Qualification Accredited

OCR
Oxford Cambridge and RSA

AS LEVEL

Examiners' report

COMPUTER SCIENCE

H046

For first teaching in 2015

H046/01 Summer 2024 series

Version 1

Contents

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate answers is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

Paper 1 series overview

H046/01 (Computing Principles) is one of two examined components for the GCE AS Level Computer Science. This component focuses on:

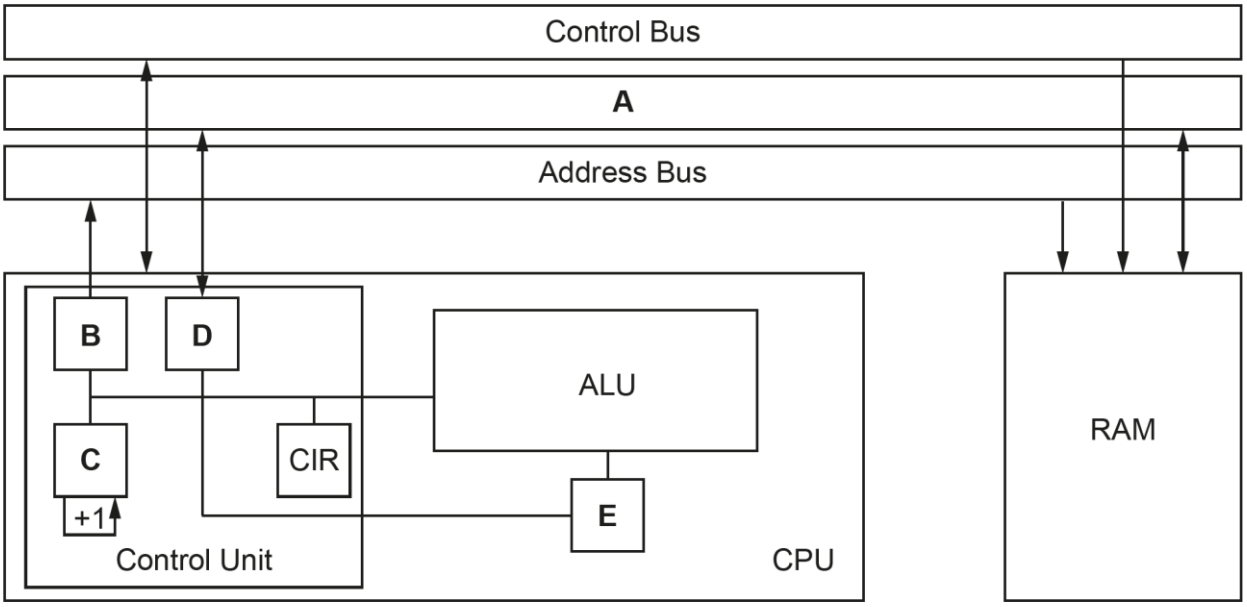
- the characteristics of contemporary processors, input, output, and storage devices
- software and software development
- programming
- exchanging data
- data types, data structures and algorithms
- legal, moral, ethical and cultural issues.

To do well on this paper, candidates needed to be able to demonstrate and apply knowledge across all the topics listed above in different contexts.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• successfully described types of operating system, giving an example of their use for Question 3 (b) • successfully wrote LMC code in Question 4 (c) • successfully wrote JavaScript code in Question 5.	• showed limited understanding of the advantages and disadvantages of using thin clients in Question 3 (a) (i) and 3 (a) (ii) • did not use terminology correctly and had limited discussion in Question 2 • demonstrated limited discussion in Question 6 (b).

Question 1

1 Here is a diagram of a computer system.



Identify each of the labelled components in this computer system.

A	
B	
C	
D	
E	

[5]

This question was generally answered well. Most candidates were able to identify the data bus, Memory Address Register (MAR) and Memory Data Register (MDR), although some candidates were not able to identify the Program Counter (PC) and/or the Accumulator (ACC).

Question 2*

2* Most modern computers are designed using Von Neumann Architecture. However, in some cases Harvard Architecture may be preferred.

