

AS Level **Computing**

COMP2 – Computer Components, The Stored Program Concept and the Internet
Mark scheme

2510
June 2015

Version: Final Mark Scheme

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

The following annotation is used in the mark scheme:

- ;** - means a single mark
- //** - means alternative response
- /** - means an alternative word or sub-phrase
- A** - means acceptable creditworthy answer
- R** - means reject answer as not creditworthy
- NE** - means not enough
- I** - means ignore
- DPT** - means "Don't penalise twice". In some questions a specific error made by a candidate, if repeated, could result in the loss of more than one mark. The **DPT** label indicates that this mistake should only result in a candidate losing one mark, on the first occasion that the error is made. Provided that the answer remains understandable, subsequent marks should be awarded as if the error was not being repeated'.

Qu	Part	Sub-part	Marking Guidance	Marks	Comments
1	a		operand; R operand code	1	
1	b	i	PC 0010; MAR 0001; MBR 00100100;	3	
1	b	ii	<p>The instruction is held in the CIR // instruction in CIR is decoded; A IR</p> <p>The control unit/instruction decoder decodes the instruction; NE the processor decodes the instruction</p> <p>Instruction will be split into opcode and operand; R if it is implied that a register will do this splitting/decoding</p> <p>Relevant part of processor/CPU executes instruction // using ALU to perform calculations; A instruction executed by the control unit / ALU NE processor executes instruction</p> <p>Further memory fetches/saves carried out if required;</p> <p>Result of computation stored in accumulator/register/written to main memory;</p> <p>Status register updated; If jump/branch instruction PC is updated;</p> <p><i>By example:</i> Will ADD contents memory location 0100 to accumulator;</p>	MAX 3	
1	c		<p>The current value in the accumulator would be stored in (memory) address/location 0011/3;</p> <p>Number 011/3 stored in (memory) address/location 0011/3;</p>	MAX 1	

2	a	<p>A language that is close to the hardware;</p> <p>Language that interacts with basic hardware/tasks of the computer;</p> <p>Commands map directly/very closely to processor instruction set;</p> <p>One instruction maps to one processor instruction;</p> <p>A processor/architecture dependent language // language that is not portable;</p> <p>NE. machine code or assembly language R. directly executable by the processor</p>	<p>MAX 1</p>	
2	b	<p>HLL allows several machine code statements to be replaced by one high level statement // HLL program shorter than its low level equivalent;</p> <p>HLL program expressed in language that is human-oriented/uses English-like keywords; A structured English NE written in English / closer to English</p> <p>Allow programmers to: use meaningful identifier names; use procedures/functions/subroutines/libraries; use programming structures such as IF THEN ELSE/ REPEAT UNTIL; use data structures such as arrays/lists;</p> <p>Easier to see logic/structure of program/ what is to be executed; A easier to spot/check errors // easier to debug;</p> <p>Can maintain one codebase for use across multiple architectures;</p>	<p>MAX 2</p>	

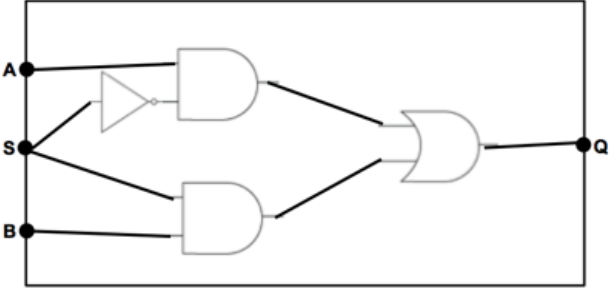
2	c	<ul style="list-style-type: none"> • The role of a translator is to take program code/source code and to translate it into a low-level/machine code • A compiler takes the whole source code and translates it (into machine code/object code) • Compiled code will execute more quickly • Produces an executable file // no need for compiler to be distributed with program // no need to distribute source code to execute program • An interpreter works through/translates/recognises program source code line-by-line • Interpreters call routines built into the interpreter to execute commands • Interpreting code is slower than running compiled code • Can run (parts of) a program using an interpreter even if it contains syntax errors • Source code is required for the program to be interpreted // when running interpreted code the interpreter is always required <p>Situations (MAX 1 each for compiler and interpreter)</p> <p>Compiler:</p> <ul style="list-style-type: none"> • So that source code cannot be accessed by users • When creating an executable file for distribution • Where speed of execution is important • Where targeting a device with a small amount of memory <p>Interpreter:</p> <ul style="list-style-type: none"> • To allow execution on a wide range of processors • When prototyping and testing/debugging code • When no compiler yet exists for the processor <p>A. (example of) building a web-application</p> <p>How to award marks:</p>	MAX 6		
		<table border="1"> <tr> <td>Mark Bands and Description</td> </tr> </table>	Mark Bands and Description		
Mark Bands and Description					

