

AQA Computer Science A-Level
4.6.1 Hardware and software
Past Paper Mark Schemes

Additional Specimen AS Paper 2

06		<p>2 marks for AO1 (knowledge) and 4 marks for AO1 (understanding)</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 10%; text-align: center;">Level</th> <th style="width: 50%;">Description</th> <th style="width: 40%; text-align: center;">Mark Range</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3</td> <td>A detailed description where the student identifies the three other types of system data and provides examples that shows a good level of understanding.</td> <td style="text-align: center;">5-6</td> </tr> <tr> <td style="text-align: center;">2</td> <td>An adequate description where the student identifies at least two other types of system data and provides examples that shows a reasonable level of understanding.</td> <td style="text-align: center;">3-4</td> </tr> <tr> <td style="text-align: center;">1</td> <td>A small number of points recalled but little or no understanding shown.</td> <td style="text-align: center;">1-2</td> </tr> </tbody> </table> <p>Type of system software translators utility programs library programs</p> <p>Description points operating system: - provides a user interface between the user and the hardware - runs application programs</p>	Level	Description	Mark Range	3	A detailed description where the student identifies the three other types of system data and provides examples that shows a good level of understanding.	5-6	2	An adequate description where the student identifies at least two other types of system data and provides examples that shows a reasonable level of understanding.	3-4	1	A small number of points recalled but little or no understanding shown.	1-2	6
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1	A small number of points recalled but little or no understanding shown.	1-2													

		<p>- manages resources / hardware</p> <p>utility programs: - programs designed to help configure / optimize / maintain the computer - examples include virus scanner / disk defragmenter / system monitor / file managers</p> <p>library programs: - are collections of resources used to develop software - include pre-written code and subroutines</p> <p>translators: - convert source code into machine code - assembler converts assembly code into machine code - compiler converts source code written in a high level language into machine code - interpreter treats high level language source code as data and interprets that data as instructions to its own routine</p>	
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January 2009 Comp 2

1	(a)	the <u>electrical/ physical</u> components/parts (electronic circuits) of the computer; <i>A by example (only acceptable on this occasion)</i>	1
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	b	programs (sequences of instructions) which run on the hardware/computer;	1
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2	Software	Category (letter only)	4
	Spreadsheet Software	D;	
	Anti-virus software	C; <i>Accept A</i>	
	Operating System	A; <i>If not given above</i>	
	Air Traffic Control Software	E // B;	

(b)	(i)	Assembler;	1
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	(ii)	Compiler; R Interpreter	1
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January 2010 Comp 2