Discuss the difference between Von Neumann Architecture and Harvard Architecture.

You should refer to the following in your answer:

- the different approaches each architecture takes to storing instructions and data
- the benefits of using a Von Neumann Architecture approach
- the benefits of using a Harvard Architecture approach. **[9]**

Candidates were assessed on the quality of their extended response in this question. Most of the candidates were clear on the basic difference between Harvard and Von Neumann architecture, but many did not discuss this in detail or did not use the correct terminology. Some candidates confused the different architectures and contradicted points in their discussion.

Exemplar 1

Von Newman and Harvard store data in different ways, they both ha> sepperate memory and addres> buse>, however Harvard ha> separate memory location> for data and instruction while Von Neumann ~~be>~~ store> ~~all~~ both in the same memory.

Von Neuman is good a> it allow> for a larger variety of progrom> to be run ~~one~~. A> memory is joint, data and instruction> can split memory in an effient way>, reducing bottleneck> due to one being full like it can happen in Harvard architecture. Also Von ~~N~~ Most progrom> are writen to support a Von Neuman architecture therefore it's easier to set up and use has it ha> more support from developer>. Better for multipurpose system.

Harvard is less complex and memory management is simpler. It's good for custom programs as it can ~~run~~ run faster if code is written specifically. Very good for embedded systems in which software isn't changed. In conclusion they're both useful while Von Neuman is more widely used and better for general purpose computers, Harvard architecture can be good for more simple and specific cases. Such as embedded systems, or machines which do not need a general purpose CPU. 6

This candidate response was given 5 marks. There are some valid points about both Von Neumann and Harvard Architecture, but the points made are not fully developed with limited application. This response was therefore given a mark within the mid-level band.

Assessment for learning

Questions with the command word 'discuss' require candidates to give a balanced discussion and provided a suitable conclusion which justifies their comments. Opportunities to practise these questions will support candidates to do better on these style questions.

Question 3 (a) (i)

3 A secondary school is upgrading their computers. They decide to install "thin client" computers. A thin client computer is when users access their computer in the usual way with a keyboard, mouse and monitor. However, all processing takes place on the virtual machine on a server rather than the computer at their desk.

(a)
(i) Describe **one** advantage of using virtual machines in this way.

.....

.....

.....

..... **[2]**

This question was generally not answered well. Candidates did not make sure that their responses were specific to thin clients.

Question 3 (a) (ii)

(ii) Describe **one** disadvantage of using virtual machines in this way.

.....

.....

.....

..... **[2]**

As with Question 3 (a) (i), candidates did not make sure that their responses were specific to thin clients and therefore lost marks.

Question 3 (b)

(b) Each virtual machine will run an operating system. One type of operating system is multi-user.

Describe **two** other types of operating system and give an example of where each may be used.

TYPE 1

Description .....

.....

.....

.....

Example .....

.....

TYPE 2

Description .....

.....

.....

.....

Example .....

.....

[6]

This question was generally answered well, although some candidates were too vague in their descriptions of real time and distributed operating systems in particular.

Exemplar 2

TYPE 1

Description real-time operating system, which is used when a response is required within a guaranteed time frame

Example intensive care units for use when patients need immediate assistance / treatment

TYPE 2

Description embedded system, which is stored in the BIOS and has limited functionality, as it is used to perform specific tasks.

Example a smart washing machine, as it's instructions aren't likely to change

The candidate has been given full marks for this response as they have been clear that real time operating systems respond in a guaranteed time frame, with a suitable example of their use. Some candidates were too vague in their response for descriptions of a real time operating system with answers such as 'responds quickly'.

Question 3 (c) (i)

(c) The virtual machines will have utility software and application software installed.

(i) Describe the difference between utility software and application software.

..... **[2]**

This question was generally answered well.

Question 3 (c) (ii)

(ii) The application software installed will be used by students to complete their school work.

Name **two** different types of application software that may be used by students, giving an example of how each may be used.

TYPE 1

Name .....

.....

Example .....

.....

TYPE 2

Name .....

