance INPUT Passengers Extra = Distance - 1 CostofExtra = Extra * 2 Cost = 3 + CostofExtra IF Passengers &gt; 4 THEN Surcharge = Cost / 2 Cost = Cost + Surcharge END IF OUTPUT COST Award marks for: Inputs distance and passengers Calculates distance - 1 (or equivalent) Calculates previous answer * 2(or equivalent) Calculates previous answer * 3 Checks if more than 4 passengers  and adds 50% correctly Outputs cost</pre>	7	Several very different algorithms possible, but any correct solution will address all stated bullet points. eg Cost = (Distance * 2) + 1 Satisfies bullets 2, 3 and 4. Candidates do not need to have considered cases where the distance < 1.

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### 1. Annotations

Annotation	Meaning
<b>^</b>	Omission mark
BOD	Benefit of the doubt
E	Subordinate clause / consequential error
×	Incorrect point
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	No benefit of doubt given
Р	Point being made
REP	Repeat
1	Slash / half-mark
<b>~</b>	Correct point
TV	Too vague
0	Zero (big)

#### 12. Subject-specific Marking Instructions

**ADDITIONAL OBJECTS:** You **must** annotate the additional objects for each script you mark. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU, likely to be 'seen' or the highlighting tool.

#### CROSSED OUT, RUBRIC ERROR (OPTIONAL QUESTIONS) AND MULTIPLE RESPONSES

**Crossed-out Responses:** Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

**Rubric Error Responses – Optional Questions:** Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. (*The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.*)

**Multiple Choice Question Responses:** When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate). When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses: When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

**Short Answer Questions** (requiring only a list by way of a response, usually worth only **one mark per response**): Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)* 

Short Answer Questions (requiring a more developed response, worth two or more marks): If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response): Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.
Question		ion	Answer	Marks	Guidance		
1			Statement	True	False	5	
			CPU stands for Central Processing Unit	✓			
			The CPU fetches and decodes instructions	✓			
			The speed of a CPU is usually measured in GigaHertz (GHz)	✓			
			If a CPU has many cores, this slows down the computer		✓		
			The hard disk drive is part of the CPU		$\checkmark$		
			One mark per row				
2	(a)		<ul> <li>1 kilobyte = 1024 bytes/~1000bytes</li> <li>1 gigabyte =1024 x 1024 x 1024 bytes/~100000000</li> </ul>	) bytes.		2	1024 x 1024 x 1024 = 1073741824.
	(b)	(i) (ii)	<ul> <li>ROM</li> <li>Stores the boot program/bootstrap loader/BIOS</li> <li>Used to start the computer/Loads the operating system</li> <li>RAM</li> <li>Stores the parts of the OS/programs that are running</li> <li>Stores the data currently in use</li> <li> for access by the CPU</li> <li>(2 for each)</li> </ul>	em. I		4	
	(c)		<ul> <li>eg</li> <li>ROM is non-volatile and RAM is volatile</li> <li>RAM is easily expandable, ROM size is (usually) fixe computer</li> <li>Contents of RAM change frequently, contents of ROI ever) change.</li> </ul>	ed for a g M never	iven (hardly	1	

A451

Question		n í	Answer	Marks		Guidance
					Content	Levels of response
3		<ul> <li>Points may inclu</li> <li>Game consusually speals also keybols similar to d</li> <li>Output is scomputer of speakers (same stand)</li> <li>Game consoptical drivito be run calso have a is the same desktop construction of the standard desktop construction of the</li></ul>	de: sole has input devices, ecialised controllers but ards, microphones etc lesktop computer imilar to desktop on a screen and sometimes using the dards eg HDMI, DVI) sole usually has an e so that the software an be inserted. Many a hard disk drive which e as that used on a imputer.	6		<ul> <li>High Level Response (5–6 marks)         <ul> <li>A detailed comparison of game consoles and desktop computers referring to input, output and storage devices. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> </ul> </li> <li>Medium Level Response (3–4 marks)         <ul> <li>A comparison is made between desktop computers and game consoles, with at least two of input, output and storage devices mentioned but may not be described in detail. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> </ul> </li> <li>Low Level Response (1–2 marks)         <ul> <li>There is an attempt to compare game consoles and desktop computers but some of the statements are incorrect or irrelevant. Information will be poorly expressed and there will be limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> </ul> </li> </ul>

Question		on	Answer	Marks	Guidance
4	(a)	(i)	<ul> <li>eg</li> <li>To enter data from outside the system for processing</li> </ul>	1	
		(ii)	<ul><li>eg</li><li>To return the results of processing</li></ul>	1	
	(b)		<ul> <li>eg</li> <li>Braille keyboard/input device</li> <li>As this is a familiar entry method for blind users</li> <li>Braille print out of transaction</li> <li>so that customer can review it.</li> <li>Use loudspeakers</li> <li>To provide audio feedback of actions taken (but not when entering card details).</li> <li>(marks in pairs, max 2 pairs)</li> </ul>	4	
5	(a)	(i)	<ul> <li>64 + 32 + 8 + 1</li> <li>105.</li> </ul>	2	
		(ii)	Answer: 10011010 (one mark per nibble if partly wrong)	2	Allow 1 mark for 01011001
	(b)	(i)	Answer: 9 7 B (one mark per hex digit)	3	
		(ii)	<ul> <li>it is 4 bits per hex digit / straightforward to convert</li> <li>shorter number to remember/quicker to enter/less susceptible to error.</li> </ul>	2	

Q	Question			Answ	er	Marks	Guidance
6	(a)		Field	Data type		4	Accept equivalent <u>names</u> of data types. NOT number, whole number, YES/NO or TRUE/FALSE
			Jongth	Deel	-		
			Lengin	Real	-		
			TimesPlayed	Integer	_		
			Protected	Boolean			
			(one mark per row	v)			
	(b)	(i)	Length > 2 : • 001, 002, 00 Artist = "MC Nail" • 003, 005, 00 Song = "Skit" ANE • 006. (correct answer of	03, 007 OR Protected = False: 06, 007 D TimesPlayed > 0: nly, but order does not	matter)	3	
		(ii)	<ul> <li>Length &gt; 2.5</li> <li>AND</li> <li>TimesPlayer</li> </ul>	5 d = 0 / TimesPlayed < ′		3	
	(c)		<ul> <li>An entity is a</li> <li>e.g. Songs/a</li> <li>In the relation</li> <li>Instances/exponential</li> <li>Entities can</li> <li> valid examt</li> <li>Attributes of</li> </ul>	a <u>type</u> of real world object albums/singers etc onal database each enti- xamples/individuals of a s of the table have attributes ople of attributes e.g. le	ect (about which data is to be stored) ty is modelled as a table an entity are represented by ngth of song ted by fields/columns of the table	4	Must include an example of an entity for full marks. The example does not need to be from the scenario in the question

G	luestion	Answer	Marks	Guidance
7	(a)	<ul> <li>Constant: PlayerKey</li> <li>Variable: Position/KeyPressed.</li> </ul>	2	Must be the identifier only and no additional code
	(b)	<ul> <li>Selection</li> <li>A condition is used to decide whether code should be executed</li> <li>Position = Position + 1 is only run if the IF condition is met.</li> <li>Iteration <ul> <li>code is executed repeatedly</li> <li>The code in the repeat loop will be run several times (until Position = 100).</li> </ul> </li> </ul>	4	
	(c)	<ul> <li>e.g.</li> <li>Position = Position + 1 should be changed <ul> <li>so the increment is a random number</li> </ul> </li> <li>The random number should be relatively small <ul> <li>so the game remains interesting</li> </ul> </li> <li>The end condition of the loop should be changed to UNTIL Position &gt; 100 / check if position &gt; 100 and if so change to 100 <ul> <li>as the position may not reach exactly 100 due to the random number.</li> </ul> </li> <li>seed/initialise random number generation <ul> <li>so that numbers generated appear random</li> </ul> </li> </ul>	4	Accept other suitable change and its justification
		Mark in pairs		

Question		on	Answer	Marks	Guidance
8	(a)		Reduce the size of the file.	1	
			Transmits more quickly / uses less bandwidth	1	Accept other valid advantages to do with <u>sending</u> files, NOT <u>storage</u>
	(b)	(i)	<ul> <li>Lossless compression</li> <li>The code has to be exactly as it was originally written</li> <li> or else it will not work.</li> </ul>	3	Explanation must follow from the type of compression given.
		(ii)	<ul> <li>Lossy compression</li> <li>Achieves higher compression/ smaller file size / faster streaming than lossless</li> <li>Video can still be viewed at lower quality (from the data compressed).</li> </ul>	3	
9	(a)		<ul> <li>Off the shelf software is available for anyone to acquire and use / commercially available</li> <li>Custom written software is made especially <u>for the school</u>/ for a specific user</li> </ul>	2	
	(b)		<ul> <li>Proprietary software cannot be copied/altered (without permission of the copyright owner)</li> <li>Open source software can be modified (provided it remains open source)</li> <li>Proprietary software is distributed only as a compiled program/source code not available</li> <li>Open source software is distributed with its source code. Mark in pairs</li> </ul>	2	Not cost/free

