



Oxford Cambridge and RSA

GCE

Computer Science

H046/01: Computing principles

AS Level

Mark Scheme for June 2023

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.

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 2023

MARKING INSTRUCTIONS

Question		Answer	Mark	Guidance
1	(a)	<ul style="list-style-type: none"> • Clock Speed ... • ... The speed at which the fetch decode execute cycle is completed/ the speed a single core can execute instructions • Number of cores/ independent processing units ... • ...that can fetch decode execute at the same time • Cache size... • ... memory that contains recently/frequently used instructions/data • ...memory that has a faster R/W speed than RAM • ...memory that is closer to/onboard the CPU 	AO1.1 (2) AO1.2 (2)	One mark for stating the factor, mark for expanding the factor - Accept cycles for "FDE Cycles"
1	(b)	<ul style="list-style-type: none"> • CISC has a larger instruction set • RISC has a smaller instruction set • CISC is difficult to pipeline • RISC is easier to pipeline • CISC tends to have more addressing modes • RISC tends to have fewer addressing modes • CISC instructions may take multiple clock cycles to execute • RISC instructions take one clock cycle to execute 	AO1.2 (2)	Accept any other valid points Mark in pairs

			<ul style="list-style-type: none"> • CISC has complex circuitry/more transistors. • RISC has less complex/simple circuitry • CISC uses less RAM • RISC uses more RAM 		
1	(c)		<ul style="list-style-type: none"> • Parallel processing will allow multiple separate jobs/instructions/FDE cycles to run concurrently. • Longer rendering jobs can be split, shortening the overall time taken. • Different CPUs/cores can tackle different frames/sections/components of the video simultaneously. 	AO1.2 (1) AO2.1 (2)	
1	(d)		<ul style="list-style-type: none"> • A piece of software which allows hardware/device to communicate... • ...with the operating system 	AO1.2 (2)	
1	(e)	(i)	<ul style="list-style-type: none"> • Monitor • Speakers//Headphones 	AO2.1 (2)	<p>Must be output devices.</p> <p>Must be suitable for video editing.</p>

Question		Answer	Mark	Guidance
1	(e) (ii)	<p>Mark Band 3–High Level (7-9 marks)</p> <p>The candidate will provide a range of accurate benefits and drawbacks of both magnetic and flash devices. 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 will come to a clear conclusion that must be justified by their comments</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Mark Band 2-Mid Level (4-6 marks)</p> <p>The candidate will provide drawbacks or benefits about both magnetic and flash methods. These will be for the most part relevant. 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 will attempt to come to a conclusion, although it may not be fully justified by their answer,</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p>Mark Band 1-Low Level (1-3 marks)</p> <p>The candidate has provided some drawbacks or benefits of magnetic or flash methods. The material is basic and contains some inaccuracies.</p>	<p>AO1.1 (2)</p> <p>AO1.2 (2)</p> <p>AO2.1 (2)</p> <p>AO3.3 (3)</p>	<p>AO1</p> <p>Magnetic Benefits:</p> <ul style="list-style-type: none"> • Lower price per GB • As standard comes in high capacity <p>Magnetic Drawbacks:</p> <ul style="list-style-type: none"> • Lower R/W speed • Higher power consumption • Moving parts /less durable <p>Flash Benefits:</p> <ul style="list-style-type: none"> • Higher R/W speed • No moving parts/more durable • Lower power consumption • Can have a higher capacity. <p>Flash Drawbacks:</p> <ul style="list-style-type: none"> • Higher cost per GB • At higher capacities prices rise exponentially. <p>AO2:</p> <p>Suitability of Magnetic:</p> <ul style="list-style-type: none"> • Video files are very large, benefiting magnetics low cost per GB • Can be used to archive the different video elements after it's been rendered • Could possibly get damaged while being transported between the different filming sites • Slow R/W speeds may take it longer to load into the software <p>Suitability of flash:</p> <ul style="list-style-type: none"> • Very fast R/W speeds therefore reducing the amount of loading time during the editing process/giving smoother playback • If money is not a barrier, flash can be bought in sufficient capacities for videos.

			<p>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.</p> <p><i>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.</i></p> <p>0 marks No attempt to answer the question or response is not worthy of credit.</p>		<p>AO3: Candidates can conclude either method, but to score in the top MB must have a clear line of reasoning to justify their choice.</p>																
2	(a)	(i)	<p><input checked="" type="checkbox"/> First In First Out</p>	AO1.1 (1)																	
2	(a)	(ii)	<table border="1" data-bbox="315 756 1137 794"> <tr> <td>Ben</td> <td>Sundip</td> <td>Tom</td> <td>Charlie</td> <td>Ling</td> <td>Sara</td> <td></td> <td></td> </tr> </table> <p>1 Mark: Adding, Charlie, Ling and Sara in correct order 1 Mark: Exclusively removing Alex and Kofi.</p>	Ben	Sundip	Tom	Charlie	Ling	Sara			AO2.1 (2)	<p>Accept:</p> <table border="1" data-bbox="1279 762 2110 804"> <tr> <td></td> <td></td> <td>Ben</td> <td>Sundip</td> <td>Tom</td> <td>Charlie</td> <td>Ling</td> <td>Sara</td> </tr> </table>			Ben	Sundip	Tom	Charlie	Ling	Sara
Ben	Sundip	Tom	Charlie	Ling	Sara																
		Ben	Sundip	Tom	Charlie	Ling	Sara														