.....

Example .....

..... **[4]**

Although this question was generally answered well, some candidates have used brand names for applications which is not allowed. Where a valid application was given, this was generally followed up with an appropriate example.

Question 3 (c) (iii)

(iii) The application software installed on the virtual machines can be closed source software or open source software.

Explain **one** advantage to the school of using open source software.

.....

.....

.....

..... **[2]**

This question was generally answered well although some candidates stated that the software can be modified rather than stating that the source code can be modified.

Question 3 (d)

(d) Name **three** different types of utility software.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

The majority of candidates have selected three utilities correctly in their response.

Question 4 (a)

4 All source code needs to be translated into object code using a translator.

(a) Tick **one** box in each row to indicate which type of translator is being used.

	Compiler	Interpreter	Assembler
Creates an executable file			
Creates one line of object code for each line of source code			
Translates all the high-level code at once			
A program needs to be translated each time it is run			

[4]

Most candidates gained all four marks for this question. Although the question states to tick 'one box', candidates were given a mark if they selected either assembler or compiler or both options for 'creates an executable file'.

Question 4 (b)

(b) A software development company has written a new computer game in a high-level language.

Identify which type of translator would be the most suitable for the computer game and give a reason why.

Type .....

.....

Reason .....

.....

[2]

Although many candidates correctly selected 'compiler' for the type of translator, this was often not followed up with a suitable reason.

Question 4 (c)

(c) The pseudocode algorithm here will take in two numbers from the user, multiply them together using addition and output the result. For example, 4 multiplied by 3 would be 4 + 4 + 4 = 12.

You can assume the function `input` takes in a value as an integer.

```
numA = input("Enter first number")
numB = input("Enter second number")

answer = 0

while (numB > 0)
   answer = answer + numA
   numB = numB - 1
endwhile

print(answer)
```

Write this algorithm in assembly language using the Little Man Computer (LMC) instruction set.

.....

.....

.....

.....

.....

..... **[6]**

Most candidates were given some of the available marks for this question. Most were able to take two inputs and perform the addition of two numbers, storing the result in the accumulator. Candidates that lost marks did not successfully loop through the instructions correctly, didn't output the correct answer and/or did not make use of DAT to subtract a value correctly.

Question 5

5 An online shop uses a website to sell its products. Part of the HTML code that is used for a login form on the website is shown here.

```
<p>
   <label>Username:</label>
   <input type="text" id="userName">
</p>
<p>
   <label>Password: </label>
   <input type="text" id="Password" onchange="errorCheck()">
</p>
<p>
   <label id="errorText">
</p>
```

The `<label>` tag will instruct the user what information they need to enter. The code `onchange` will run a function called `errorCheck` automatically after a password has been entered. The function `errorCheck` will check that the password is a suitable length.

Write JavaScript code for the function `errorCheck` which:

- checks the length of the password is between 8 and 12 characters (including 8 and 12)
- displays the message "Password Length Error" in the HTML `label` tag identified by the id `errorText` if the length is not between 8 and 12 characters.

.....

.....

.....