Questic	on Answer	Marks	Guidance		
			Content	Levels of response	
9 (c)	<ul> <li>Points may include:</li> <li>Must abide by software licence</li> <li>So for open source, the school will be able to make modifications/customisations to exams system</li> <li>But will probably have to make these modifications also available to other users</li> <li>And credit all previous contributors in the code</li> <li>Will have to purchase off the shelf attendance package legally</li> <li>Software must be able to ensure all legal data protection requirements are met.</li> </ul>	6	Candidates are most likely to discuss copyright issues to do with software licensing and/or data protection issues to do with pupils' personal data. Consider any relevant legal issues. It is the quality of discussion, not the breadth of issues that determines the level (eg it is possible to score a high level mark with a detailed description of copyright issues only).	<ul> <li>High Level Response (5–6 marks) <ul> <li>A detailed description of legal issues linked to the scenario in the question. There will be few if any errors in spelling, grammar and punctuation.</li> <li>Technical terms will be used appropriately and correctly.</li> </ul> </li> <li>Medium Level Response (3–4 marks) <ul> <li>A description of legal issues and an attempt to link this to the scenario. Either the description of the issues or the links to the scenario may be weak.</li> <li>There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> </ul> </li> <li>Low Level Response (1–2 marks) <ul> <li>Candidate outlines some obvious legal issues vaguely relevant to a school context. Information will be poorly expressed and there will be a limited,</li> <li>if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> </ul> </li> </ul>	

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Question	Answer	Marks	Guidance
10	Example INPUT Length1 INPUT Length2 INPUT Length3 IF Length1 = Length2 THEN Output "Isosceles" ELSE IF Length1 = Length3 THEN Output "Isosceles" ELSE IF Length2 = Length 3 THEN Output "Isosceles" ELSE OUTPUT "Not Isosceles" END IF END IF END IF END IF END IF Ward marks for: Inputting three lengths Comparing lengths in pairs for all three ways <u>correctly</u> outputting "Isosceles" for all cases and only in cases where the three lengths are different.	5	There are various ways to implement this but the two most common methods will be the method shown or one disjuncted IF statement (ie IF Length1 = Length2 OR Length1 = Length3 OR Length2 = Length3). In all cases, apply the criteria in the last 4 bullet points to the whole algorithm to determine the mark.

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# GCSE

# Computing

Unit A451: Computer systems and programming

General Certificate of Secondary Education

### Mark Scheme for June 2014

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<b>^</b>	Omission mark
BOD	Benefit of doubt
E	Subordinate clause/Consequential error
×	Cross
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
Р	Point being made
REP	Repeat
1	Slash
<b>~</b>	Tick
TV	Too vague
0	Zero (big)

Here are the subject specific instructions for this question paper

**ADDITIONAL OBJECTS:** You **must** annotate the additional objects for each script you mark. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU, likely to be 'seen' or the highlighting tool.

#### **CROSSED OUT, RUBRIC ERROR (OPTIONAL QUESTIONS) AND MULTIPLE RESPONSES**

**Crossed-out Responses:** Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

**Multiple Choice Question Responses:** When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate). This applies especially where candidates need to, for example, tick one box per row. When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

**Contradictory Responses:** When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

**Short Answer Questions** (requiring only a list by way of a response, usually worth only **one mark per response**): Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. (*The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.*)

Short Answer Questions (requiring a more developed response, worth two or more marks): If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response): Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

C	uestion	Answer	Mark	Guidance
1	a	<ul> <li>Computers are <u>connected to each other</u></li> <li>Restricted to a small geographical area/site/other suitable example</li> <li><u>Dedicated</u> wired or WiFi connections</li> </ul>	2	<ul> <li>For the first bullet point candidates should be describing a network – just the idea that computers are connected to "something" is not enough.</li> <li>For the third bullet point, just "connected by cables" is not enough as there is no indication these are dedicated cables for the network.</li> </ul>
	b	<ul> <li>One central hub/switch/router/server/connection point</li> <li>All computers/devices connected to this central point</li> </ul>	2	Accept diagram which shows the points in the mark scheme. Note that if the diagram is not annotated or described one mark can still be given for the second bullet point.
	C	<ul> <li>bus</li> <li>ring</li> </ul>	2	<ul> <li>Accept other standard names of topologies that are not on the specification:</li> <li>line, linear (only as an alternative for bus)</li> <li>tree/hierarchical, mesh</li> <li>hybrid</li> <li>loop(only as an alternative to ring</li> </ul>
2	а	· 1GB	1	Accept 1.024 The units are not necessary
	b	<ul> <li>Operating system</li> <li>Other programs that are running / in current use</li> <li>Data in current use</li> </ul>	2	Accept examples for the second and third bullet points as long as it is clear that the programs/data are currently in use Accept instructions for programs
	С	<ul> <li>Using the hard disk/secondary storage</li> <li>Used as RAM/to store the contents of RAM/main memory</li> <li>Needed when there isn't enough physical memory</li> </ul>	3	Note that these points may be worded differently. E.g. "items are taken from memory and stored on the hard disk until needed" achieves the first two bullet points.

G	Question	Answer		Guidance	
3	а	Answer: 1 1 1 0 1 1 1 1 One mark per nibble	2		
	b	<ul> <li>There is an extra carry/bit</li> <li>As number cannot fit into 8 bits</li> <li>Result is greater than 255/11111111</li> </ul>	2		
4	а	Hypertext Markup Language	1		
	b	<ul> <li>Contains text/content to be displayed</li> <li> and links to other resources / files / images etc</li> <li> and instructions about how they should be displayed / layout</li> <li>In a standard format (that can be understood by web browsers)</li> </ul>	2		
	С	<ul> <li>JPG files: images</li> <li>MPEG files: videos</li> </ul>	2		
5	a	<ul> <li>Input device:         <ul> <li>e.g. (touch screen, menu/next/prev page) buttons / keypad / touchpad / microphone</li> </ul> </li> <li>Output device:         <ul> <li>e.g. screen, speaker</li> </ul> </li> </ul>	2	Accept any devices relevant to an e-book reader. For input device accept a clear description of an inbuilt scrolling device such as a trackball, but do not accept "mouse". Also do not accept a clear indication of a software keyboard as this is a piece of software rather than a device. For output device, accept "monitor"	
<u> </u>	b i	Solid state	1		

Mark Scheme

Q	Question		Answer		Guidance
		ii	<ul> <li>Fast access</li> <li> less delays when turning the device on/ turning pages etc</li> <li>No moveable parts/robust</li> <li> can be handled/manipulated/moved without damaging it</li> <li>Small/light enough</li> <li> to fit within a hand held device</li> <li>low power</li> <li>to extend battery life of reader</li> </ul>	2	No follow through from (i). Candidates need to identify a relevant characteristic of solid state storage for the first mark, and expand by explaining why this is an advantage in an e-book reader for the second mark. Note that portable/capacity are not acceptable answers here (as solid state storage is not particularly more portable/larger than other forms of storage for this application)
	С	i	<ul> <li>eg</li> <li>Cheap to produce</li> <li>Easily portable / Fits in a magazine</li> <li>Enough capacity for e-books</li> <li>Can be read by other devices e.g. computers</li> <li>Read only / can't write over</li> </ul>	2	Note that portable/capacity are acceptable answers here (as they are relevant characteristics of a CD ROM) Do not accept "compact" (unless portability is clearly implied)
		ii	optical	1	
	d	i	<ul> <li>Source code not made available/ Only compiled code is published</li> <li>Licence restricts the copying/modifying/distribution of the software</li> </ul>	2	The mention of a licence is not sufficient. Candidate should state that the licence restricts copying/modifying/distributing. "closed source" is not enough because it just gives an alternative term for "proprietary" without a description of what we mean by "closed"

Q	Question		Answer					Mark	Guidance
	ii		<ul> <li>eg</li> <li>Stops competing companies copying their software (or hardware/ebooks)</li> <li> and producing similar/better products.</li> <li>Ensures compatibility (with the e-book reader)</li> <li> as they can ensure that no modifications have been made</li> <li>(mark points in pairs).</li> </ul>						The first mark is for identifying a relevant advantage <i>to the</i> <i>manufacturer</i> , and the second for details expanding this point. Accept answers about preventing reverse engineering the company's product or piracy of the company's software or e- books (e.g. DRM) as referring to the first set of answers.
6	а							3	1 mark per row
			Item of data	Date	Integer	Real	String		
			The amount paid		ü				
			The customer's card number				ü		
			The date of the payment	ü					

