Cambridge Assessment International Education

Example Responses – Paper 1

Cambridge IGCSE™ / IGCSE (9–1) Computer Science 0478 / 0984

Cambridge O Level Computer Science 2210

For examination from 2023

Cambridge Pathway

Contents

Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge IGCSE / IGCSE (9-1) / O Level Information and Communication Technology 0478 / 0984 / 2210.

This booklet contains responses to all questions from June 2023 Paper 12, which have been written by a Cambridge examiner. Responses are accompanied by a brief commentary highlighting common errors and misconceptions where they are relevant.

The question papers and mark schemes are available to download from the School Support Hub

0478 / 0984 / 2210 June 2023 Question Paper 12

0478 / 0984 / 2210 June 2023 Mark Scheme 12

Past exam resources and other teaching and learning resources are available from the School Support Hub

Question 1

1 Output devices are used to output data from a computer.

Circle **three** devices that are output devices.

actuator | digital versatile disk (DVD) | keyboard

microphone | mouse | printer | scanner

sensor | solid-state drive (SSD) | speaker

[3]

Examiner comment

- Some candidates thought that a microphone was an output device.
- Candidates often did not recognise an actuator as an output device.

Question 2

2 Binary numbers can be converted to hexadecimal.

(a) Convert the **two** binary numbers to hexadecimal.

10010011 93

00001101 0D

[4]

Examiner comment

Some candidates did not convert all parts of the binary number to hexadecimal. If part of the binary number converted to a 0, candidates should still show this in their answer.

(b) A value is stored as a binary number in a register.

0	1	1	1	1	0	1	0

A logical right shift of **three** places is performed on the binary number.

(i) Complete the binary register to show its contents after this logical right shift.

0	0	0	0	1	1	1	1

[1]

Examiner comment

Candidates sometimes shifted the values into the register from the right-hand side, instead of shifting each value to the right the required number of places. In this question, this resulted in the incorrect answer of 11010000. This was performing a logical left shift of three places, instead of a right shift.

(ii) State **one** effect this logical shift has on the binary number.

the value is divided by 8, but this makes the value inaccurate

[1]

Examiner comment

Candidates often just provided a vague statement that the value increased, decreased or changed. More detail needed to be provided than this to demonstrated the amount that the value was divided or multiplied by.

(c) Give **two** reasons why a programmer may use hexadecimal to represent binary numbers.

1 hexadecimal numbers take up less space on a screen than binary numbers

2 it is easier for the programmer to find mistakes in the program

[2]

Examiner comment

- Some candidates did not provide an accurate answer when referring to screen space in this question. Sometimes, they wrote a statement that was too vague, stating that it takes up less space, but not stating where less space was taken.
- Candidates also had a misconception regarding space. They often stated that hexadecimal takes up less storage space, but this was not correct as hexadecimal is stored as binary.

(d) Denary numbers can also be converted to hexadecimal.

Convert the denary number to hexadecimal.

301 12D [2]

Examiner comment

Candidates often struggled to convert denary to hexadecimal. Candidates could convert the denary to binary first, then convert the binary to hexadecimal.

Question 3

3 When keys are pressed on a keyboard, the text is converted to binary to be processed by the computer.

(a) Describe how the text is converted to binary to be processed by the computer.

When text is converted to binary, an ASCII character set can be used. Each character has a unique binary value that the character is converted to.

..... [3]

Examiner comment

When text is converted to binary, an ASCII character set can be used. Each character has a unique binary value that the character is converted to.

(b) Text that is input into a computer can be stored in a text file.

A text file can be compressed using lossless compression.

(i) State what effect this has on the file size.

the effect that this has on the file size is that it reduces it

..... [1]

Examiner comment

Candidates sometimes inaccurately stated that the size of the data was reduced, but it was the size of the file that was reduced.

(ii) Describe how lossless compression compresses the text file.

A compression algorithm is used to find repeated words in the text. Each different word is indexed into a table. This records the word and the positions where it occurs in the text.

[4]

Examiner comment

- Many candidates found it challenging to be detailed and accurate in their response.
- Candidates also struggled to apply the question to the context given. Some candidates referred to repeating pixels, rather than repeating characters. Pixels would be relevant to an image file, but not a text file. Candidates were vague when referring to the elements they listed as repeating, using terms such as 'repeating values' and 'repeating data'. These terms were not specific enough for the context given.