2	(b)	(i)	<pre>function pop() if top == 0 then return -1 else item = items[top] top = top - 1 return item endif end function</pre>	AO3.2 (4)	
2	(b)	(ii)	<ul style="list-style-type: none"> • Correctly declaring the function reverse to include passing in name as a parameter • Correct logic to calculate the number of pushes required • Correct use of a loop to push all characters onto the stack separately • Creating a local variable reverseName to hold the reversed string • Correct use of a loop to pop all characters from the stack (in the reverse order) • Correct logic to add each popped character to the reverseName variable • Correctly returning the reverseName variable 	AO3.1 (3) AO3.2 (4)	<p>Example solution</p> <pre>function reverse(name) reverseName = "" for nameCount = 0 to name.Length-1 theStack.push(name[nameCount]) next nameCount for nameCount = 0 to name.Length-1 reverseName = reverseName + theStack.pop() next nameCount return reverseName end function</pre> <p>Give full marks for alternative solutions that would work fully.</p> <p>Allow FT for any duplicate identifiers named incorrectly or using the incorrect case</p>

Question		Answer	Mark	Guidance
3	(a)	<ul style="list-style-type: none"> List/mapping of characters (that can be understood by the hardware/software/computer) Each character is given a unique binary/numeric code that is stored instead of the character. 	AO1.2 (2)	Allow a list of letters /symbols
3	(b)	(i) <ul style="list-style-type: none"> 102 (correct answer) Suitable working out 	AO2.2 (2)	
		(ii) <ul style="list-style-type: none"> Hexadecimal values are shorter than binary as 4 bits/nibble can be represented by one hex character. Hexadecimal values are faster / more reliable to communicate / enter / write down / read. 	AO2.2 (2)	Do not accept Hexadecimal is “easy” communicate/enter etc...
3	(c)	<ul style="list-style-type: none"> Fixed point is 0110.01 Mantissa becomes 0.11001 Exponent of three needed (represented at 011) 	AO2.2 (3)	Final Answer 011001 011 Correct answer with any working gets full marks
3	(d)	<ul style="list-style-type: none"> Allows for more accuracy/precision from the given number of bits The representation of each binary value is unique 	AO1.1 (1)	

Question		Answer	Mark	Guidance	
4	(a)	<ul style="list-style-type: none"> Relational data allows for less redundancy of data/less repeated data Relational databases improve the consistency of data Relational databases allow for complex queries and/or searches to be performed 	A01.2 (2)		
4	(b)	<p>1 mark for each bullet point to max 2 marks:</p> <ul style="list-style-type: none"> One customer to many orders Many orders to many products // One order to many orderLines and many orderLines to one product <p>Solution 1:</p> <pre> graph LR Customer[Customer] --- Order[Order] Order --- Product[Product] style Customer fill:#fff,stroke:#000 style Order fill:#fff,stroke:#000 style Product fill:#fff,stroke:#000 </pre> <p>Solution 2:</p> <pre> graph LR Customer[Customer] --- Order[Order] Order --- OrderLine[OrderLine] OrderLine --- Product[Product] style Customer fill:#fff,stroke:#000 style Order fill:#fff,stroke:#000 style OrderLine fill:#fff,stroke:#000 style Product fill:#fff,stroke:#000 </pre>	AO3.1 (2)	<p>Ignore any relationship between customer and product.</p> <p>Accept any suitable alternative name for the OrderLine entity.</p> <p>Additional guidance: For MP2, candidates may have avoided the use of many-to-many relationships, due to the information in part c). Therefore, allow one product to many orders.</p>	
4	(c)	(i)	<ul style="list-style-type: none"> A primary key will only appear once in a table/is a unique identifier 	AO1.1 (2)	Accept entity for table

			<ul style="list-style-type: none"> A foreign key may appear multiple times a table/may not be unique 		
4	(c)	(ii)	<ul style="list-style-type: none"> <u>CustomerID</u> <u>ProductID</u> 	AO2.2 (1)	Correct answer only
4	(c)	(iii)	<ul style="list-style-type: none"> There may be duplicate values. 	AO2.2 (1)	
5	(a)		<ul style="list-style-type: none"> Stores instructions / programs currently running Stores data currently in use 	AO1.1 (1)	