		Answer	Marks	Guidan	ce
				Content	Levels of response
6	b	<ul> <li>Points may include:</li> <li>Need to be always available</li> <li> shops and customers want to process payments quickly,</li> <li> if it goes down, there will be delays/customers lost etc</li> <li>Need to always process payments accurately</li> <li> shops want to be confident that they will receive the payment</li> <li> customers do not want to be overcharged</li> <li>Need to be able to trust the security of the system</li> <li> that fraudulent purchases cannot be made</li> <li> that customers' personal details cannot be stolen/to prevent identity theft</li> </ul>	6		<ul> <li>High Level Response(5/6): A detailed description of the need for reliability with a number of fully justified points. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> <li>Medium Level Response (3/4); Some reasons why reliability is needed are explained, but some explanations may not be detailed. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> <li>Low level response (1/2): One or more reasons why reliability is needed are identified, but there is little or no explanation. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> <li>O : Answer not worthy of credit</li> </ul>

Question		Answer					Mark	Guidance
7							4	No follow through on row 4.
			Α	b	NOT(a AND b)			
			0	0	1			
			0	1	1			
			1	0	1			
			1	1	0			
		1 mark for r correctly ide correct outp	ow two an entifying 1 out 0 )	d three. F 1 as the i	For row 4, 1 mar nputs, and 1 ma	k for ark for the		
8		<ul> <li>correct output 0 )</li> <li>System information :         <ul> <li>displays important data about the current state of the computer</li> <li>e.g. temperature, free memory, network speed, % processor used</li> </ul> </li> <li>Diagnosis:         <ul> <li>attempts to detect/resolve items that are not working correctly</li> <li>e.g. missing drivers, network connection</li> </ul> </li> </ul>				t state of speed, % e not	4	<ul> <li>1 mark each for explaining "system information" and "diagnosis" + 1 mark for each example – accept relevant examples, but not examples related to virus/malware for diagnosis.</li> <li>Examples should be specific examples of the use of these utilities rather than general descriptions.</li> </ul>

Q	Question		Answer	Mark	Guidance
9	а	i	<ul> <li>6 * 16 + 2 / 0110 0010</li> <li>98</li> </ul>	2	Accept working where candidates write the least significant bit first in their binary representation (i.e. 01000110) as long as this is clear (e.g. by showing the place values)
		ii	<ul> <li>62 ÷ 16 = 3 r 14 / 62 = 0011 1110</li> <li>3E</li> </ul>	2	Accept working where candidates write the least significant bit first in their binary representation (i.e. 01111100) as long as this is clear (e.g. by showing the place values)
	b		<ul> <li>Binary produces long strings/ Hex is shorter</li> <li> Binary is difficult to work with/Hex easier to work with</li> <li>Hex can be easily converted to/from binary / 1 hex digit per nibble</li> <li>Hex is less susceptible to error</li> </ul>	3	
10	а		<ul> <li>A value that does not change (while the program is running)</li> <li>eg Noise</li> </ul>	2	For the example do not accept the whole line of code; candidate should show that they know where the constant is. Note that "A constant is a variable which does not change" is a contradictory answer (because by definition variables change) and when candidates give a contradictory answer award no marks.
	b		<ul> <li>A location in memory to store / a value that may change (as the program is running)</li> <li>eq Wins/ Losses/ Net/Goals</li> </ul>	2	
	С		<ul> <li>Net = 5 which is less than Noise</li> <li>Goals = 0</li> </ul>	2	<ol> <li>mark for the subtraction <b>and</b> result of the comparison</li> <li>mark for correct result</li> </ol>
			<ul> <li>Net = 15 which is greater than Noise</li> <li>Runs Loop once {Goals = Goals + 1, Net = Net – Noise}</li> <li>Goals = 1</li> </ul>	3	1 mark for the subtraction and result of the comparison 1 mark for clearly indicating that the loop is executed once 1 mark for correct result
					Remember to enter a total mark out of 5 for both sections.

Mark Scheme

G	Question		Answer	Mark	Guidance
11	11 a		A (persistent) organised store of data	1	Accept answers that imply that the data is organised – e.g. data stored in tables/records
	b		<ul> <li>data structure does not depend on the application / no data dependence</li> <li>Multiple platforms/ applications</li> <li> can operate on the same data</li> <li> ensures no redundancy/inconsistency (between applications)</li> <li>Different views of the same data</li> <li> can easily be prepared for different users according to their need.</li> <li>Any application can be changed if needed</li> <li> without changing the data structure / reduces unproductive maintenance</li> </ul>	3	Do not accept answers that refer to protecting the data from being accidentally deleted / different levels of PERMISSIONS for different users / data integrity But DO accept answers that refer to different users viewing different/user appropriate data (bullet 4)

Question		Answer	Mark	Guidance
	C	<ul> <li>Queries</li> <li>eg</li> <li>Select attendance for all students of a particular tutor group each week</li> <li> so the tutor can see who has missed lessons</li> <li>Select weekly attendance of a particular student for a term</li> <li>So the school can see if his/her attendance is improving</li> <li>(1 mark for a correct point + 1 mark for expansion)</li> </ul>	4	Do not accept answers which explain what is meant by a query or validation rule. The question requires candidates to explain one example of <b>how</b> they can be used in this application, not what they are. Award one mark for a correct example and an expansion mark for detail/justification of this use. Remember to award a mark out of 4 for both parts of the question.
		<ul> <li>Validation rules <ul> <li>eg</li> <li>Range check / only allow a range of marks (e.g. Present, Absent, Late)</li> <li>When teachers are calling the register and inputting the marks</li> </ul> </li> <li>Presence check on required fields(such as name, class etc.)</li> <li>When a pupil is added to the register <ul> <li>(1 mark for a correct point + 1 mark for expansion)</li> </ul> </li> </ul>		

Qı	uestion	Answer	Marks	Guidance		
12				Content	Levels of response	
		<pre>Example: Choice = "" REPEAT INPUT Button IF Button is between 0 and 9 THEN Choice = Choice &amp; Button OUTPUT Choice ELSE IF Button = CANCEL THEN Choice = "" END IF UNTIL Button = OK IF Choice is between 1 and 20 THEN IF drink chosen available THEN Dispense drink OUTPUT "Collect your drink" ELSE OUTPUT "Collect your drink" ELSE OUTPUT "Drink not available" END IF ELSE OUTPUT "Invalid selection" END IF Wait OUTPUT "Ready"</pre>			<ul> <li>High Level Response(5/6): A clear and complete algorithm with correct input, validation and reasonable output/outcome (accept minor errors).</li> <li>Algorithm presented in algorithm in code, pseudocode or as a flowchart with correct conventions used to make it clear (e.g. indentation, shapes of flow chart objects). Technical terms are used correctly and there are few, if any, errors in spelling.</li> <li>Medium Level Response (3/4): An algorithm that deals with input, validation and reasonable output/outcome but there may be some logical errors. Algorithm may be in code, pseudocode, flowchart, or very well structured English (e.g. clear bulleted steps) using some accepted conventions, although this may not be consistent. Technical terms are mainly correct and there may be occasional spelling errors.</li> <li>Low level response (1/2): A description of the Input, validation and output required, but some may be missing.</li> <li>Response may be in English or a poorly structured code/flowchart. Limited, if any, use of technical terms and errors of spelling may be intrusive.</li> <li>O: Response not worthy of credit</li> </ul>	

A451

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0	Zero (big)

Here are the subject specific instructions for this question paper

**ADDITIONAL OBJECTS:** You **must** annotate the additional objects for each script you mark. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU, likely to be 'seen' or the highlighting tool.

### **CROSSED OUT, RUBRIC ERROR (OPTIONAL QUESTIONS) AND MULTIPLE RESPONSES**

**Crossed-out Responses:** Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

**Rubric Error Responses – Optional Questions:** Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. (*The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.*)

**Multiple Choice Question Responses:** When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

**Contradictory Responses:** When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

**Short Answer Questions** (requiring only a list by way of a response, usually worth only **one mark per response**): Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)* 

**Short Answer Questions** (requiring a more developed response, worth **two or more marks**): If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

**Longer Answer Questions** (requiring a developed response): Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

Q	uestion	Answer/Indicative content	Mark	Guidance
1		<ul> <li>e.g.</li> <li>Input device: touch screen / microphone / accelerometer/(hardware) button/ camera / (hard) keyboard</li> <li>Output device: screen / speaker / vibrating device / LEDs</li> <li>Storage device: Solid state memory e.g. SD card, memory card, flash memory , SIM card</li> </ul>	3	<ul> <li>Accept any devices that can be built-in to a mobile phone.</li> <li>Do not accept devices which send or receive binary data as input or output devices (such as those involved with Bluetooth, Wi-Fi, GPS).</li> <li>For output accept display</li> <li>Do not accept headphones as they are not built-in.</li> <li>Do not accept Hard Disk/Hard drive as a storage device.</li> </ul>
2	a	ContentType of fileAn image showing a map of the school.JPGA text document containing information to parents about the school rules.PDFA high resolution picture of all the staff and pupils.JPGA short video clip of some pupils saying why they like the school.MPEG1 mark per row	4	
	b	<ul> <li>When the file is compressed some detail/data/quality/resolution is lost</li> <li> which is <u>not noticeable</u> in the video file/<u>video still</u> <u>viewable</u> with lower quality</li> <li> but would make the text file unreadable/lose meaning or comprehension</li> </ul>	3	The first bullet is for the idea that something is lost in the compression process. The second bullet is for the idea that the video file is still usable with this loss. The third bullet is for the idea that the text file is not usable.

A451					Mark Scl	neme	June 2015	
Question		Answer/Indicative content				Mark	Guidance	
3	а			Variable Gender	Data Type String		3	Allow known equivalent names of data types: String: alphanumeric/text. Do not accept character but accept an array of character or pointer to character. Real: single, double, float, decimal. Do not accept Number.
				Dose	Real	_		
			1 marl	k per row	Doolean			
	b		•	(Age < 20 is FAL ( Gender = "Fem 0.5 therefore Dose	.SE so) <u>Dose =</u> 2 nale" is FALSE) so Dose = e = 1	Dose *	3	Award mark for first bullet only if 2 clearly refers to the dose. Allow follow through error for second and third bullet. i.e. if candidate has the wrong dose they can still get a mark for Dose * 0.5 and for doing this calculation correctly. (Typically 3 * 0.5 = 1.5 which is therefore worth 2 marks)
	C		•	(Age is less than 1.9 <u>[ isPregnant ANI</u> Dose = 1.5	1 20 = true) so Dose = 0.1 <u>D Dose &gt; 1.5 ]</u> is TRUE	* Age	4	Candidates do not need to refer to dose, provided it is clear that they are performing the correct operation. For 3 <sup>rd</sup> bullet it is sufficient if the candidate has shown that both isPregnant and (Dose > 1.5) are TRUE (This may not be at the same point in the answer and they do not need to explicitly state the result of the AND)
4	а		•	antivirus firewall			2	

A451	Ma	ark Scheme	June 2015	
Question	Answer/Indicative content	Mark	Guidance	
b	<ul> <li>e.g.</li> <li>(User name and) password</li> <li>Only allows you to use the system if you are authorised</li> <li>Encryption</li> <li>Prevents hackers from understanding any da accessed (e.g. passwords)</li> <li>Access rights</li> <li>To prevent files from being modified/deleted</li> <li>User access control</li> <li>Prevents users from making changes to the system</li> </ul>	4 nta if	Accept any security measure that is provided by the operating system itself but not by standard utility programs (even if the utility program is normally bundled with operating systems). The first bullet is for identifying or a brief description of a measure. The second bullet is for a further more detailed description or a description of how the measure ensures security. Any reasonable biometrics is acceptable.	
	Marks in pairs			

A451			Mark Scheme							
Question		ion	Answer/Indicative content	Mark	Guidance					
5	а	i	<ul> <li>High level code :</li> <li>human oriented code / written by programmers</li> <li>contains words for commands / closer to English/natural language</li> <li>Machine independent /Portable to different systems</li> <li>Needs to be translated before it can be executed.</li> <li>Problem based</li> <li>One (high level) command equates to many machine code instructions.</li> </ul>	4	Award marks for correct points about machine code made under high level code and vice versa. Do not accept Machine code is in Hex					
			<ul> <li>Machine code:</li> <li>Code for the CPU to execute / not readily understandable by humans</li> <li>binary instructions</li> <li>specific to a particular (type of) computer / not portable to different systems</li> <li>does not need to be translated</li> </ul>							
		ii	<ul> <li>To translate the <u>high level code into machine code</u></li> <li>To pick up (syntax) errors</li> </ul>	1	Translate to object code is acceptable Accept "errors" on its own, but do not accept answers referring specifically to logic or runtime errors.					

Question		ion	Answer/Indicative Content	Marks	Guidance		
					Content	Levels of response	
5	b		<ul> <li>Examples of standards;</li> <li>Code should be written using standard/agreed conventions</li> <li> such as in the choice/capitalisation of variable names</li> <li>language chosen</li> <li>use of functions</li> <li>comments</li> <li>Meaningful identifiers</li> <li>Indenting (constructs)</li> </ul> Examples of justification <ul> <li>compatibility between components</li> <li>consistency</li> <li>allow multiple people to work on the same project</li> <li>ensure coding conventions are kept</li> <li>so others can read/edit the code</li> </ul>	6	Allow answers relating to standardised design.	<ul> <li>High level Response (5-6) <ul> <li>A number of examples of coding standards are explained and justified.</li> <li>There will be few if any errors in spelling, grammar and punctuation.</li> <li>Technical terms will be used appropriately and correctly.</li> </ul> </li> <li>Medium level Response (3-4) <ul> <li>Description of why standards are required with at least one example of a coding standard.</li> <li>Examples may not be wholly relevant.</li> <li>There may be occasional errors in spelling, grammar and punctuation.</li> <li>Technical terms will be mainly correct.</li> </ul> </li> <li>Low level Response (0-2) <ul> <li>A vague description of coding standards.</li> <li>Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</li> </ul></li></ul>	

Question		Answer/Indicative content		Mark	Guidance	
6	а		•	Software that is produced for a variety of users / not for a specific user / commercially available to anyone / immediately available	1	Do not accept answers that state that it is not bespoke / custom written. Candidates need to be more specific. Do not accept simply "can be bought" as custom written software is also bought. Do not accept "can be bought off the shelf".
	b		• • •	<u>Create</u> tables / entities <u>Define</u> fields / attributes / columns <u>Define</u> (primary) keys <u>Define</u> relationships / links between tables / foreign keys <u>Set</u> the constraints on the data /validation rules / data types / field lengths / other suitable example	3	Accept define secondary keys / indexed fields
	С		e.g. • • •	Add client/appointment data Edit client/appointment data Delete client/appointment data Run/Create/View reports using a relevant example of a report that would be needed e.g. today's appointments Search/query for data using a relevant e.g. search for a client's phone number Back up (client/appointment) data. Archive (client/appointment) data/ example of archiving	2	<ul> <li>Accept any two <u>different</u> operations that would be typical of the use of a database system by the hairdresser in managing client and appointment data.</li> <li>Bullets 1,2,3 should specifically mention data from the context.</li> <li>Bullets 4,5 should contain a relevant example Bullets 6,7 need not be in context.</li> </ul>
7	а		•	Instructions/programs(currently running)/data are stored in the RAM these are fetched <u>from the RAM</u> by the CPU /Processor where the instructions are executed / instructions are processed / data is processed	3	If the candidate has described the functions of RAM and the CPU separately, only award the 2 <sup>nd</sup> bullet if it is clearly stated that instructions are fetched from RAM. Mention of the fetch – execute cycle in the CPU is enough to award bullet 3.

A451	Mark Sc	June 2015	
Question	Answer/Indicative content	Mark	Guidance
b	<ul> <li>To store instructions/data that is frequently used / previously used / next to be used</li> <li>Data does not need to be fetched from RAM</li> <li>Speeds up access</li> </ul>	2	

Question	Answer/Indicative Content	Marks	Guidance			
			Content	Levels of response		
7 C	E.g. Memory; • Smaller in size • Faster access • Larger capacity • More durable • Costs less per byte/kb etc Technology can; • be smaller • be more mobile/portable • have similar capacity	6		Higher Level Response (5-6)Candidates will describe the advances in memory and how these have impacted computers. Points made about the memory are detailed and linked to the advances There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.Medium level Response (3-4) Candidates will describe some advances in memory and improvements in performance. Points made about the memory lack detail or may not be linked to the advances. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.Low level Response (0-2) Candidates may identify changes in technology or changes in memory. Information will be poorly expressed and there will be a limited, if any.		
Question		Answer/Indicative content			Guidance	
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8	а	i	•	(Part of the instruction which) specifies the operation to be carried out e.g. 00001000 = add to timer/00000100 = subtract from timer	2	The answer must refer specifically to the operation to be carried out and not the instruction as a whole.
		ii	•	(Part of the instruction which) supplies the data/ address/value needed for an operation e.g. the number to be added/subtracted from the timer / numerical example from the table (00010100 or 00000001)	2	For data, accept number/integer.
	b		1 mar	00000101 00011110 k per byte	2	All 8 bits must be correct for each byte.
	С		•	Instructions and data are fetched at different points of the fetch execute cycle Instructions and data are kept in separate parts of the memory (by the operating system)	1	<ul> <li>Award the mark for:</li> <li>The program counter points to the address of instructions</li> </ul>
9	а		e.g. • •	record log on / log off times remote access / view users' screens audit printing keylogging monitor internet usage / downloads monitoring emails / files sent / copied inspect files in users' areas	2	Accept answers which show how the LAN is used to <u>monitor</u> <u>the work of employees</u> rather than advantages of using a LAN in general