			<p>5-6</p> <p><i>To achieve a mark in this band, candidates must meet the subject criterion (SUB) and all 5 of the quality of written communication criteria (QWCx).</i></p> <p>SUB Candidate has made at least five mark-worthy points and covers both interpreter and compiler with a valid situation for at least one.</p> <p>QWC1 Text is legible.</p> <p>QWC2 There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear.</p> <p>QWC3 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>QWC4 Sentences (and paragraphs) follow on from one another clearly and coherently.</p> <p>QWC5 Appropriate specialist vocabulary has been used.</p>		
			<p>3-4</p> <p><i>To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of written communication criteria (QWCx).</i></p> <p>SUB Candidate has made at least three mark-worthy points and covers both compiler and interpreter.</p> <p>QWC1 Text is legible.</p> <p>QWC2 There may be occasional errors of spelling, punctuation and grammar. Meaning is clear.</p> <p>QWC3 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>QWC4 The candidate has used well-linked sentences (and paragraphs).</p> <p>QWC5 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) and 3 of the 5 quality of written communication criteria (QWCx).</i></p> <p>SUB Candidate has made a small number of relevant points.</p> <p>QWC1 Most of the text is legible.</p> <p>QWC2 There may be some errors of spelling, punctuation and grammar but it should still be possible to understand most of the response.</p> <p>QWC3 The candidate has used a form and style of writing which has many deficiencies. Ideas are not always clearly expressed.</p> <p>QWC4 Sentences (and paragraphs) may not always be well-connected.</p> <p>QWC5 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 written communication criteria then drop mark by one band, providing that at least 4 of the quality of language criteria are met in the lower band. If 4 criteria are not met then drop by two bands.</p>			

3	a		<table border="1"> <thead> <tr> <th>Input A</th> <th>Input B</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	Input A	Input B	Output	0	0	1	0	1	1	1	0	1	1	1	0	1	
			Input A	Input B	Output															
0	0	1																		
0	1	1																		
1	0	1																		
1	1	0																		
<p>One mark for having correct values in Output column;</p>																				

3	b	i	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>S</th> <th>A</th> <th>B</th> <th>$\bar{\mathbf{S}}$</th> <th>$\mathbf{A}.\bar{\mathbf{S}}$</th> <th>$\mathbf{B}.\mathbf{S}$</th> <th>Q</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr> </tbody> </table> <p>Marking: One mark for the $\mathbf{A}.\bar{\mathbf{S}}$ column being correct; One mark for the $\mathbf{B}.\mathbf{S}$ column being correct; The final Q column should follow through from the previous two columns as an OR statement;</p>					S	A	B	$\bar{\mathbf{S}}$	$\mathbf{A}.\bar{\mathbf{S}}$	$\mathbf{B}.\mathbf{S}$	Q	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	0	1	1	0	1	0	1	1	1	1	0	1	1	0	0	0	0	0	0	1	0	1	0	0	1	1	1	1	0	0	0	0	0	1	1	1	0	0	1	1	3	
S	A	B	$\bar{\mathbf{S}}$	$\mathbf{A}.\bar{\mathbf{S}}$	$\mathbf{B}.\mathbf{S}$	Q																																																																		
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3	b	ii	 <p>One mark for NOT gate with input from S; A just a circle on AND gate input from S</p> <p>One mark for AND gate with input from NOT S and A; A if no NOT gate from S</p> <p>One mark for AND gate with input from B and S;</p> <p>One mark for output from AND gates going into OR gate with output connect to Q;</p>	4	
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3	b	iii	<p>A multiplexor selects one of several input lines/wires and forwards/duplicates the Boolean value on this one line onto a single line/wire;</p> <p>If S is 1 then input B is output otherwise input A is output // if S is 0 then input A is output otherwise input B is output;</p> <p>Note: 1 can be mapped to on/true/high 0 can be mapped to off/false/low</p>	<p>MAX 1</p>	
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4	a	<ol style="list-style-type: none">1. a mechanical/moveable structure;2. can sense its surroundings/environment;3. can manipulate things// interact with things;4. makes dextrous coordinated movements;5. has some degree of intelligence or ability to make choices based on environment;6. is programmable // controlled by a computer system;7. a mechanism guided by automatic controls//autonomous operation;8. a machine that replaces a human being and performs various tasks of a human being // can operate in places/situations humans can not;9. a device that automatically performs complicated/repetitive tasks;10. a mechanism which reacts to its environment;11. capable of consistent application/precise movements;12. Should obey Asimov's laws // A robot may not injure a human being // allow a human being to come to harm;	MAX 2	
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4	b	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: left; padding: 2px;">Marking</th> </tr> <tr> <td style="padding: 2px;">0 marks</td> <td style="padding: 2px;">student makes no valid points</td> </tr> <tr> <td style="padding: 2px;">1 mark</td> <td style="padding: 2px;">student makes a valid point</td> </tr> <tr> <td style="padding: 2px;">2 marks</td> <td style="padding: 2px;">student makes two or more valid points but these are not developed or connected</td> </tr> <tr> <td style="padding: 2px;">3 marks</td> <td style="padding: 2px;">student makes at least two or more valid points that are connected and leads to a final opinion</td> </tr> </table> <p>The following is a collection of examples that students could use to support their opinion.</p> <p>YES: Programs have been developed to mimic 'intelligent' behaviours such as playing chess; Technology is moving on at a very fast pace; AI research has shown that computers can 'learn'; Research into how the brain works is continuing to reveal new insights; Evolutionary algorithms // adaptive algorithms // computer can modify their own programs; Computers are getting closer to passing the Turing test (which is a test for intelligence)</p> <p>NO: Computers cannot learn to the same extent as humans and therefore cannot demonstrate intelligence; Computers lack emotion / feelings / instinct / creativity; Computers find it hard to cope with unexpected situations/work well only in a structured environment; Hard to actually state/define what intelligence is; No computer has passed the Turing test (even though this has been around for a long time) // due to the Chinese room/box argument; Theological/existential reasons // intelligence can only be bestowed by a God;</p> <p>Note: marks can be awarded for other valid statements - refer to team leader for discussion</p>	Marking		0 marks	student makes no valid points	1 mark	student makes a valid point	2 marks	student makes two or more valid points but these are not developed or connected	3 marks	student makes at least two or more valid points that are connected and leads to a final opinion	MAX 3
Marking													
0 marks	student makes no valid points												
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4	c	i	a person who breaks through some security systems to gain access to a computer system;	1	
4	c	ii	Computer Misuse (Act); I. year	1	
4	c	iii	a global crime as criminals can easily be in another country; use of botnets means that computers used are separate from and do not belong to the criminal // hacking might be routed through multiple computers // use of public computers/wifi; use of IP spoofing //changing/dynamic IP address // use of proxy/vpn; companies rarely wish to report that they have been hacked // bad publicity; often difficult to detect that a crime has been committed // no physical/biological evidence; <i>Any other good reason - refer to team leader if in doubt.</i>	MAX 2	
5	a		MAX 2 for reader: RFID reader transmits/sends signal// emits electric / electro-magnetic field; signal activates/energises/induces current in RFID tag; MAX 1 for tag: RFID tag transmits data (by radio wave); RFID tag is passive;	MAX 3	
5	b		Laser Printer - 3; Inkjet Printer - 1;	2	