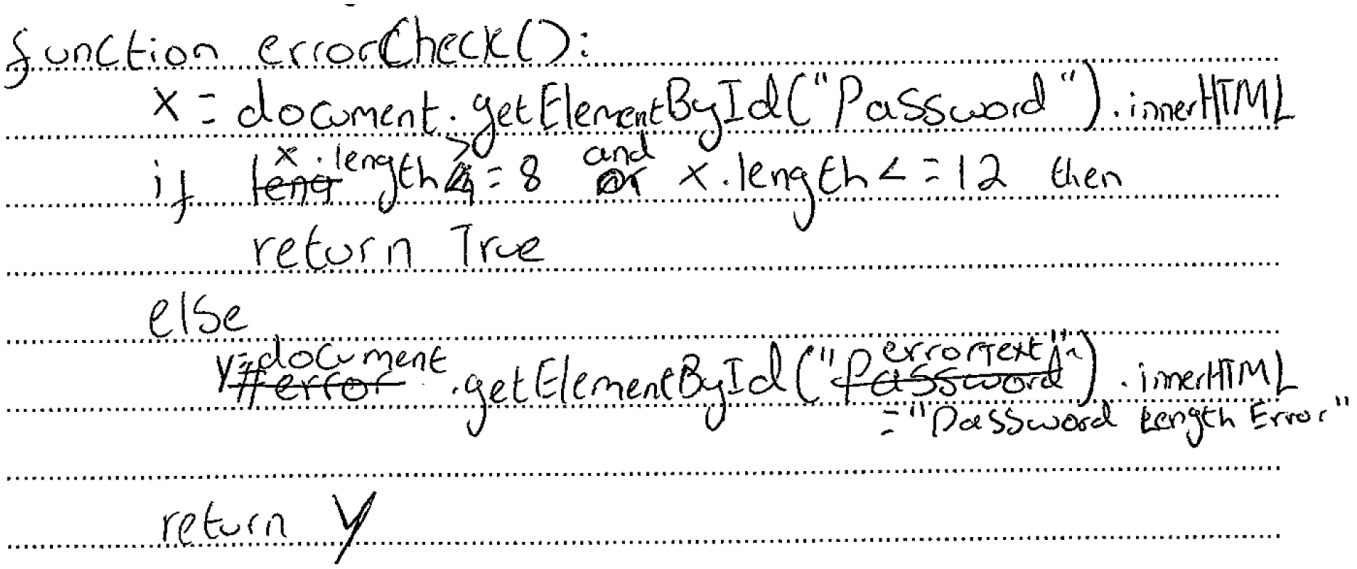
.....

.....

..... **[5]**

Although candidates were required to write this response in JavaScript, marks were still given if the syntax was close, and the logic was generally correct. A number of candidates didn't use JavaScript and gave responses in alternative scripts or Python. The question states that JavaScript code must be written, therefore any other code received no marks.

Exemplar 3



This candidate response was given full marks. The second part of the 'if' statement is not entirely correct, but the overall code provided is very close to each mark scheme point and was therefore given full marks.

Assessment for learning

Appendices 5d in the specification gives guidance on what students are expected to know regarding JavaScript with examples.

Question 6 (a) (i)

6

(a) Using the binary value 1001 1101, convert this into:

(i) A positive denary number.

.....

..... **[1]**

Most candidates answered this question correctly.

Question 6 (a) (ii)

(ii) A negative denary number using two's complement.

.....

..... **[1]**

Most candidates answered this question correctly.

Question 6 (a) (iii)

(iii) A hexadecimal value.

.....

..... **[1]**

Most candidates answered this question correctly.

Question 6 (b)*

(b)* Binary values stored by a computer can represent different types of data.

Discuss the different types of data that can be stored in binary and why computer systems store data in binary format.

You should refer to the following in your answer:

- what types of data can be represented in binary
- examples of how binary is used to represent this data
- why computers store data in binary format. **[9]**

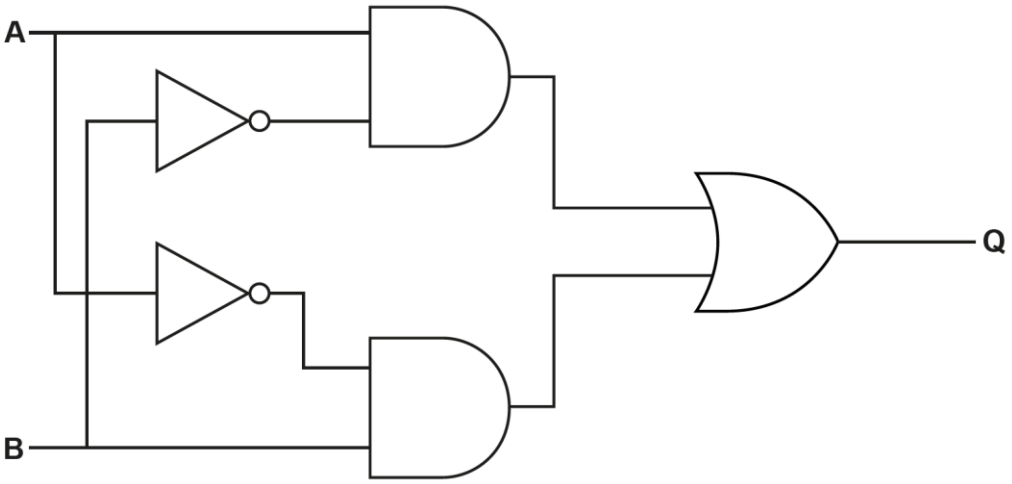
Candidates were assessed on the quality of their extended response in this question. Most candidates were able to explain why computers store data in a binary format and many discussed character sets being used to store test using ASCII and UNICODE. Many candidates also further discussed storing numbers using sign and magnitude and floating point, etc.