A451	Mark Sch	June 2015		
Question	Answer/Indicative content	Mark	Guidance	
b	<ul> <li>IP addresses can be changed / are allocated as needed</li> <li>MAC addresses can't be changed / every device has a fixed MC address</li> <li>IP(v4) addresses are 4 bytes long</li> <li>MAC addresses are 6 bytes long</li> <li>IP(v4) addresses are normally written in denary</li> <li>MAC addresses are normally written in Hex</li> <li>IP addresses are configured by software</li> <li>MAC addresses are used for routing across a WAN/internet</li> <li>MAC addresses are only used within the LAN</li> </ul>	4	For bullets 3 and 4, accept answers where candidates refer to IPv6 being 16 bytes(128 bits). Award one mark if candidates state that IP addresses and MAC addresses are of different size.	
C	<ul> <li>Redundant components/hardware/capacity (servers/disks/routers etc) is built into the network</li> <li>If there is a failure, network automatically switches to use the spare capacity</li> <li>Allows the bank to continue to operate / avoids network downtime</li> <li>avoiding loss of income /customer dissatisfaction/ loss of records / other example related to the bank</li> </ul>	4		

10	а	Lidia	1	Accept incorrect spelling if intention is clear.
	b	<ul> <li>Program finds there is no position 7 in the array / array index out of bounds</li> <li>An error will occur / an error message would be displayed / program will crash</li> </ul>	2	Only award bullet 1 if answer is clearly about the contents of the array and not about the context. Do not award bullet 2 if candidate specifically mentions syntax error.
	C	<pre>Example INPUT Num For i = 1 to Num Temp = PlayerName(6) PlayerName(6) = PlayerName(5) PlayerName(5) = PlayerName(4) PlayerName(3) = PlayerName(3) PlayerName(2) = PlayerName(2) PlayerName(1) = Temp Next i Award marks for: Input the number of places to move (e.g. Num) Use of temporary variable(s) or second array to avoid overwriting values in the array Sensible use of a loop  with correct end condition Correctly deals with moving from position 1 (e.g. 1 + Num) Correctly deals with moving from position 6 (e.g. Num )</pre>	6	If there is more than one loop, award bullets 3 and 4 for any non-trivial loop that contributes to the solution. For bullet 3, "sensible" use of a loop, requires that the loop clearly address the problem (e.g. move every player from pos a to b). Although candidates can get partial marks here, candidates will only get full marks (incl bullet 6) if all conditions of all loops are correct.

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# GCSE

# Computing

Unit A451: Computer systems and programming

General Certificate of Secondary Education

## Mark Scheme for June 2016

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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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These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning of annotation
BP	Blank Page – this annotation <b>must</b> 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.
~	Omission mark
BOD	Benefit of doubt
E	Subordinate clause/Consequential error
×	Cross
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
Р	Point being made
REP	Repeat
1	Slash
<b>√</b>	Tick
TV	Too vague
0	Zero (big)

Qu	Question		Answer/Indicative content				content		Mark	Guidance	
1	а		The characters/symbols a <u>computer</u> uses/understands/displays				1	<ul> <li>This has to explain what the set is, not how they are stored.</li> <li>0 marks for:</li> <li>The characters for coding/programming</li> <li>the amount/number of/quantity of characters</li> </ul>			
1	b	i	1 ma	rk each	_	_	-			2	Allow 100 for 4
				Hex:	1	F	6	4	А		
				Binary:	0001	1111	0110	0100	1010		
1	b	ii	<ul> <li>Unicode has more characters/space (to store the emoji)</li> <li>Unicode is 16 bit/1-4bytes compared to ASCII's 7/8 bits</li> </ul>				ace (to store ared to ASCI	the emoji) I's 7/8 bits	2	Allow the opposite for bullet 1 i.e. ASCII does not have enough space	
											Allow any acceptable format for Unicode e.g. 1, 2, 3 or 4 bytes long Allow numeric quantities in place of bits/bytes for bullet 2

Question		Answer/Indicative content		Guidance
2*		<ul> <li>Points may include:</li> <li>Legal <ul> <li>Data Protection Act</li> <li>Rules of DPA</li> <li>Keeping data secure, need for firewall, anti-virus</li> <li>Methods of restricting access</li> <li>Intellectual property/copyright/licences</li> </ul> </li> <li>Ethical <ul> <li>Storing and access to personal information</li> <li>Rules/terms set up before people can join</li> <li>Consequences for misconduct e.g. cyberbullying</li> <li>Plagiarism</li> <li>Communication of inappropriate materials for students/school/teacher</li> <li>Backing up to preserve/save data</li> <li>Gaining parental consent for communication online</li> <li>E-safety</li> <li>Acceptable use policy</li> </ul> </li> </ul>	6	<ul> <li>High Level Response (5-6):</li> <li>A detailed discussion of the ethical and legal issues, with clear explanations that are linked to the scenario.</li> <li>There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> <li>Medium Level Response (3-4):</li> <li>A description of some ethical and/or legal issues with some explanation/justification. Material may not be explicitly linked to the context. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> <li>Low Level Response (1-2):</li> <li>There is an attempt to describe either a legal issue and/or ethical issue. The points are poorly expressed and/or not related to the context. There is limited, if any, use of technical terms. Errors in grammar, punctuation and spelling may be intrusive.</li> </ul>
3	а	<ul> <li>It is a foreign key</li> <li>It is a <u>Primary Key in FILM</u></li> <li>It links to the <u>FILM table</u> // create a relationship to the <u>FILM table</u></li> <li>To get details about the film the rating refers to</li> <li>Do not have to repeat the data/film/rating // reduces data redundancy</li> <li>1 film can be given many ratings</li> </ul>	3	It must be clear that foreign key is in the rating table.

Qu	Question		Answer/Indicative content	Mark	Guidance
3	b		<ul> <li>Multiple/different brands of applications/platforms can access the database</li> <li>without having to adapt the database structure</li> <li>Different views of the data can be set up // can limit what users can access</li> <li>The applications can be changed</li> <li>without affecting the data/file structure</li> <li>The data can be updated/changed // database structure can be changed</li> <li>without affecting the application(s)</li> <li>Data consistency/integrity is maintained</li> </ul>	2	Not <u>data</u> redundancy
3	С		One piece of valid data for each of the fields in the user table e.g. J123, Joe, blogs, 1/4/1982	1	Accept any valid/reasonable data for each field Username, First name, Surname, DateOfBirth
3	d	i	00215	1	Correct answer only Must have leading 0s 0 marks if any additional
3		ii	<ul> <li>1 mark per bullet</li> <li>Year = 2015</li> <li>AND</li> <li>Category="Comedy"</li> </ul>	3	Comedy must have speech marks Ignore speech marks around 2015 ' ok for " Spellings must be accurate
4	а		Sequence	1	
4	b		<ul> <li>A location in <u>memory</u></li> <li>The <u>value/contents</u> <u>cannot</u> be changed (whilst the program is running)</li> </ul>	2	0 mark for "a variable that does not change" 0 marks for "stays the same"
4	С		numberOfPages = numberOfPages+numberOfChapters	1	Accept: • += instead of = numberOfPages • numberOfPages=RoundDown(numberOfWords/wordsPerPage) +numberOfChapters • numberOfPages=RoundDown(numberOfWords/300) +numberOfChapters Variable names must be spelt correctly, ignore case

Qu	esti	on	Answer/Indicative content	Mark	Guidance
4	d		Integer/Int	2	Do not allow 'need to ignore the decimal'
			<ul> <li>It is a whole number/you can't have half a word</li> </ul>		Cannot get reason if data type incorrect
4	е		String (name)	2	
			<ul> <li>Real/Single/Double/Currency/Float/(Decimal) (price)</li> </ul>		
4	f		1 mark for identification, 1 for matching description	4	Do not allow auto-documentation.
			e.g.		Can get description mark, without identification/incorrect
			<ul> <li>Error diagnostics/debugger</li> </ul>		identification
			<ul> <li>highlight errors/suggest changes</li> </ul>		
					Allow:
			<ul> <li>Run-time environment</li> </ul>		Variable watch/window
			<ul> <li>…Lets you run/test the program</li> </ul>		See how the values change
			<ul> <li>Text editor</li> <li>highlight key words</li> <li>auto-indent</li> <li>to type/edit source code</li> <li>Auto-complete</li> <li>highlight syntax errors</li> <li>Versioning tools</li> <li>To allow for tracing back</li> <li>To create new files with changes</li> <li>Stepping/breakpoints</li> <li>Allow tracing of algorithms</li> </ul>		Do not allow compiler/interpreter

Question	Answer/Indicative content		Guidance
4 g	<ul> <li>Max 2 for compiler, 2 for interpreter Compiler</li> <li>To convert to low-level in one go</li> <li>Create an executable//export the file</li> <li>To distribute the software</li> <li>Users will have no access to source code</li> <li>so no-one can edit/steal/copy the code/program</li> <li>Use for error detection</li> <li>Interpreter</li> <li>To convert to low-level line by line</li> <li>To test the program // to find errors</li> <li>stops running when it finds an error//shows the location of the error when found</li> <li>it is quicker (compared to compiler) to re-interpret than recompile</li> </ul>	4	The uses must be different for compiler and interpreter

