

QUESTION 2.



5 (a) Telephone calls can be made by using:

- conventional telephones (using the Public Service Telephone Network (PSTN) over a wired network)
- a computer, equipped with speakers and microphone, connected to the Internet

Put a tick (✓) in the correct column to match each description to the appropriate communication method.

Description	Conventional telephone using PSTN	Internet-based system
connection only in use whilst sound is being transmitted		
dedicated channel used between two points for the duration of the call		
connection maintained throughout the telephone call		
encoding schemes and compression technology used		
lines remain active even during a power outage		

[5]

(b) Distinguish between the Internet and the World Wide Web (WWW).

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..... [3]



(c) Name the hardware device that is being described:

(i) A device that transfers data from one network to another in an intelligent way, task of forwarding data packets to their destination by the most efficient route.

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(ii) A device used between two dissimilar LANs. The device is required to convert data packets from one protocol to another.

.....[1]

(iii) A device or software that provides a specific function for computers using a network. The most common examples handle printing, file storage and the delivery of web pages.

.....[1]

QUESTION 3.



5 A computer system in a control room is used to monitor earthquake activity.

An earthquake zone has a number of sensors to detect seismic activity.

The system detects when seismic activity is greater than 3 on the Richter Scale. Whenever this happens, a printer in the control room prints a report.

(i) Identify the steps that are required in this monitoring system.

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(ii) When the system detects high activity, operators may need to respond rapidly. A printer is useful for hard copies, but may not be the best way to inform operators.

Give a reason why.
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.....[1]

(iii) Name an alternative output device for this monitoring system and give a reason for your choice.

Output device

Reason for choice

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.....[2]

QUESTION 4.



- 3 (a) A computer has a microphone and captures a voice recording using sound recording software.

Before making a recording, the user can select the sampling rate.

Define the term **sampling rate**. Explain how the sampling rate will influence the accuracy of the digitised sound.

Sampling rate

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Explanation

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[2]

- (b) The computer also has bitmap software.

- (i) Define the terms **pixel** and **screen resolution**.

Pixel

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Screen resolution

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[2]

- (ii) A picture has been drawn and is saved as a monochrome bitmap image.

State how many pixels are stored in one byte.

.....[1]

- (iii) A second picture has width 2048 pixels and height 512 pixels. It is saved as a 256-colour image.

Calculate the file size in kilobytes.

Show your working.

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.....[3]

(iv) The actual bitmap file size will be larger than your calculated value.

State another data item that the bitmap file stores in addition to the pixel data.

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.....[1]



QUESTION 5.



- 3 (a) A computer has a microphone and captures a voice recording using sound e

The user can select the sampling resolution before making a recording.

Define the term **sampling resolution**. Explain how the sampling resolution will affect the accuracy of the digitised sound.

Sampling resolution

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Explanation

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[3]

- (b) The computer also has bitmap software.

- (i) Define the term **image resolution**.

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..... [1]

- (ii) A picture is drawn and is saved as a 16-colour bitmap image.

State how many bits are used to encode the data for one pixel.

..... [1]

- (iii) A second picture has width 8192 pixels and height 256 pixels. It is saved as a 256-colour bitmap.

Calculate the file size in kilobytes.

Show your working.

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..... [3]

- (iv) The actual bitmap file size will be larger than your calculated value as a bitmap file has a file header.

State **two** items of data that are stored in the file header.

1

2 [2]

QUESTION 6.

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5 A Personal Computer (PC) has a number of input and output devices.

(a) (i) Name **three** components of a speaker.

1

2

3 [3]

(ii) Explain the basic internal operation of a speaker.

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..... [4]

(b) (i) The user is considering the purchase of a removable device for secondary storage.

Name **one** suitable device.

..... [1]

(ii) Describe **two** possible uses for this device on a home Personal Computer (PC).

1

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2

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..... [2]

QUESTION 8.



1 A student is creating a short video and needs to record music to play in the background.

(a) The student uses a microphone to capture the music.

Explain how the microphone captures the music.

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.....[3]

(b) An analogue-to-digital converter uses sampling to encode the sound.

Explain how different sampling resolutions affect the sound file and the sound it represents.

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.....[3]

(c) The student needs to edit the sound file.

Describe **two** features of sound editing software that can be used to edit the sound file.

Feature 1

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Feature 2

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(d) The video is recorded with a frame rate of 60 frames per second (fps) and progressive encoding.

(i) Describe what is meant by **a frame rate of 60 fps**.

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.....[1]

(ii) Describe what is meant by **progressive encoding** in video recording.

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.....[2]

(e) MP4 multimedia container format is used to save the video.

State what is meant by **multimedia container format**.

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.....[1]

QUESTION 9.



4 Shazia is creating a computer program that will be released to the public. The program will be released as a video.

(a) Shazia uses a microphone to record a sound track for the video.

(i) Describe the internal operation of a microphone.

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..... [3]

(ii) The script for the sound track is printed using a laser printer.

Describe the internal operation of a laser printer.

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..... [3]

(b) The video is recorded using progressive encoding.

Describe **progressive encoding**.

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..... [2]



(c) Shazia’s computer has Dynamic RAM (DRAM) and Static RAM (SRAM).

Explain the differences between Dynamic RAM and Static RAM.

..... [4]

(d) Shazia wants to make sure her computer program is copyrighted.

(i) Define the term **copyright**.

..... [1]

(ii) Shazia does not want to release the software as open source.

Explain why Shazia does **not** want to use an open source licence.