6		<p><i>General purpose software-</i></p> <ul style="list-style-type: none"> • Carries out many different tasks/variety of tasks; A more than one task NE tasks • Any reasonable example e.g. word processor, spreadsheet; <p><i>Bespoke software-</i></p> <ul style="list-style-type: none"> • Bespoke; • Written to a particular customer's requirements/needs; • Example of bespoke software package must clearly have been made for a particular organisation or is implicit from the application (likely to be very large scale or hardware related); n.b. stock control system NE where as stock control system for particular company is correct <p><i>Special purpose software-</i></p> <ul style="list-style-type: none"> • Special purpose; • Carries out one/a specific/particular task; A just one task • Any reasonable example e.g. stock control, accounting, route planning, web browser, air traffic control; <p>R anti-virus</p> <p><i>General points-</i></p> <ul style="list-style-type: none"> • Off-the-shelf // immediate availability for either general purpose or special purpose/bespoke is NOT immediately available/not off the shelf; (once only) • If contradictory examples for any class of software T.O. 			
Mark Bands and Description					
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center; vertical-align: top; border-right: 1px solid black;">5-6</td> <td style="padding: 5px;"> <p><i>To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QLx).</i></p> <p><i>SUB</i> Candidate has made at least 5 relevant points, including at least one from each type of software.</p> <p><i>QL1</i> Text is legible.</p> <p><i>QL2</i> There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear.</p> <p><i>QL3</i> The candidate has selected and used a form and style of writing appropriate to the purpose and has expressed ideas clearly and fluently.</p> <p><i>QL4</i> Sentences and paragraphs follow on from one another clearly and coherently.</p> <p><i>QL5</i> Appropriate specialist vocabulary has been used.</p> </td> </tr> </table>				5-6	<p><i>To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QLx).</i></p> <p><i>SUB</i> Candidate has made at least 5 relevant points, including at least one from each type of software.</p> <p><i>QL1</i> Text is legible.</p> <p><i>QL2</i> There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear.</p> <p><i>QL3</i> The candidate has selected and used a form and style of writing appropriate to the purpose and has expressed ideas clearly and fluently.</p> <p><i>QL4</i> Sentences and paragraphs follow on from one another clearly and coherently.</p> <p><i>QL5</i> Appropriate specialist vocabulary has been used.</p>
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Mark Bands and Description	
3-4	<p><i>To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QLx).</i></p> <p><i>SUB</i> Candidate has made at least 3 relevant points, including at least one point from two different types of software</p> <p><i>QL1</i> Text is legible.</p> <p><i>QL2</i> There may be occasional errors of spelling, punctuation and grammar. Meaning is clear.</p> <p><i>QL3</i> The candidate has, in the main, used a form and style of writing appropriate to the purpose, with occasional lapses. The candidate has expressed ideas clearly and reasonably fluently.</p> <p><i>QL4</i> The candidate has used well-linked sentences and paragraphs.</p> <p><i>QL5</i> Appropriate specialist vocabulary has been used.</p>
1-2	<p><i>To achieve a mark in this band, candidates must meet the subject criterion (SUB). The quality of language should be typified by the QLx statements.</i></p> <p><i>SUB</i> Candidate has made at least 1 relevant point.</p> <p><i>QL1</i> Most of the text is legible.</p> <p><i>QL2</i> There may be some errors of spelling, punctuation and grammar but it should still be possible to understand most of the response.</p> <p><i>QL3</i> The candidate has used a form and style of writing which has many deficiencies. Ideas are not always clearly expressed.</p> <p><i>QL4</i> Sentences and paragraphs may not always be well-connected or bullet points may have been used.</p> <p><i>QL5</i> Specialist vocabulary has been used inappropriately or not at all.</p>
0	Candidate has made no relevant points.
<p>Note: Even if English is perfect, candidates can only get marks for the points made at the top of the mark scheme for this question.</p> <p>If a candidate meets the subject criterion in a band but does not meet the quality of language criteria then drop mark by one band, providing that at least 3 of the quality of language criteria are met in the lower band. If 3 criteria are not met then drop by two bands.</p>	
6	

January 2011 Comp 2

6	a	system (software) / operating system; R – OS A – (device) driver	1
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6	b	i	Software that can carry out many tasks// has many purposes/uses; NE “many things” // “many functions” // “general purposes” R for everyday use/tasks	1
6	b	ii	Word processor, spreadsheet, database, desktop publishing/DTP, presentation or other suitable example; R web browser // image/photo editor	1
6	c	i	(It is) immediately available; A “off the shelf” (It has a) lower cost as development costs shared amongst many; NE cheaper Wide range of training/support available; Regular upgrades available; Can hire staff with experience of package; More likely to be bug-free as already in widespread use/“tested” by many users; A it has been “tried and tested” R no bugs / tested more	MAX 2
6	c	ii	No appropriate software to solve the problem exactly; The only way to obtain software to do exactly/precisely what they want // may need particular features not in special purpose software // will be developed to match	

January 2013 Comp 2

1			<p>Hardware: physical components // devices (that make up the computer) // electrical circuit // electrical components (that make up the computer);</p> <p>NE components</p> <p>Software: programs/instructions that are run/executed (by the computer);</p> <p>A. codes that are run/executed A. programs that enables computer to run A. programs that allow user to perform tasks</p>	2	Need both parts to gain mark
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June 2010 Comp 2

1	(a)	(i)	<p>Hardware: <u>Electrical/physical</u> components/parts/circuits of the computer; R Examples R Just components/parts NE R Physical device NE R System</p>	1
1	(a)	(ii)	<p>Software: Programs/sequences/series of instructions which run / execute (on) the hardware/computer ; R Examples only R Application NE R Code NE</p>	1

1	(b)	1. Special Purpose (software); A Specialist / Specific purpose (software) 2. General Purpose (software); 3. System Software; A Systems Software 4. Utilities;	4
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June 2011 Comp 2