(iii) Give **two** reasons why the text file may have been compressed.

1 it will take up less storage space

2 it will be faster to transmit from one device to another

[2]

Examiner comment

- Candidates sometimes stated that a compressed text file took up less space, but they did not give enough detail about where the space would be saved.
- Some candidates gave repeated reasons that drew on the same knowledge. They stated that it was faster to upload the file, then stated that it would be faster to download the file. Both these statements related to it being quicker to transmit the file.

Question 4

4 A student uses a mobile phone to take photographs for a school project.

The student needs to transmit the photographs to their computer. They could use serial data transmission or parallel data transmission to transmit the photographs.

(a) (i) Describe how the photographs would be transmitted using serial data transmission.

the photographs would be transmitted one bit at a time down a single wire

[2]

Examiner comment

- Some candidates inaccurately stated that the data was sent one at a time, but they did not provide specific detail about the data or refer to transmission bit by bit.
- Some candidates inaccurately referred to a single wire as a cable. A cable can contain multiple wires, so answers needed to refer to a wire and not a cable.

(ii) Give **two** benefits of transmitting the photographs using serial data transmission.

1 *there will be less chance of error in the data as there is less interference*

2 *the data is sent bit by bit so it will not be skewed*

[2]

Examiner comment

- Candidates often referred to serial being more suitable to send the data over a long distance. In this instance this was not relevant to the context given. Candidates needed to note the context given in the question and tailor their answer to the context. The context did not state that long distance was involved.
- Candidates sometimes referred to the cost being cheaper for serial transmission, however the difference in cost between the two types of transmission is negligible. Candidates needed to focus on the other benefits.

(iii) State **one** benefit of the student using parallel data transmission instead of serial data transmission.

using parallel transmission would mean the data can be transmitted faster [1]

Examiner comment

Candidates sometimes stated that the data could be transmitted fast. Their answer needed to be a comparison between the two types of data transmission. When they referred to 'fast' transmission, this was not a comparison, so their answer needed to state that it was a 'faster' transmission.

(b) The photographs are also transmitted across a network to cloud storage. A device on the network forwards the data towards its correct destination.

(i) State the name of this device.

router [1]

(ii) Describe what is meant by cloud storage.

Cloud storage is storage and is a group of servers that are stored in a remote location. The servers store data that is accessed using an internet connection.

[2]

Examiner comment

Some candidates believed that there is no physical hardware storing data in the cloud. They thought it is stored virtually somehow, but did not understand that it is stored on physical servers.

(iii) Give **one** disadvantage of storing the photographs in cloud storage instead of storing them locally.

if the user loses their internet connection, they will lose access to the data that is stored in the cloud [1]

Examiner comment

Some candidates referred to data stored in the cloud being easy to hack. This statement was vague and inaccurate. Data stored locally can be easy to hack, whereas data stored in the cloud is likely to have a lot more security placed on it, so it is not easy to hack. Candidates could refer to the possibility that there may be security risks.

Question 5

5 A programmer writes a computer program using a high-level language.

(a) Tick (✓) **one** box to show which statement is correct about writing computer programs in a high-level language.

A Mnemonics are used to create instructions. ☐

B The computer program is harder to debug than a low-level language program. ☐

C The computer program is machine independent. ✓

D The hardware of the computer can be directly manipulated. ☐

[1]

Examiner comment

Some candidates had a misconception that high-level language is more complex to program than low-level language. Therefore, some candidates incorrectly chose option B, that the computer program is harder to debug.

(b) The programmer uses a compiler to translate the computer program.

(i) Describe how the compiler translates the computer program.

The compiler translates all the program code to machine code at once before it is then executed. It also creates an executable file for the code.

[3]

Examiner comment

- Some candidates gave vague statements about the translation process of a compiler and they stated that all the code is translated at once. This was vague as an interpreter translates all the code too, it just translates a line at a time then executes it.
- Candidates needed to provide extra detail and accuracy that all the code is translated before it is executed. This would provide a clear distinction between the operation of a compiler and an interpreter.

(ii) Describe how the compiler reports errors.

The compiler creates a report that shows all the errors in the code.

The report is displayed after the program has tried to compile.

..... [2]

Examiner comment

- Some candidates stated that the report is created before the code is executed. This was inaccurate as the code would not be executed if there are errors.
- Candidates needed to be precise and technically accurate in their responses. This is very important where questions require them to describe a technical process.

(c) The programmer uses an integrated development environment (IDE) to create the computer program.

One function of the IDE is that it has the built-in compiler.

Give **three** other common functions of an IDE.

1 auto-completion .....

2 auto-correction .....

3 prettyprint .....

[3]

Examiner comment

- Candidates sometimes gave a description of a function instead of naming it. Responses such as highlighting syntax in different colours was an acceptable alternative to naming the function. Some candidates gave the 'built-in translator'.
- Candidates needed to give additional functions to those given in the question. A compiler is a type of translator, so this was a repeat of the question.

Question 6

6 (a) Complete the statements about cookies.

Use the terms from the list.

Some of the terms in the list will **not** be used. Some terms may be used more than once.

compression	executable	hypertext markup language (HTML)
hypertext transfer protocol (HTTP)	image	internet protocol (IP) address
persistent	session	sound
text		
uniform resource locater (URL)	web browser	web server

Cookies are small .....text..... files that are sent between a .....web browser..... and a .....web server..... .

.....session..... cookies are stored in memory and **not** in the user's secondary storage.

When the web browser is closed a .....session..... cookie is lost, whereas a .....persisent..... cookie is **not** lost.

[6]

Examiner comment

Some candidates incorrectly thought that cookies are small executable files.

(b) Give **three** functions of a cookie.

1 *storing user preferences on how a website is displayed*

2 *saving items in a virtual shopping cart*

3 *storing login details so they do not need to be entered each time*

[3]