Question		Answer/Indicative content	Mark	Guidance
5	a	<ul> <li>max 2 for explanation max 1 for example/use of Figure 2 or 3</li> <li>An image is made up of/consists of pixels</li> <li>A pixel can be one colour</li> <li>Each colour has a <u>unique/corresponding</u> binary number</li> <li>Each pixel/square is given the binary number of its colour</li> <li>The <u>binary</u> numbers are stored in order in the file</li> <li>E.g. White = 000, Red = 010, Blue= 110, top line would be 00000010010010110110</li> </ul>	3	Accept answers that are annotated on Figures 1 and 2, or that use these to explain the storage of the image, that meet each bullet The example must be more than describing what the diagram shows, e.g. 'the squares with W in are white' is not enough.
5	b	<ul> <li>2 from</li> <li>Fewer bits are needed per colour</li> <li>which means fewer bits per pixel</li> <li>Any example from diagram</li> </ul>	2	"fewer bits" with no reason or application is 0
5	С	<ul> <li>Max 1 for description, 1 for example</li> <li>To store data/information about the image/data</li> <li>E.g.Dimensions/height/width/No. of bits per pixel/Colours used/location/date/file type</li> </ul>	2	0 marks for filename as example 'tells you something about the image' = TV 0 marks for definition referring to how the image is 'displayed'

Question		on	Answer/Indicative content	Mark	Guidance
5	d	i	<ul> <li>The amplitude/height of the wave is measured</li> <li>At set/regular intervals//by reasonable example</li> <li>And stored as a binary number</li> <li>The samples form an approximated sound wave</li> </ul>	3	NOT frequency/pitch NB For the second bullet, this must relate to set intervals/the same interval. A set number of times per second does not suggest the same intervals.
5	d	ii	<ul> <li>File size increases</li> <li>So the sound is truer/better quality/more accurate compared to the <u>original/analogue</u></li> </ul>	2	
6	а		<ul> <li>2 from</li> <li>Tasks can split between the processors</li> <li>tasks/processes/software/ can be processed faster</li> <li>more processes completed per second</li> <li>Allows multitasking // Run more than one process/task/instruction/data <u>at a</u> <u>time/per clock cycle</u></li> <li>tasks/processes/software/ can be processed faster</li> <li>more processes completed per second</li> </ul>	2	MUST have given splitting tasks, or multi-tasking to allow speed Faster can only be given a mark if the first bullet(s) have been given.
6	b	i	<ul> <li>Max 2 per difference, 1 for RAM, 1 for ROM</li> <li>e.g.</li> <li>RAM is volatile</li> <li>ROM is non-volatile</li> <li>RAM stores currently running instructions/programs/applications/OS/data</li> <li>ROM stores boot-up instructions/bios</li> <li>RAM can be changed</li> <li>ROM (normally) cannot be changed</li> </ul>	4	Do not allow e.g. ROM is not for 2nd mark. Mark in pairs

Quest	ion	Answer/Indicative content	Mark	Guidance
6 b	ii	<ul> <li>2 from</li> <li>More instructions/programs/applications can run at the same time/be held in RAM</li> <li>Open software faster/respond faster</li> <li>More memory space for current programs</li> <li>Run more memory intensive programs/relevant example e.g. computer games/graphic rendering</li> <li>reduces use of Virtual Memory</li> <li>less use of hard drive which is slower to access</li> </ul>	2	
6* b		<ul> <li>e.g.</li> <li>Increase processor clock speed</li> <li>Run more FE cycles per second</li> <li>Faster response</li> <li>Smoother actions</li> <li>Less likely to freeze</li> <li>Add more cores</li> <li>Run more tasks simultaneously</li> <li>Better performance for programs that are programmed for multi-core systems <ul> <li>E.g. new computer games</li> </ul> </li> <li>Increase cache size</li> <li>Cache stores frequently used instructions/programs/data</li> <li>Can store more so increase access speed to more frequently used instructions/programs/data</li> <li>New graphics card</li> <li>Can carry out more processes for CPU</li> <li>Can improve speed and quality of graphics</li> <li>Change hard disk drive to SSD</li> <li>faster read/write speed</li> </ul>	6	<ul> <li>High Level Response (5-6): Several upgrades are identified and there is a detailed explanation of how each of these will impact the computer given in the example. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> <li>Medium Level Response (3-4): Upgrades are identified, although how these would improve the performance may be weak. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> <li>Low Level Response (1-2): There is an attempt to identify upgrades that could be made. There may be little or no explanation of how these improve performance. The points are poorly expressed or are not related to the context. There is limited, if any, use of technical terms. Errors in grammar, punctuation and spelling may be intrusive.</li> <li>Allow defragmentation and reducing the read time for the hard disk.</li> </ul>

Question		on	Answer/Indicative content	Mark	Guidance
					Do not allow hard drive if referring to secondary storage size, allow for increasing amount of VM.
					<ul> <li>Do not allow:</li> <li>Increasing RAM</li> <li>Upgrading components that do not affect performance (e.g. peripherals)</li> </ul>

Qı	Question		Answer/Indicative Content	Marks	Guidance
7	а		<ul> <li>WAN is over a large geographical area/needs to transmit over a large distance // a LAN is over a small geographical area.</li> <li>WAN uses <u>external</u> hardware/infrastructure/cables/network // LAN has its <u>own</u> infrastructure/cables/network/hardware due to distance/practicalities</li> </ul>	2	NB Examples of infrastructure/hardware are allowed for WAN e.g. satellite, phone lines, Internet Allow LAN as <u>Ethernet</u> for second bullet NOT wide area for WAN
7	b		<ul> <li>2 marks per benefit</li> <li>E.g.</li> <li>All files can be stored centrally <ul> <li>so workers can access files from any computer</li> <li>all computers can update the central database/file</li> <li>Peer-to-peer files might be stored on their own computers/spread across many computers</li> </ul> </li> <li>Backups are central <ul> <li>all data is backed up each time</li> <li>individual computers do not need to backup their own data</li> <li>Peer-to-peer may need to perform their own backups.</li> </ul> </li> <li>Monitor clients <ul> <li>to ensure they are working correctly</li> </ul> </li> <li>Upgrade software centrally <ul> <li>so you do not have to install on each computer individually</li> </ul> </li> <li>Central security (antivirus/firewall) <ul> <li>do not need to install protection on all computers</li> <li>Peer-to-peer individual security may need to be installed on individual computers</li> </ul> </li> </ul>	4	Do not allow: -easy to share data -"more secure"

Mark Scheme

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Q	Question		Answer/Indicative Content	Marks	Guidance
7	С		<ul> <li>WWW is the web pages (that are stored on servers)</li> <li>Internet is the infrastructure // collection of networks</li> </ul>	2	

Question		on	Answer/Indicative content	Mark	Guidance
8	а		10111111	1	
8	b		1 mark per nibble	2	
			1100 0110		
9			<pre>1 mark per bullet • Taking the move as input • Checking if array element input is free • oOutputting if it is taken • Writing "A" to the correct array element • Counting how many free space there are • oOutputting the number of free spaces (if good attempt at counting free spaces) e.g. INPUT move IF numbers (move) = "" then numbers (move) = "A" ELSE output "taken" ENDIF free = 0 FOR x = 0 TO 100 IF numbers (x) = "" then free = free + 1 ENDIF NEXT x OUTPUT free e.g. INPUT move IF numbers (move) = "A" numbers (move) = "A" numberFree = numberFree - 1 ELSE output "taken" ENDIF OUTPUT numberfree OUTPUT numberfree</pre>	6	<ul> <li>The output mark can only be awarded if a reasonable attempt at adding the free spaces have been performed</li> <li>Counting how many free spaces there are can be done by either: <ul> <li>Looping through each element of the array and updating a variable if free/taken</li> <li>Subtracting 1 each time an element is taken (this must work, i.e. there is no initialisation of the variable e.g. to 101, as that would run every time and reset the variable). If Initialisation is used, this must be outside a loop and must be 101.</li> </ul> </li> </ul>

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# GCSE

# Computing

Unit A451: Computer systems and programming

General Certificate of Secondary Education

## Mark Scheme for June 2017

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Annotations

Annotation	Meaning
BP	Blank Page – this annotation <b>must</b> 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.
	Omission mark
BOD	Benefit of doubt
E	Subordinate clause/Consequential error
×	Cross
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
Р	Point being made
REP	Repeat
1	Slash
<b>√</b> *	Tick
TV	Too vague
0	Zero (big)

### MARK SCHEME

G	Question		Answer / Indicative Content	Mark	Guidance
1	а		<ol> <li>mark per bullet to max 2</li> <li>Hardware</li> <li>Software</li> <li>Allows for <u>input</u>, process and output</li> </ol>	2	All of input, process and output required for third bullet. Do not accept examples of hardware/software.
1	b	i	Input: to allow instructions/data/commands/destination_to be input/entered/given/example (e.g. entering a post code)	1	Do not accept "information".
1	b	ii	<ol> <li>mark for input device, 1 for sensible use of device e.g.         <ul> <li>Microphone</li> <li>to let the user say their destination/voice recognition</li> </ul> </li> <li>Touch screen</li> <li>let the user press options/enter data</li> <li>Keyboard / braille keyboard</li> <li>to let the user enter their destination</li> <li>Camera</li> <li>to let the user enter/select options by moving their eye/use an eye typer</li> <li>Puff/suck switch</li> <li>to allow the users to select options</li> </ol>	2	<ul> <li>Allow any reasonable input device, do not accept software e.g. voice recognition. Do not accept "sensor" without detailing what type of sensor.</li> <li>Accept "braille keyboard" but do not accept "braille" on its own. Accept buttons.</li> <li>Second mark is awarded for a sensible use of the device – for example, what is inputted (eg the destination) or how it is inputted (eg inputted using your voice).</li> <li>If input device is incorrect, <u>do not</u> award follow on mark for use.</li> </ul>
1	С	i	<ol> <li>mark for why, 1 for application</li> <li>Long term/permanent/non-volatile/persistent storage</li> <li>Store maps//user preferences//journey history//operating system//sat nav software</li> </ol>	2	Second bullet point must be related to the sat nav, not just generic "programs" or "data".

