8 An alarm clock is controlled by a microprocessor. It uses the 24 hour clock. The ho
by an 8-bit register, **A**, and the number of minutes is represented by another 8-bit re

(a) Identify what time is represented by the following two 8-bit registers.

A

128	64	32	16	8	4	2	1
0	0	0	1	0	0	1	0

:

B

128	64	32	16	8	4	2	1
0	0	1	1	0	1	0	1

Hours ..... Minutes .....

[2]

(b) An alarm has been set for 07:30. Two 8-bit registers, **C** and **D**, are used to represent the hours and minutes of the alarm time.

Show how 07:30 would be represented by these two registers:

C

Hours

:

D

Minutes

[2]

(c) Describe how the microprocessor can determine when to sound the clock alarm.

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.....

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.....[3]

(d) The LCD (liquid crystal display) on the clock face is back-lit using blue LE
diodes). The brightness of the clock face is determined by the level of light in
amount of light given out by the LEDs is controlled by a control circuit.

Describe how the sensor, microprocessor and LEDs are used to maintain the c
brightness of the clock face.

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.....[3]

(e) Modern LCD monitors and televisions use LED back-lit technology.

Give **two** advantages of using this new technology compared to the older cold cathode fluorescent lamp (CCFL) method.

1 .....

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2 .....

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.....

[2]

QUESTION 2.

3 Four input devices, four descriptions and four applications are shown below.

Draw a line to connect each input device to its correct description. Then connect each to its correct application.

Input device	Description	Application
barcode reader	copies paper documents and converts the text and pictures into a computer-readable form	voice recognition
microphone	reads labels containing parallel dark and light lines using laser light or LEDs; the width of each line represents a binary code	reading passports
pH sensor	detects changes in acidity levels; data is often in analogue form	automatic stock control
scanner	device that allows audio signals to be converted into electric signals; these can be interpreted by a computer after being converted into digital form	monitor soil in a greenhouse

[6]

QUESTION 3.

10 There are **six** descriptions in the table below.

Complete the table below by writing the correct storage device or media in the box next to each description.

Description	Storage device or media
Non-volatile memory that can only be read from and not written to.	
Optical storage media that allows very high storage capacity by using blue/violet laser technology.	
Volatile memory that stores data, programs and the parts of the operating system that are currently in use.	
Optical storage media that uses a single spiral track and uses dual layer technology, allowing high data storage capacity.	
Device that stores data by controlling the movement of electrons within a microchip; there are no moving parts.	
Optical storage media that uses concentric tracks allowing writing and reading to take place at the same time.	

[6]

QUESTION 4.

8 Leonard has a new laser printer to print letters for his business.

Leonard connects his printer to his computer using the USB port.

(a) Give **three** benefits of using the USB port to connect the printer to the computer.

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....

[3]

(b) State **two** benefits and **one** drawback of Leonard using a laser printer, instead of an inkjet printer, to print the letters.

Benefit 1 .....

.....

Benefit 2 .....

.....

Drawback .....

.....

[3]

(c) An interrupt signal is sent from the printer to the computer.

(i) Give **two** examples of when a printer would generate an interrupt signal.

Example 1 .....

Example 2 .....

[2]

(ii) Many devices send interrupt signals.

Identify the software in the computer that will receive and manage all interrupt signals.

..... [1]

(ii) Describe how a browser checks that a website is secure.

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..... [4]

8 **Six** statements are given about printers.

Tick (✓) to show whether the statement applies to a **3D** printer, an **Inkjet** printer or a **Laser** printer.

Some statements apply to more than one printer.

Statement	**3D (✓)**	**Inkjet (✓)**	**Laser (✓)**
Uses a moving print head			
Uses liquid ink			
Produces output using materials such as plastic and resin			
Uses piezoelectric or thermal technology			
Uses a rotating drum to transfer the image to the paper			
Uses layer upon layer of material to create the output			

[6]

QUESTION 6.

5 **(a)** Inkjet printers and laser printers are two common types of printer.

Describe the features and principles of operation of each type of printer.

(i) Inkjet printer

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..... [4]

(ii) Laser printer

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..... [4]

(b) Another type of printer is the 3D printer.

Describe 3D printing.

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..... [3]

(b) When data are transmitted from one device to another, a parity check is oft
each byte of data. The parity bit is often the leftmost bit in the byte.

(i) If a system uses even parity, give the parity bit for each of the following bytes:

parity bit

	1	**1**	**0**	**0**	**1**	**1**	**0**

parity bit

	0	**0**	**0**	**0**	**0**	**0**	**1**

[2]

(ii) A parity check can often detect corruption of a byte.

Describe a situation in which it **cannot** detect corruption of a byte.

.....

.....