5	c	<p>To award a mark a comparison between the two needs to be made.</p> <p>Hard disk drive uses magnetic media, CD-ROM is an optical media; Hard disk drive uses magnetic fields, CD-ROM uses pits (and lands); Hard disk drive uses magnetic induction (to read data), CD-ROM uses a laser (and sensor); Hard disk is split into sectors/tracks, CD-ROM follows a spiral track; Hard disk has multiple platters and read/write heads, CD-ROM single-layered; Hard disk spins at a fast constant rotation speed, CD-ROM keeps a constant linear velocity/speeds rotation up and down; Hard disk drive is a read/write medium, CD-ROM is read only; Hard disk drive and disk are integrated, whereas drive and disk are separate for CD-ROM; External hard disk connection via cable/usb/firewire, CD-ROM requires a CD-ROM drive; Hard disk drive can be damaged by exposure to magnetic field, CD-ROM cannot; CD-ROM can be scratched, hard disk drive cannot; Hard disk drive can transfer/access data faster than a CD-ROM;</p> <p>R. portability / lightness / physical size</p>	<p>MAX 3</p>	
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<p>6</p>	<p>a</p>	<pre> </head> <body> <h1 class="toright">Fairy Cakes</h1> <hr /> Ingredients flour,butter and sugar 2 eggs Mix together Bake for 10 minutes <p>Decorate with hundreds and thousands </p> </body> </html> </pre> <p>1 mark – Fairy cakes in a heading tag, <h1> Fairy Cakes </h1> for example (number can go up to 7)</p> <p>1 mark - using class="toright" to move the Fairy Cake text [either inside the heading tag or as a separate div/span]</p> <p>1 mark – use of <hr> or <hr /> tag for horizontal rule; A <p>_____</p> A a <div> is defined with css to create a margin or border</p> <p>1 mark – for the ordered list and correct three list items</p> <p>1 mark – for an unordered list being inside the ordered list and correct two items, unordered list can be inserted before or after the for ingredients DPT if missing end of list tags and </p> <p>1 mark – for correct text ‘Decorate with hundreds and thousands’ inside <p> and </p> tags</p>	<p>MAX 6</p>	
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		<p>1 mark – for the use of <code></code> and <code>class="bandw"</code> to alter text 'hundreds and thousands' [See note below]</p> <p>1 mark – for the <code></head><body> </body></code> and <code></html></code> No mark for <code></head></code> alone</p> <p>A. either ' ', " " or no quotations around class selectors I. missing <code></code> tags</p> <p>NOTE: The student could use an inline tag such as <code><a></code>, <code></code> or <code><i></code> and then apply the class – this should be awarded the mark. However the <code><div></code> or <code><p></code> tag should not be accepted.</p>		
6	b	<p>Analogous colour scheme:</p> <p>using colours that are adjacent to each other in the colour wheel;</p> <p>Complementary colour scheme:</p> <p>using colours that are opposite to each other in the colour wheel; A highly contrasting</p>	2	
7	a	<p>SMTP;</p> <p>Telnet; A SSH;</p> <p>Note For SMTP accept Simple Mail Transfer Protocol For SSH accept Secure Shell</p>	2	
7	b	<p>Uniform Resource Locator;</p> <p>I case</p>	1	
7	c	<p>129.12.3.236 // 10.0.1.1 // 81.111.110.1 // 213.105.114.89 // 62.253.174.77;</p> <p>I brackets</p>	1	

7	d	<p>A link between routers might be down/busy and/or a different route is picked;</p> <p>Routes are determined dynamically as the packet moves from sender to receiver;</p> <p>A to take the fastest route at that time NE to travel faster</p>	MAX 1	
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7	e	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Layer</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Application (layer)</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Transport (layer)</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Network / internet (layer)</td> </tr> <tr> <td style="text-align: center;">4</td> <td>Link (layer)</td> </tr> </tbody> </table> <p>1 mark for any two layers correct; 2 marks for all four layers correct;</p>		Layer	1	Application (layer)	2	Transport (layer)	3	Network / internet (layer)	4	Link (layer)	2	
	Layer													
1	Application (layer)													
2	Transport (layer)													
3	Network / internet (layer)													
4	Link (layer)													

7	f	<p>(Link layer) responsible for network drivers // network cabling // physical connection // changing from one medium to another;</p> <p>(Link layer) (removes MAC address and) adds MAC address for the next hop; A hardware address for MAC address</p> <p>(Network layer) looks at destination IP address;</p> <p>Router decides on next appropriate hop (after seeing destination IP address);</p> <p>(Network layer) can split/combine/resize packets if required;</p> <p>error checking / error detection; encryption for wireless connections; tunnelling through a firewall;</p>	MAX 2	
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