..... [2]

(iii) Name **and** describe **two** software licences, other than open source that Shazia could use.

Licence 1

Licence 2

[2]

QUESTION 10.



2 Aaron uses a desktop computer to do school work.

(a) Aaron has a mouse and keyboard that he can use as input devices and a monitor as an output device.

(i) Identify **two** additional input devices Aaron could use with his desktop computer.

- 1
- 2 [2]

(ii) Identify **two** additional output devices Aaron could use with his desktop computer.

- 1
- 2 [2]

(iii) Aaron needs to store a large number of applications and data on his computer. He needs at least 50GB of secondary storage space.

Identify **one** internal secondary storage device for Aaron's computer.

-
- [1]

(iv) Describe the internal operation of a trackerball mouse.

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- [3]



(b) Aaron's computer has an operating system (OS). The OS manages the running of programs and provides a user interface.

Describe these OS management tasks.

Process management

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Provision of a user interface

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[6]

(c) Aaron's computer has a virus checker and backup software.

Describe these utility programs.

Virus checker

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Backup software

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[4]



(d) Aaron creates a web page using JavaScript code and HTML tags.

Describe how the JavaScript code is translated using an interpreter.

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..... [2]

QUESTION 11.



6 Dominic uses a tablet computer to complete work. He records videos of his work for his colleagues to watch at a later date.

(a) The tablet computer has input and output devices.

(i) The table lists four devices built into the tablet.

Tick (✓) one or more boxes for each device to identify whether it is an input device, an output device or both.

Device	Input	Output
Touchscreen		
Webcam		
Microphone		
Fingerprint scanner		

[2]



(ii) An external speaker is plugged into the tablet computer.

The sequence of steps 1 to 7 describes the internal operation of the speaker.

The statements **A**, **B**, **C**, **D** and **E** are used to complete the sequence.

Letter	Statement
A	Changes in the audio signal cause the direction of the electrical current to change. This determines the polarity of the electromagnet.
B	The vibration creates sound waves.
C	An electric current is sent to the speaker.
D	The electromagnet is repelled by, or attracted to the permanent magnet.
E	The electric current passes through the coil.

Write **one** of the letters **A** to **E** in each appropriate row to complete the sequence.

1

2

3 The current in the coil creates an electromagnetic field.

4

5

6 The movement of the coil causes the diaphragm to vibrate.

7



(b) The tablet computer's secondary storage is solid state (flash) memory.

(i) Give **one** reason why the tablet computer needs secondary storage.

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..... [1]

(ii) Describe solid state memory.

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..... [3]

(c) The tablet computer has RAM and ROM memory.

State the purpose of RAM and ROM memory in the computer.

RAM

ROM

[2]

(d) Dominic's tablet captures a video of Dominic to send to other people. The video is made of a sequence of images and a sound file.

(i) Describe how the images and sound are encoded into a digital form.

Images

Sound

[4]



- (ii) The sequence of images and the sound file create a video. This is sent as a video stream. The video stream can use interlaced encoding or progressive encoding.

Describe the terms **interlaced encoding** and **progressive encoding**.

Interlaced encoding

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Progressive encoding

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[4]

- (e) Dominic sends his videos to his colleagues over the Internet using bit streaming.

- (i) Describe how the video is sent using bit streaming.

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[4]

- (ii) Circle either Real-time or on-demand to identify whether the video will be sent using real-time or on-demand bit streaming. Justify your choice.

Real-time / on-demand

Justification

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[2]



(iii) Describe the following video terms.

Temporal redundancy

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Spatial redundancy

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[2]

15
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QUESTION 12.

- 1 In a supermarket, a self-checkout machine allows customers to scan the barcodes and then pay for their shopping. These are an alternative to the traditional cashier-staffed



(a) The self-checkout machine has a touchscreen.

(i) Identify **two** other input devices that self-checkout machines have.

1

2 [2]

(ii) Identify **two** other output devices that self-checkout machines have.

1

2 [2]



(iii) The touchscreen uses capacitive technology.

The sequence of steps 1 to 6 describes the internal operation of the touchscreen.

The statements **A**, **B**, **C** and **D** are used to complete the sequence.

A	Charge is drawn to the point of contact.
B	The screen has a layer that stores an electrical charge.
C	There is a change in the electrostatic field.
D	The coordinates are sent to the touchscreen driver.

Write **one** of the letters **A** to **D** in each appropriate row to complete the sequence.

- 1
- 2 When the user touches the screen
- 3
- 4
- 5 The coordinates of the point of contact can be calculated.
- 6

[2]

(b) The self-checkout machines have primary storage.

(i) Give **two** reasons why the self-checkout machine needs primary storage.

- 1
-
- 2
-

[2]

(ii) The self-checkout machines use Static RAM (SRAM) for their cache.

The following table has statements about SRAM or Dynamic RAM (DRAM).

Tick (✓) **one** box in each row to identify whether the statement is about SRAM or DRAM.

Statement	SRAM	DRAM
More expensive to make		
Requires refreshing (recharging)		
Made from flip-flops		

[2]



(c) The self-checkout machines connect to a server that stores all the data for the supermarket. This is a client-server network.

(i) Describe, using an example for the supermarket, the client-server network mode

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..... [4]

(ii) The supermarket is concerned about the security and integrity of the data on the server.

Identify **two** methods that can be used to minimise the security risk to the data, and **one** method to protect the integrity of the data.

Security 1

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Security 2

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Integrity

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[3]