1	a	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>General Purpose</th> <th>Special Purpose</th> <th>Bespoke</th> </tr> </thead> <tbody> <tr> <td>Word Processor</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Payroll</td> <td></td> <td>✓</td> <td>A ✓</td> </tr> <tr> <td>Flight control software</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>		General Purpose	Special Purpose	Bespoke	Word Processor	✓			Payroll		✓	A ✓	Flight control software			✓	3
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Word Processor	✓																		
Payroll		✓	A ✓																
Flight control software			✓																
R Answers with more than one tick on a row.																			
1	b	1 – Operating System; R OS, Operating Software 2 – Assembler / Compiler / Interpreter; TO “assembly language” 3 – Backup / Anti virus / defragmenter / encryption / compression / archive / system profilers / application launchers; Accept any other examples of a utility	3																

June 2012 Comp 2

1	a	Comp	S/ware	Hardware	Hardware and software	3
		Wireless router			TICK;	
		Compiler	TICK;			
		Keyboard		TICK;	A TICK;	
<p>A – crosses used rather than ticks R – answers where two columns have been ticked in a single row</p>						

1	b	i	<p>Provide an interface between the computer and user; To manage devices/files/memory; To provide a virtual machine; To provide a software platform on which other programs can run// to run application software; To hide the complexity of the hardware from the user;</p> <p>NE to allow user to use hardware R to execute commands</p>	MAX 1	
1	b	ii	<p>To allow sharing of run-time code across programs; To save memory as routines are only loaded when needed;</p> <p>To provide access to procedures/functions when writing a program; To reduce amount of programming required // time taken to write program;</p>	MAX 1	

1	c	i	<p>Meets all of the end-user requirements; Only performs necessary functions; Can be fitted into existing hardware/software;</p>	MAX 1	
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1	c	ii	<p>More expensive as have to cover production costs; Not available immediately // have to wait for software to be written; Less widely tested so more likely to contain bugs; Lack of 3rd party support;</p> <p>NE – (more) expensive R “no testing”</p>	<p>MAX 1</p>
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June 2012 Comp 3

1			<p>Processor management // Allocation of processors // Allocation of processor time // (process) scheduling // thread management; A processing management Allocation/management of RAM / memory // allocation of buffers; Allocation/management of / control of I/O devices/peripherals // I/O management // device driver management; File / backing store / secondary store management / access / organisation; Power / battery management;</p> <p>A Interrupt handling; A Provision of Application Program Interface / API; A interface between hardware and applications A Provision / management of (windows in) user interface; A Management of system security; A Answers by example, only one example of each type A A description of a type of software management but not just “software management”. e.g. loading of programs, software installation, registering DLLs.</p> <p>R Software management alone unless role of OS in this is clear e.g. installation of new software, updating registry</p> <p>MAX 3</p>	<p>3</p>
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June 2013 Comp 2

7	(e)	<p>Word processor : General purpose (application software);</p> <p>Parent portal : Bespoke;</p> <p>Web server : Special purpose (application software);</p>	3
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June 2009 Comp 2

5	(a)	<p><i>Rationale:</i> The key difference is that application software performs a user oriented task whereas system software performs a machine oriented task.</p> <p><i>Application Software –</i> Used to perform task that is independent of computer/that user would have to do if didn't have computer/real world task;</p> <p>A You for user A Performs a task for the user R Task MAX 1</p> <p><i>System Software –</i> Software that performs tasks to run computer; Layer of software which enables user to operate computer;</p>	
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		<p>Interface between user and computer;</p> <p>Hides complexity of computer from user/provides virtual machine;</p> <p>Software that lets user communicate with/manage hardware;</p> <p>Software to run applications/hardware/programs/computer/ packages;</p> <p>Software required to make computer work;</p> <p>MAX 1</p>	2
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	(b)	<p>Operating System;</p> <p>Library program; NE Library</p> <p>Translator/Compiler/Interpreter/Assembler; A Translation</p> <p>R Examples of types MAX 2</p>	2
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Specimen AS Paper 2

05	2	Marks are for AO1 (understanding) Greater scrutiny/checking of code; Weaknesses in the routines can be spotted and publicised; The security of the routines can be tested/validated by third parties; Other programmers can learn from the code; From a philosophical point of view source code should be available; Might encourage further development of the program; Max 2 marks	MAX 2
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04	1	<p>All marks AO2 (apply)</p> <table border="1"> <thead> <tr> <th data-bbox="418 275 532 348">Level</th> <th data-bbox="532 275 1166 348">Description</th> <th data-bbox="1166 275 1284 348">Mark Range</th> </tr> </thead> <tbody> <tr> <td data-bbox="418 348 532 884">4</td> <td data-bbox="532 348 1166 884"> <p>A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. The response covers all four areas indicated in the guidance below and in at least three of these areas there is sufficient detail to show that the student has a good level of understanding of the technologies required. A good level of understanding would be indicated by three substantiated points being made per area. To reach the top of this mark range, a good level of understanding must be shown of all four areas.</p> </td> <td data-bbox="1166 348 1284 884">10-12</td> </tr> <tr> <td data-bbox="418 884 532 1171">3</td> <td data-bbox="532 884 1166 1171"> <p>A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response but the response may only cover three of the areas indicated in the guidance below, with two or three substantiated points being made per area.</p> </td> <td data-bbox="1166 884 1284 1171">7-9</td> </tr> <tr> <td data-bbox="418 1171 532 1430">2</td> <td data-bbox="532 1171 1166 1430"> <p>A limited attempt has been made to follow a line of reasoning by covering at least two of the topic areas in the guidance below. Overall, at least four valid points must have been made which can relate to any of the topic areas in the guidance.</p> </td> <td data-bbox="1166 1171 1284 1430">4-6</td> </tr> <tr> <td data-bbox="418 1430 532 1650">1</td> <td data-bbox="532 1430 1166 1650"> <p>A few relevant points have been made but there is no evidence that a line of reasoning has been followed. The points may only relate to one or two of the four areas from the guidance or may be made in a superficial way with little substantiation.</p> </td> <td data-bbox="1166 1430 1284 1650">1-3</td> </tr> </tbody> </table>	Level	Description	Mark Range	4	<p>A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. The response covers all four areas indicated in the guidance below and in at least three of these areas there is sufficient detail to show that the student has a good level of understanding of the technologies required. A good level of understanding would be indicated by three substantiated points being made per area. To reach the top of this mark range, a good level of understanding must be shown of all four areas.</p>	10-12	3	<p>A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response but the response may only cover three of the areas indicated in the guidance below, with two or three substantiated points being made per area.</p>	7-9	2	<p>A limited attempt has been made to follow a line of reasoning by covering at least two of the topic areas in the guidance below. Overall, at least four valid points must have been made which can relate to any of the topic areas in the guidance.</p>	4-6	1	<p>A few relevant points have been made but there is no evidence that a line of reasoning has been followed. The points may only relate to one or two of the four areas from the guidance or may be made in a superficial way with little substantiation.</p>	1-3	12
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<p>PhysicsAndMathsTutor.com</p>		<p><u>Guidance – Indicative Response</u></p>																

1. Fridge capturing data from food

RFID well suited as completely automatic short-range wireless transmission so no user involvement

- tag does not contain a power source but is energised by reader in fridge
- this causes wireless transmission of data stored in memory on tag to reader

Alternatively, scan barcode/QR code as food put into fridge

Barcode less suitable than RFID as only identifies product not use by date and must be manually scanned

Problem of how to deal with untagged produce – possible use of voice recognition or touch screen interface

Can identify products and potentially track use by dates, but how to work out how much of the product is left – refrigerators redesigned with load cells to weigh items automatically?

2. Networking technologies

IPv4 does not have a big enough address space for the number of devices, hence introduction of Ipv6

Higher bandwidth Internet connections required for so many devices

- copper-based transmission systems replaced with fibre optic
- Need for a standard (application layer) protocol for devices

Security issues with many devices connected to Internet that could be hacked

Would data be communicated to retailers directly from each device or through a server in the home?

Need to consider how to deal with interference between wireless devices, collisions etc with many more devices communicating

3. The data gathered and storage

Automatic collection of data from devices will produce vast amounts of data

This volume of data would be classified as big data

May also be classified as big data due to the velocity of data collection with so many devices

Storage could be cloud based for flexibility or close to processing cores for speed

Velocity at which data generated would make solid state storage appropriate as has fast access speeds but volume of data and lower cost per megabyte of hard disk storage may mean hard disks more likely to be used

Need to consider how long to keep data for in context of

- Storage capacity available
- Complying with relevant laws about privacy

4. Processing

	<p>Volume of data means parallel processing or distributed processing architectures required</p> <p>Volume of data collected makes it unsuitable for processing by traditional relational databases</p> <p>Functional programming is one approach that could be used</p> <p>Functional programming appropriate as works well on parallel processing systems as programs do not specify order of execution</p> <p>Would software that managed contents of the fridge be run as embedded system in fridge or in the cloud / by the retailer?</p> <p>Retailers may develop a standard API to interface with devices</p>	
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