Few candidates discussed other points such as sound, video and images being stored in binary, and few mentioned that computers are made up of logic gates/switches.

Question 7 (a) (i)

7

(a) A logic gate diagram is shown below.



(i) Complete the truth table for this logic gate diagram.

A	B	Q
0	0	
0	1	
1	0	
1	1	

[2]

The majority of candidates were able to correctly complete the truth table for both marks.

Question 7 (a) (ii)

(ii) What single gate is this logic gate diagram equivalent to?

.....

..... **[1]**

Most candidates correctly stated the correct single logic gate (XOR).

Question 7 (b)

(b) Draw the logic gate diagram for this expression:

$Q = (A \vee \neg B) \wedge C$

[3]

Most candidates were able to draw the three logic gates correctly, although some did not make it clear the difference between an 'and' gate and an 'or' gate in their diagram.

Supporting you

Teach Cambridge

Make sure you visit our secure website **Teach Cambridge** to find the full range of resources and support for the subjects you teach. This includes secure materials such as set assignments and exemplars, online and on-demand training.

Don't have access? If your school or college teaches any OCR qualifications, please contact your exams officer. You can forward them this link to help get you started.

Reviews of marking

If any of your students' results are not as expected, you may wish to consider one of our post-results services. For full information about the options available visit the OCR website.

Access to Scripts

We've made it easier for Exams Officers to download copies of your candidates' completed papers or 'scripts'. Your centre can use these scripts to decide whether to request a review of marking and to support teaching and learning.

Our free, on-demand service, Access to Scripts is available via our single sign-on service, My Cambridge. Step-by-step instructions are on our website.

Keep up-to-date

We send a monthly bulletin to tell you about important updates. You can also sign up for your subject specific updates. If you haven't already, sign up here.

OCR Professional Development

Attend one of our popular professional development courses to hear directly from a senior assessor or drop in to a Q&A session. Most of our courses are delivered live via an online platform, so you can attend from any location.

Please find details for all our courses for your subject on **Teach Cambridge**. You'll also find links to our online courses on NEA marking and support.

Signed up for ExamBuilder?

ExamBuilder is a free test-building platform, providing unlimited users exclusively for staff at OCR centres with an Interchange account.

Choose from a large bank of questions to build personalised tests and custom mark schemes, with the option to add custom cover pages to simulate real examinations. You can also edit and download complete past papers.

Find out more.

Active Results

Review students' exam performance with our free online results analysis tool. It is available for all GCSEs, AS and A Levels and Cambridge Nationals (examined units only).

Find out more.

You will need an Interchange account to access our digital products. If you do not have an Interchange account please contact your centre administrator (usually the Exams Officer) to request a username, or nominate an existing Interchange user in your department.

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
facebook.com/ocrexams
twitter.com/ocrexams
instagram.com/ocrexaminations
linkedin.com/company/ocr
youtube.com/ocrexams

We really value your feedback

Click to send us an autogenerated email about this resource. Add comments if you want to. Let us know how we can improve this resource or what else you need. Your email address will not be used or shared for any marketing purposes.

I like this **I dislike this**

Please note – web links are correct at date of publication but other websites may change over time. If you have any problems with a link you may want to navigate to that organisation's website for a direct search.

CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT