OCR
Oxford Cambridge and RSA

Monday 02 November 2020 – Afternoon

GCSE (9–1) Computer Science

J276/01 Computer systems

Time allowed: 1 hour 30 minutes

Do not use:
- a calculator

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

INSTRUCTIONS
- Use black ink.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.

INFORMATION
- The total mark for this paper is **80**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of written communication will be assessed in questions marked with an asterisk (*).
- This document has **16** pages.

ADVICE
- Read each question carefully before you start your answer.

1 Data in computer systems is valuable and at risk of loss, damage or being stolen.

(a) The table has four potential threats to data.

Write one prevention method for each threat in the table. Each prevention method must be different.

Threat	**Prevention method**
Unauthorised access to computer	
Virus	
Phishing	
Data interception	

[4]

(b) Name **two** other threats to the data in a computer system and give a method of preventing each.

Threat 1 .....

Prevention 1 .....

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Threat 2 .....

Prevention 2 .....

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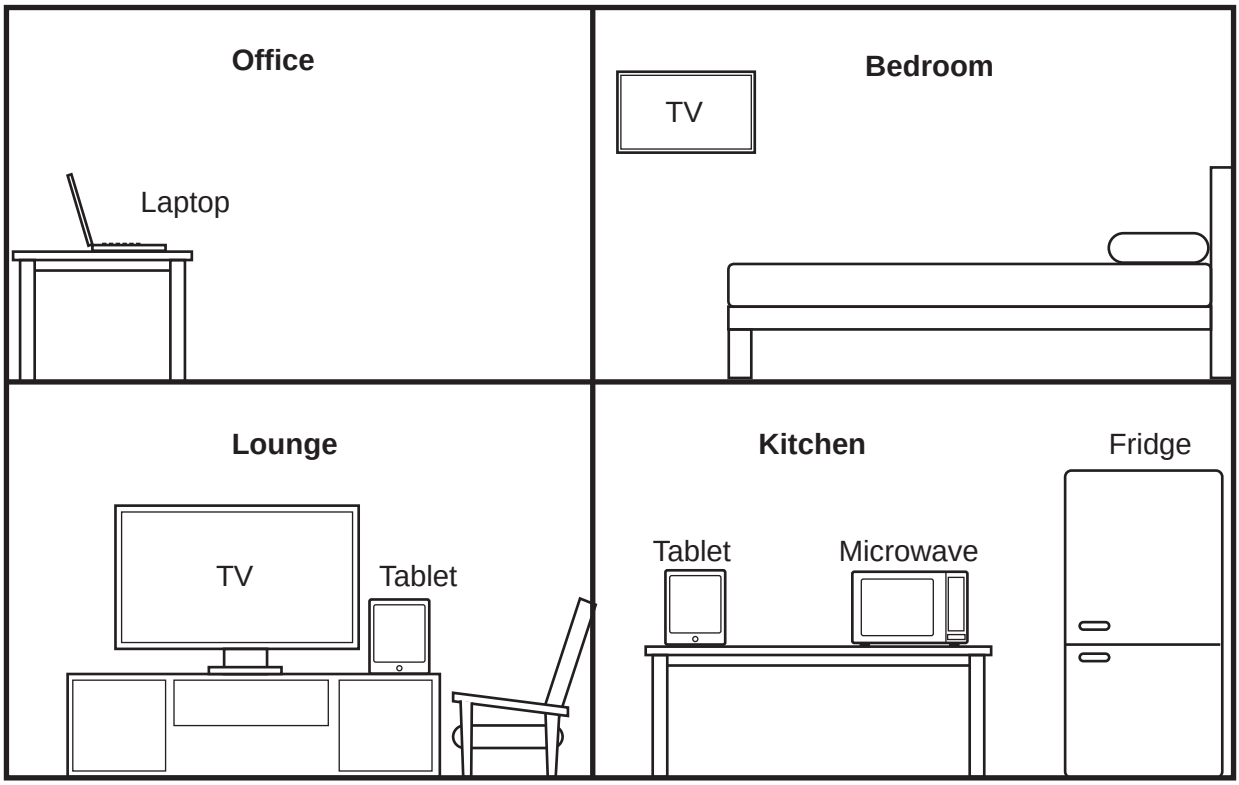
[4]

2 Hope has a network in her house. The main devices are shown in the diagram.



(a) State whether Hope's network is a LAN or a WAN. Justify your choice.

Choice .....

Justification .....

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..... **[3]**

(b) Devices on the network do not currently have Internet access.

Identify **one** device that Hope can use to connect her home network to the Internet.

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

(c) The network has one wireless access point in the kitchen that transmits data on the 5 GHz frequency.

(i) When the laptop is in the kitchen, it has better network performance.

Explain why the laptop's network performance is lower in the bedroom.

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

(ii) State **two** ways Hope could improve the wireless network performance in the bedroom.

1 .....

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2 .....

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[2]

(d) Explain why Hope's network uses a peer-to-peer model and not a client-server model.

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..... **[3]**

(e) Some of Hope's files are stored on the cloud.

Describe the benefits and drawbacks to Hope of storing her files on the cloud.

Benefits

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Drawbacks

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[6]

3 Draw **one** line from each part of the processor to its correct definition.

Part of the processor	Definition
Control Unit (CU)	Performs mathematical operations
Cache	Sends signals to direct the operations
Arithmetic Logic Unit (ALU)	Keeps the clock in sync
Register	A small piece of memory inside the processor that can hold one instruction or address
	High speed memory inside the processor that stores recently used instructions

[4]

4* Daniel is a medical researcher trying to find a cure for a disease. He has a team of hundreds of people carrying out medical testing.

Recent developments in Artificial Intelligence (AI) mean that a computer program could do the work of dozens of researchers in a much shorter time. Daniel decides to increase his use of Artificial Intelligence.

Discuss the issues surrounding this decision. Consider the following in your answer:

- ethical issues
- legal issues
- cultural issues

[8]

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5 Ali's tablet computer has an operating system.

(a) Complete the following description of the functions of an operating system by selecting the appropriate missing words from those in the box.

user	drivers	directories	hardware	interface	multitasking
output	peripherals	printers	processor	RAM	utility
ROM	running	passwords	faster	volatile	virtual

The operating system provides a user ..... . This displays the output to the user and allows the user to interact with the ..... .

The operating system controls the movement of data from secondary storage to ..... and vice-versa. This is known as memory management.

The operating system can only perform one process at a time, but by managing the memory the computer can appear to be completing more than one process at a time. This is known as ..... .

An operating system allows device ..... to be installed to allow an external piece of hardware to interact with the ..... .

The operating system provides security through user accounts and ..... . It also creates and maintains a file system to organise files and ..... . **[8]**

(b) Ali runs defragmentation analysis on his magnetic hard disk. Parts of the results are shown.

	File 1
	File 2
	File 3
	Free space

(i) Explain how defragmentation will change how the files and free space are arranged on Ali's hard disk.

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..... **[3]**

(ii) After defragmentation, Ali's computer is able to access files faster.

Explain why Ali's computer can access the files faster after defragmentation.

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

(iii) Give **three** additional examples of utility programs.

1 .....

2 .....

3 .....

[3]

(c) Ali's computer uses virtual memory. Ali has written two procedures to help himself understand how virtual memory works.

`storeData()` describes how data is stored in RAM.
`accessData()` describes how data is read from RAM.

Write the letter of the missing statements from the table in the correct place to complete the algorithms. Not all statements are used, and some statements might be used more than once.

```
procedure storeData()
    if RAM is ..... then
        move data from RAM to .....
    endif
    store data in next free space in .....
.....
procedure accessData()
    if  ..... (data required is in RAM) then
        if RAM is full then
            move unneeded data from RAM to HDD
        endif
        move required data from HD to RAM
    endif
    read data from .....
endprocedure
```

Letter	Statement
A	Secondary storage
B	NOT
C	Full
D	endfunction
E	Empty
F	endprocedure
G	AND
H	RAM

[6]

(d) Ali's tablet computer also has ROM (read only memory).

Describe the purpose of ROM in Ali's tablet computer.

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

(e) Ali thinks his tablet is an embedded system.

State whether Ali is correct or incorrect, justifying your choice.

Choice .....

Justification .....

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[3]

(f) Ali's tablet computer has 100 GB of secondary storage. There is currently 80 GB available.

Ali wants to transfer a series of video clips onto his tablet. Each video is, on average, 200 000 kilobytes.

Calculate an estimate of the number of video clips Ali can fit onto his tablet.

Show your working.

Working: .....

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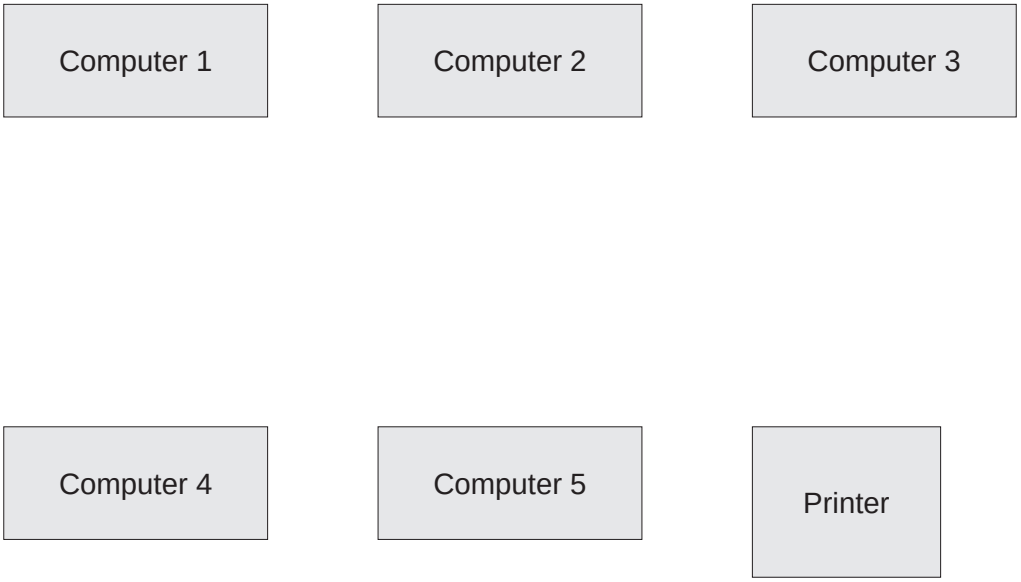
Answer: .....

[4]

6 Naomi's office has five computers connected into a Local Area Network (LAN). There is also one printer that all the devices can print to.

(a) The LAN is set up as a mesh topology.

Draw connections to show one way that the devices could be connected using a mesh topology.



[2]

(b) Ethernet cables are used within the office building.

Tick **one** box in each row to identify if the statement about Ethernet is True or False.

Statement	**True**	**False**
Ethernet is a protocol		
Ethernet uses wireless data transmission		
Ethernet can transmit data at speeds of up to 100 Gbits per second		
Ethernet is a protocol within the TCP / IP stack		

[4]

(c) Computer 1 enters the URL www.ocr.org.uk into a web browser. This is then converted into the IP address of the webserver that hosts the website.

(i) Explain how the URL www.ocr.org.uk is converted into the IP address.

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..... **[3]**

(ii) The website request is sent using packet switching. Each packet has a header.

State **three** items of data that would be contained in a packet header.

1 .....

2 .....

3 .....

[3]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).