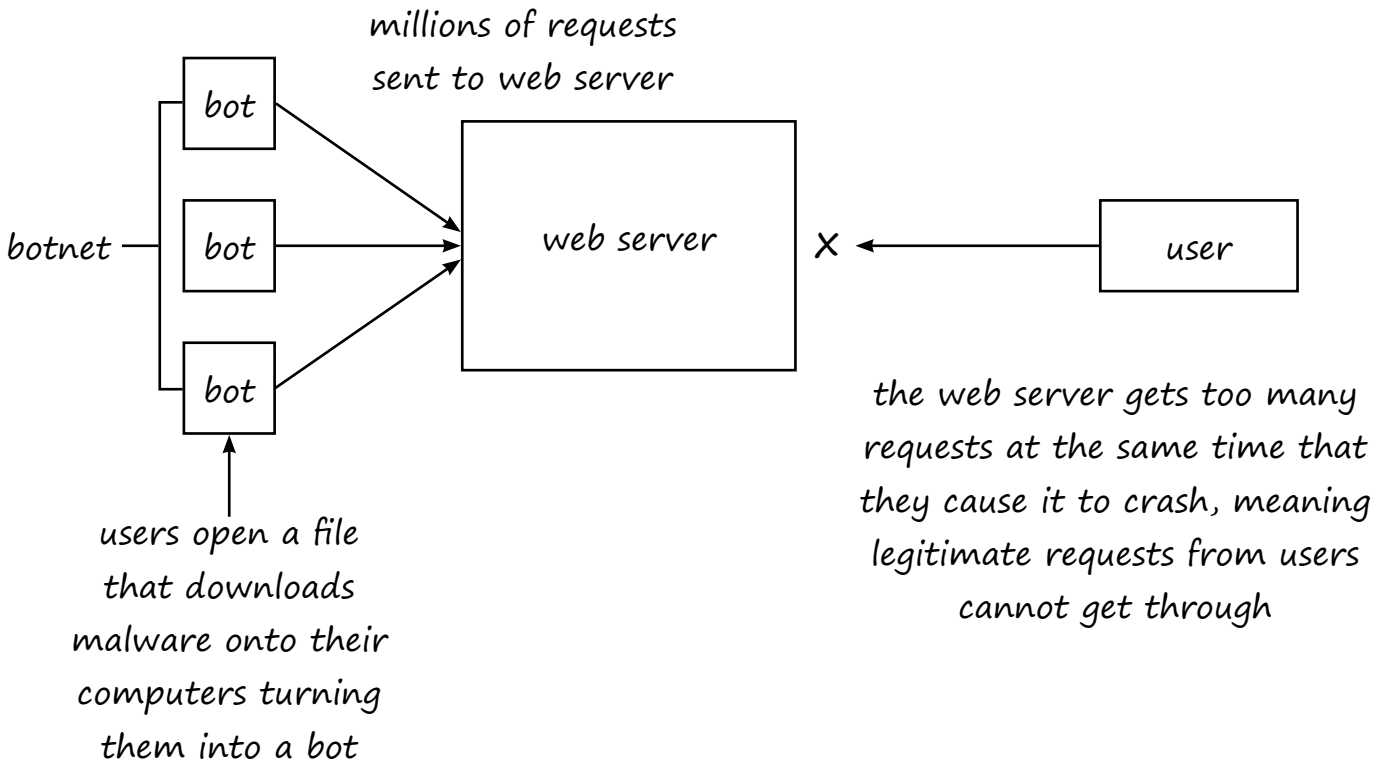
Examiner comment

Some candidates gave vague statements such as ‘storing user history’. This is more a function of a web browser and too vague for a use of a cookie. Candidates needed to be more specific about what is stored in the cookie than just the user's history.

Question 7

7 A distributed denial of service attack (DDoS) is a cyber security threat.

(a) Draw and annotate a diagram to represent the process of a DDoS.



Examiner comment

Candidates found this question challenging and sometimes focused on producing an elaborate drawing instead of keeping their diagrams simple and concise. Candidates needed to maintain the level of accuracy in their annotations that they would havein a written response to the question.

(b) State **two** aims of carrying out a DDoS attack.

1 to stop people accessing the web server and demand a ransom for the attack to stop

2 to affect a company's reputation because people believe they are doing bad things

[2]

Examiner comment

Some candidates incorrectly thought that a DDoS damages or deletes data. It can prevent access to the data that is stored on the web server, but it will not directly damage or delete it.

(c) Give **two** security solutions that can be used to help prevent a DDoS attack being successful.

1 proxy server

2 firewall

[2]

Examiner comment

Some candidates incorrectly thought that using antivirus software and setting strong passwords would prevent a DDoS from being successful.

Question 8

8 A computer is connected to a network and assigned an IPv4 address.

(a) Tick (✓) **one** box to show which device would assign the IPv4 address to the computer.

A	Domain name server (DNS)	
B	Network interface card (NIC)	
C	Router	✓
D	Web server	

[1]

Examiner comment

Some candidates incorrectly thouht that a DNS assigns an IP address.

(b) Describe the characteristics of an IPv4 address.

An IPv4 address is an IP address that uses only denary numbers. It is a 32-bit address that has four groups of numbers that are separated by dots.

[4]

Examiner comment

Some candidates just described the characteristics of a general IP address and did not tailor this to being an IPv4 address. They gave generic characteristics such as that it can be static or dynamic. Having some generic points in their answer was acceptable, but they needed to include points specific to IPv4.

Question 9

9 One component of an expert system is the inference engine.

(a) Identify the **three** other components in an expert system.

1 user interface

2 knowledge base

3 rule base

[3]

Examiner comment

Some candidates gave general components of a computer system, but these were not specific to an expert system.

(b) Describe the role of the inference engine in an expert system.

The inference engine makes decisions to solve a problem or provide a diagnosis. It does this by using the facts in the knowledge base and applying these to the rules in the rule base.

[2]

Examiner comment

Many candidates found it difficult to provide the required level of technical detail for this question. Many did not refer to how the inference engine interacts with the other components in the expert system to perform its role.

Question 10

10 A user has both system software and application software installed on their computer.

(a) Describe the difference between system software and application software.

Give an example of each software in your answer.

System software is software that a computer needs to run effectively as it helps maintain the computer. An example of system software is an antivirus program.

Application software allows the user to perform tasks on the computer and provides services for the user. An example of application software is a web browser.

..... [4]

Examiner comment

- Candidates found it challenging to distinguish the difference between system software and application software. They needed to clearly demonstrate the difference between the two.
- Some candidates gave brand names as examples of the software, but these could not be accepted.

(b) State which component in the computer would store both types of software when the power is turned off.

secondary storage ..... [1]

Examiner comment

Some candidates incorrectly thought that both system software and application software will be stored in ROM.

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