A451			Mark Schem		June 20	
1	C	ii	<ol> <li>mark for identifying the reason why solid state was chosen, 1 for explanation e.g.         <ul> <li>Is durable/robust//no moving parts</li> <li>Less likely to be damaged//by example (eg dropped)</li> </ul> </li> <li>Faster read/write speed</li> <li>Faster to boot//faster to load maps//more responsive</li> <li>Small in size/light in weight</li> <li>Reduces size of the sat nav// fit inside the sat nav</li> <li>Lower power requirements</li> <li>More suitable for running off batteries</li> </ol>	2	Do not accept portability / reliability. Do not accept "faster" without clarification of what is faster.	
1	d	i	<ol> <li>mark per bullet to max 1</li> <li><u>Fetch data/instructions</u></li> <li><u>Decode data/instructions</u></li> <li><u>Execute instructions</u></li> <li>Performs fetch-(decode)-execute cycle</li> <li>Performs calculations/arithmetic/logical operations</li> </ol>	1	Must include fetch / decode / execute as verb for first three bullet points. Must include reference to either data or instructions. Allow reference to tasks carried out by the Control Unit.	
1	d	ii	<ul> <li>1 mark per bullet to max 2</li> <li>Computers are made of logic gates/transistors/switches</li> <li>which can only be two states / on or off / 1 or 0 /high or low</li> </ul>	2	Second point dependent on first bullet point being awarded.	

2	а	i	<ol> <li>1 mark         <ol> <li>e.g.</li> <li>Tags</li> <li>Hyperlinks</li> <li>Location/dimensions/name of images/videos/sound</li> <li>Structure / e.g. table</li> <li>Layout instructions</li> <li>Formatting e.g font/colour/style</li> <li>Metadata</li> </ol> </li> </ol>			s/sound	1	Accept any valid item that could be in a HTML file e.g. a link to a CSS file Accept other languages/scripting that could embedded into a HTML document, eg CSS/Javascript/etc. Do not accept: image, video etc. The HTML file holds a link to the files, not the actual image or video itself. Mark first answer only.
2	а	ii	<ul> <li>1 mark per bullet to max 2</li> <li>All webpages are made using HTML</li> <li>All <u>browsers</u> read/understand HTML</li> <li>Allows for compatibility</li> <li>Allows devices to understand the same code/display the webpage correctly</li> </ul>			e/display the	2	
2	b	i	1 mark for gettin 2 marks for getti	g 1 correct ng both correct			2	
				Red	Green	Blue		
			Decimal	111	58	156		
			Hexadecimal	6F	3A	9C		
2	b	ii	<ul> <li>1 mark per bullet to max 1</li> <li>Easier to remember/to enter/to read</li> <li>Faster to enter/read</li> <li>Fewer digits to remember/to enter/to read</li> <li>Less prone to error <u>when</u> <u>entering/reading/communicating</u></li> <li>Quick to convert into binary</li> </ul>				1	Do not accept "easier to understand" "Less prone to error" requires further detail as shown.

A451		Mark Schem	ieme		
2	C	<ol> <li>1 mark per bullet to max 2</li> <li>Compression makes the file size smaller//takes up less space (on Shannon's computer)</li> <li>File(s) upload more quickly / lower bandwidth required</li> <li>File(s) take up less storage space <u>on the web server</u></li> <li>File(s) can be downloaded/streamed more quickly by the end user//website will load more quickly</li> </ol>	2		
2	d	<ol> <li>mark per bullet, to max 3</li> <li><u>URL/domain name</u> is sent to the DNS</li> <li>DNS has a list/database/table of URLs and matching IP addresses.</li> <li>DNS looks up/translates/resolves/searches/finds the IP address</li> <li>DNS sends back IP address (to web browser)</li> <li>If not found, refers to higher/other DNS/returns error</li> <li>DNS updates from other DNS</li> <li>Browser uses IP address to retrieve webpage / connect to web server.</li> </ol>	3	Do not accept "each URL has an associated IP address" on its own.	

3	а		1 mark for each pseudocode statement	2	Ignore capitalisation.
			<pre>Total = Total + NumberArray(Count) Mean = Total/Quantity Or Mean = Total/Count Or Mean = Total/10</pre>		Accept any correct symbol or structured English meaning division for mean calculation. Accept mean calculations that refer to 11 numbers: e.g. • Total/11 • Total/(Count+1) • Total/(Quantity+1)
3	b		<ul> <li>1 mark per bullet, max 2 for definition, 1 for example Definition: <ul> <li>A location in memory</li> <li><u>A value/data</u> that <u>cannot</u> be changed (whilst the program is running)</li> </ul> </li> <li>Example: <ul> <li>Quantity</li> </ul> </li> </ul>	3	0 marks for "stays the same" / "does not change". Must have the idea that it cannot / is impossible to change. Correct answer only ("Quantity") for the example. Do not accept other surrounding code (eg "Const Quantity = 10" is incorrect). Do not accept incorrect spellings. Ignore capitalisation.
3	С		1 mark for data type, 1 for justification Data type: Real/Float/Single/Double/Decimal Justification: can be decimal/fractional/not a whole number	2	Do not accept "a constant is a variable that…" If candidate uses "decimal" as data type, do not accept "can be decimal" for the justification. Do not award justification if data type is incorrect.
3	d	i	<ol> <li>mark per bullet, to max 2</li> <li>A <u>construct</u></li> <li>Code is executed/run repeatedly//is looped</li> <li>Until a condition is met/while a condition is true/a set number of times</li> </ol>	2	Do not accept only an example (eg "for loop").
3	d	ii	<ul> <li>While/do while</li> <li>Repeat/ Repeat until/do until/ Until</li> </ul>	2	Do not accept "do loop".

3	e		<ul> <li>1 mark for sensible borderline data, 1 mark for sensible invalid data.</li> <li>Borderline – 0, 100</li> <li>Invalid – number less than 0 (eg -1, -12) / number more than 100 (eg 101, 206) / non-numeric data (eg "test", "#!*%")</li> </ul>	2	
4	а		<ul> <li>1 mark per bullet to max 2</li> <li>The data is stored permanently / is unchanging / remains when the DBMS or application is closed / non- volatile / on secondary storage</li> <li>The data has a structure / stored in tables / fields / records</li> </ul>	2	Accept rows / columns as alternative to records / fields for second bullet point.
4	b	i	1 mark for data type, 1 for justification Data type: Text/String Reason: leading 0s/will not be treated as a number	2	Accept Alphanumeric/Varchar/Char as alternatives for Data type. Do not award reason if data type is incorrect.
4	b	ii	4	1	Correct answer only.
4	b	111	1 mark for Field name, 1 for reason Field: RequestID Reason: it will be unique/each request will have a unique number/it will not be repeated/other fields can be repeated	2	Do not award reason if field is incorrect. Do not penalise incorrect spelling or capitalisation.
4	C	İ	Max 1 mark per validation rule. Both rules must be different, e.g. cannot both be presence TeacherID e.g. • Presence check//must be entered • Format check//must be letters then numbers • Existence check//must already exist in the database • Lookup//must be selected from a list of valid teachers • Type/character check//must be string • Length check//must be (minimum of) 3 characters long	2	Accept any reasonable validation rule for a field Accept name of a rule, or example Mark first answer only if candidates have provided multiple validation techniques for each.

A4	51		Mark Schem	ne	June 2017
			Date e.g. Range check//must be within certain dates Presence check//must be entered Format/character check//must be DD/MM/YYYY Type check//must be a valid date Length check//must be 8/10 characters Lookup/existence check//must be a valid date (eg from calendar)		
4	С	ii	<ul> <li>3 marks for each feature, 1 for identifying, 1 for description, 1 for example use</li> <li>e.g</li> <li>Query</li> <li>Use to select specific information // find records that match a criteria // search for records // extract data</li> <li>e.g. Find all requests made on a specific date</li> <li>Form</li> <li>User friendly way to enter data // uses drop down boxes etc.</li> <li>e.g. form to enter a new request</li> <li>Report</li> <li>User friendly/formatted copy of results // can be used as a hard copy // method of outputting data</li> <li>e.g. report of all requests made by one teacher for printing</li> <li>Security</li> </ul>	6	<ul> <li>The feature identified must be a feature of a DBMS and not a database.</li> <li>Allow any sensible example that relates to this database.</li> <li>If feature is incorrect, do not award marks for description or example.</li> <li>If feature is poorly identified (eg search instead of query), give credit for matching description / example but not for identification.</li> <li>Mark feature/description/example together.</li> <li>Allow table <u>creation</u> / editor / modules / integrity checks / access control / concurrent access / creating links between tables.</li> <li>Do not accept validation (in the question)</li> </ul>
			<ul> <li>Security</li> <li>Stop unauthorised access or modification</li> <li>e.g. usernames and passwords</li> </ul>		Do not accept tables / fields/ key fields (all features of a database, not a DBMS).

### Mark Scheme

5*	<ul> <li>Points may include: Ethical issues: <ul> <li>Safer driving as no room for human error</li> <li>Can machines make snap judgements, taking into account all factors – can impact safety</li> <li>Cars can react to the facts, i.e. avoid accidents</li> <li>Can record where people go and when they go – how is this data going to be stored, or used?</li> <li>Impact on pollution (negative and positives)</li> <li>Impact on employment (taxis / delivery drivers)</li> </ul> </li> <li>Legal issues: <ul> <li>Cars will not break traffic laws, e.g. run red lights</li> <li>Issues with who is legally the driver</li> <li>Is a drivers' licence needed?</li> <li>Who is legally liable/responsible in an accident?</li> <li>Insurance requirements</li> <li>Data Protection issues with data generated</li> <li>Possibility of "hacking" into cars</li> <li>May need to change or adapt existing laws</li> </ul> </li> <li>Many points can be considered from both an ethical and legal point of view.</li> </ul>	6	<ul> <li>High Level Response (5-6): <ul> <li>A detailed discussion of at least one ethical and one legal issue, with clear explanations that are linked to the scenario. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</li> </ul> </li> <li>Medium Level Response (3-4): <ul> <li>A description of an ethical and/or a legal issue with some explanation/justification that may be weak at times. Material may not be explicitly linked to the context. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</li> </ul> </li> <li>Low Level Response (1-2): <ul> <li>There is an attempt to describe either a legal issue or ethical issue. The points are poorly expressed or are not related to the context. There is limited, if any, use of technical terms. Errors in grammar, punctuation and spelling may be intrusive.</li> <li>0 marks, response not worthy of credit</li> </ul> </li> </ul>
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6	2	May 2 par explanation 1 for example	6	Accept any other reasonable benefit for using a network in
σ	a	1 iviax $2$ per explanation, 1 for example	O	this sconario, except for monitoring
		e.y.		this scenario, except for monitoring.
		• Share files between computers/employees // by		Mark question as a whole
		example Controlized data storage // by example		
		Centralised data storage // by example		3 <sup>rd</sup> mark is awarded for example linked to the scenario, so
		Allows for collaborative working // by example		max 2 per benefit if no example diven
		<ul> <li>More efficient working practices // by example</li> <li>OOD Assess to use a share disting to share used.</li> </ul>		max 2 per benent il no example given.
		• e.g. OCR Accounts use a snared drive to share work		
		<ul> <li>Share devices / printers / routers // by example</li> </ul>		
		<ul> <li>Share devices / printers / rodiers // by example</li> <li>Fower peripherals / printers required// by example</li> </ul>		
		<ul> <li>Tewer periprierals / printers required// by example</li> <li>Save money in purchasing equipment// by example</li> </ul>		
		• Save money in purchasing equipment/ by example		
		• e.g. OCK Accounts only needs 1 printer, father than 1		
		per employee		
		<ul> <li>Improved communication // by example</li> </ul>		
		Can use e-mail/other appropriate means // by example		
		<ul> <li>e a OCR Accounts can e-mail documents/work</li> </ul>		
		Central management of security // by example		
		Anti-virus/firewall/security is configured for all		
		computers // by example		
		e g each computer at OCR Accounts does not need		
		its own security		
		Centralised backups // by example		
		Can backup all computers automatically // by example		
		e.g. OCR Accounts can backup data for all staff		
		•		
		Centralised updates // by example		
		<ul> <li>Can update all computers at the same time // by</li> </ul>		
		example		
		e.g. OCR Accounts can update software without		
		having to visit everyworkstation.		

A451			Mark Sch	Mark Scheme	
6	b	i	Modem/Router	1	

6	b	ii	max 2 marks per hardware device	4	Accept any hardware device that can be used to create/set
			e.g.	-	up/produce a network.
			• NIC		
			to connect Ethernet cable to computer		Device must be different than answer given in 6bi
			Router		Accept repeater / range extender / powerline adaptor etc.
			to receive and transmit data within the network/to		
			send data around a network/to join networks		
			together/to connect to the Internet		
			- Pridao		
			<ul> <li>Diluge</li> <li>connect networks together</li> </ul>		
			• Switch		
			to connect multiple devices together / directs traffic		
			to its destination.		
			• Hub		
			…to connect multiple devices together.		
			• Server		
			to store the data/manage the network/store backups		
			- Wireless Assess Deint/MAD		
			• Wileless Access Folill WAP		
			Cables		
			to connect devices together		
			Modem		
			•to connect computers via telephone lines // to covert		
			digital data to analogue / to convert analogue data to		
			digital.		

6	C*	Points may include:	6 High Level Response (5-6):
		Acceptable use	A detailed discussion of network policies, covering points
		<ul> <li>Define what employees can/ca</li> </ul>	annot do on a from at least <b>two</b> different policies, with clear explanations of
		network	purpose that are linked to the scenario.
		<ul> <li>Restrict employees to only per</li> </ul>	forming work There will be few if any errors in spelling, grammar and
		tasks	punctuation. Technical terms will be used appropriately and
		<ul> <li>Stop illegal activities such as a</li> </ul>	ccessing correctly.
		inappropriate material, downlo	ading software
		Disaster recovery	Medium Level Response (3-4):
		<ul> <li>A plan in case something happenet.</li> </ul>	bens to the A description of some network policies, covering points from
		computers/network/data	at least <b>two</b> policies, with some explanation/justification that
		<ul> <li>A plan to allow recovery to avoid</li> </ul>	bid may be weak at times. Material may not be explicitly linked
		downtime/restore the network/	data to the context. There may be occasional errors in spelling,
		Failover	grammar and punctuation. Technical terms will be mainly
		<ul> <li>Backup devices ready to autor</li> </ul>	natically take correct.
		over if a device fails	Level Decrement (1.0)
		<ul> <li>Allows the company to continu</li> </ul>	e working
		<ul> <li>Avoids downtime</li> </ul>	The points are poorly everypoord or are not related to the
		Backup	context. There is limited if any use of technical terms
		<ul> <li>A plan for when data is backed</li> </ul>	Tup
		<ul> <li>How it is backed up</li> <li>W/ba is responsible for it</li> </ul>	intrusive
		<ul> <li>vvno is responsible for it</li> <li>Where it is backed up ato</li> </ul>	
		o where it is backed up etc.	0 marks, response not worthy of credit
		Archiving     Bomoving old data that is no li	anger needed but
		kept in case peeded	
			mouter
		<ul> <li>Plan of when data will be arch</li> </ul>	ived what will be
		archived etc	
		Security	
		<ul> <li>Usernames / passwords / auth</li> </ul>	entication
		• Encryption	

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7	<pre>1 mark per bullet: • Storing a number for the user to guess • Loops 10 times correctly • Inputs the user's guess • If correct, outputs congratulations and stops the loop / ends the game (any appropriate method of breaking out of loop) • If the guess is greater than stored number, outputs lower (or similar) • If the guess is lower than stored number, outputs higher (or similar) • If the guess is lower than stored number, outputs higher (or similar) • e.g. using while loop num = 50 // (could be a random number) x = 0 while x &lt; 10 input guess if guess == num then output "Congratulations" x = 10 elseif guess &gt; num then output "lower" else output "higher" endif</pre>	6	Allow pseudocode, flowchart, or structured English as long as it is not just repeating the instructions and where it meets the bullet points. If candidate uses FOR loop, accept 0 to 9 / 0 to 10 / 1 to 10 / 1 to 11 (or equivalent) as valid for 2 <sup>nd</sup> bullet point.	
	end while			
	<pre>e.g. example using for loop num = 50 // (could be a random number) for x = 1 to 10 input guess if guess == num then output "Congratulations" end // (could be break / exit, or x = 10) elseif guess &gt; num then output "lower" else</pre>			
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		output "higher" endif next		

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