Question		Answer	Mark	Guidance
5	(b)	<ul style="list-style-type: none"> If the amount of RAM available is insufficient... ...Used to store instructions/data ...Using secondary storage. Likely to be loading large image files (which may exceed her RAM) Likely to be loading large programs (which may exceed her RAM) 	AO2.1 (2)	
6	(a)	(i)		
		<ul style="list-style-type: none"> In circuit switching dedicated hardware resources are used for each connection In packet switching hardware is used for multiple different connections. <ul style="list-style-type: none"> In circuit switching the data is sent along one route/stream. In packet switching packets of data may be sent along multiple different routes/packets may not be in order 	AO1.2 (2)	Marks answers in pairs

			<ul style="list-style-type: none"> • Circuit switching is less secure if data is intercepted • Packet switching, data is more secure if intercepted/not all packets will be intercepted 		
6	(a)	(ii)	<ul style="list-style-type: none"> • Computer networks would involve multiple connections happening concurrently • In packet switching hardware is not tied up with each unique connection // can handle multiple connections simultaneously • Computers pass vast amounts of data which may encounter transmission errors • Packet switching means only resending individual packets instead of the whole data stream • Computers may be transmitting business critical data • Packet switching means any network hardware failures can be mitigated by routing around it. 	AO2.1 (2)	
6	(b)		<p>Mark Band 3–High Level (7-9 marks)</p> <p>The candidate demonstrates a thorough knowledge and understanding of both peer to peer and client server and can give valid application of both in this scenario. All detail are generally accurate and relevant</p> <p>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.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Mark Band 2-Mid Level (4-6 marks)</p>	AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	<p>AO1 P2P:</p> <ul style="list-style-type: none"> • Each computer can act independently • Each computer is responsible for it's own security and login • Each computer will maintain and possibly share its own connected hardware (printer/external storage/internet connection) • Each computer will maintain and possibly share its own secondary storage • If a computer is powered down it's shared resources will not be available. • There are no resources not shared by a peer machine • Adding a machine is simple • Very little administration is needed <p>Client Server:</p>

		<p>The candidate demonstrates reasonable knowledge and understanding of client server and peer to peer; the material is generally accurate but at times underdeveloped. The candidate may not have applied both to this scenario.</p> <p>The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed.</p> <p>Evidence/examples are for the most part implicitly relevant to the explanation.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p>Mark Band 1-Low Level (1-3 marks)</p> <p>The candidate demonstrates a basic knowledge of client/server or peer to peer and has made some attempt at applying this knowledge. the material is basic and contains some inaccuracies.</p> <p>The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided.</p> <p>The candidate provides nothing more than an unsupported assertion.</p> <p><i>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.</i></p> <p>0 marks</p> <p>No attempt to answer the question or response is not worthy of credit.</p>		<ul style="list-style-type: none"> • All network functionality can be provided by servers. • A server is a process running on a machine, usually dedicated to providing these services. • A server machine is designed to never be powered down. • Login/security is handled centrally • Shared storage may be managed by a server • Shared resources (printer/internet connection etc) my be managed by a server • If a server process or machine fails, network functionality, including the ability login is lost • Adding a new machine can mean installing specialist client software and setting up OS policies. • IT skills and a lot of time are needed to administer a client server network <p>AO2 P2P:</p> <ul style="list-style-type: none"> • As Zak is looking to expand his staff, P2P would offer flexibility in adding staff ad hoc. • Zak's company is still small and may struggle to pay for the IT administrator skills needed for a client server <p>Client Server:</p> <ul style="list-style-type: none"> • As Zak's firm is an accountancy firm it will have sensitive customer data • Client server would allow stronger centralised security • As Zak is taking on multiple staff, they may wish to work collaboratively, which shared storage would allow. • Zak could share a single printer/other hardware with all staff and not worry about an individual computer being switched on.
--	--	---	--	---

					AO3: Candidates can conclude either method, but to score in the top MB must have a clear line of reasoning to justify their choice.
--	--	--	--	--	--

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on

01223 553998

Alternatively, you can email us on

support@ocr.org.uk

For more information visit

 ocr.org.uk/qualifications/resource-finder

 ocr.org.uk

 [Twitter/ocrexams](https://twitter.com/ocrexams)

 [/ocrexams](https://twitter.com/ocrexams)

 [/company/ocr](https://www.linkedin.com/company/ocr)

 [/ocrexams](https://www.youtube.com/ocrexams)



OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. © OCR 2023 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA.

Registered company number 3484466. OCR is an exempt charity.

OCR operates academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers including A Levels, GCSEs, Cambridge Technicals and Cambridge Nationals.

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up-to-date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please [contact us](#).

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our [Expression of Interest form](#).

Please [get in touch](#) if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.