.....[1]

8 The steps to print a document using a laser printer are shown in the table below.

Put each step in the correct order. The first step has been done for you.

Step	Order
As the printing drum rotates, a laser scans across it; this removes the positive charge in certain areas	
The printing drum is coated in positively-charged toner; this then sticks to the negatively-charged parts of the printing drum	
The paper goes through a fuser which melts the toner so it fixes permanently to the paper	
The printer driver ensures that the data is in a format that the laser printer can understand	**1**
A negatively-charged sheet of paper is then rolled over the printing drum	
Data is then sent to the laser printer and stored temporarily in the printer buffer	
The toner on the printing drum is now transferred to the paper to reproduce the required text and images	
The printing drum is given a positive charge	
Negatively-charged areas are then produced on the printing drum; these match exactly with the text and images to be printed	

[8]

QUESTION 8.

6 High-level or low-level languages can be used when writing a computer program.

State **two** advantages of using a high-level language and **two** advantages of using a low-level language.

High-level language advantage 1 .....

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High-level language advantage 2 .....

.....

Low-level language advantage 1 .....

.....

Low-level language advantage 2 .....

.....

[4]

7 Modern Liquid Crystal Display (LCD) monitors use Light-Emitting Diode (LED) backlit technology.

Give **four** benefits of using LED technology.

1 .....

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2 .....

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3 .....

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4 .....

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[4]

QUESTION 9.

(c) A sports events company uses a digital camera attached to a drone (small [illegible] video their events from the sky.

The video is stored as it is captured, on a device that is attached to the drone.

(i) Circle the most suitable type of storage to store the video.

Optical Magnetic Solid state

[1]

(ii) Explain the reasons for your choice in **part (c)(i)**.

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..... [2]

6 Two examples of output devices are a 3D printer and a 3D cutter.

(a) The table contains **four** statements about 3D printers and 3D cutters.

Tick (✓) to show which statements apply to each output device, some statements may apply to both output devices.

Statement	3D printer (✓)	3D cutter (✓)
Outputs a physical 3D product		
Uses a high powered laser to create the output		
Creates 3D prototypes		
Uses layers of material to create the output		

[4]

(b) Identify the software used to create the computerised designs for 3D printing.

..... [1]

(c) A Digital Light Projector (DLP) is another example of an output device.

Describe how a DLP displays an image.

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QUESTION 10.

4 **(a)** Identify **three** security issues that can put a computer system at risk.

Security issue 1 .....

Security issue 2 .....

Security issue 3 .....

[3]

(b) Explain how a firewall can help to protect a computer system from security issues.

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.....[4]

5 **(a)** Karina is taking her Computer Science examination. She has **three** questions to answer about output devices.

(i) For the first question she writes the answer:

"It is a high powered laser that cuts materials such as thin metals or wood."

Identify the output device that Karina is describing.

.....[1]

(ii) For the second question she writes the answer:

"The screen is made up of blocks of red, green and blue pixels. The screen uses layers of different types of liquid."

Identify the output device that Karina is describing.

.....[1]

(iii) For the third question she writes the answer:

"It is responsible for powering and moving a motor in machinery, such as a robot arm in a factory."

Identify the output device that Karina is describing.

.....[1]

(b) Karina correctly answers another examination question about some more ou

Five different terms have been removed from her answer.

Complete the sentences in Karina's answer, using the list given. Not all terms in the list to be used.

- 3D
- digital light projector
- inkjet
- interactive whiteboard
- laser
- rotating
- scanning
- sliding
- speaker
- thermal bubble

An ..... allows a user to write on a surface using a pen, the text and drawings can then be captured and stored for later use. An ..... printer produces a hard copy of a document using ..... and piezoelectric technology. A ..... printer uses a ..... drum, and positive and negative charges, to produce a hard copy of a document.

[5]

QUESTION 11.

2

1 There are **six** output devices and **six** descriptions shown.

Draw a line to connect each output device to the most appropriate description.

Device	Description
Laser Printer	Uses a high-intensity beam of light shone through three layers of changing pixels
LCD Projector	Uses millions of micro mirrors to reflect light through a lens
Digital Light Projector (DLP)	Uses plastic, resin or powdered metal to generate a physical output
Inkjet Printer	Uses a static electric charge on a rotating drum to generate a physical output
3D Printer	Uses liquid ink to generate a physical output
2D Cutter	Uses a high-power laser to generate a physical output

[5]

1 Andrew wants to produce advertising material for his company.

(a) Andrew can use an **Inkjet printer** or a **Laser printer**.

Draw lines to connect each printer to a correct statement. More than one line may be u
connect to each printer or statement.

Printer	Statement
	Can print in colour
Inkjet printer	
	Uses a charged drum to create the printed item
	Uses powdered toner
Laser printer	
	Creates output line by line using a print head

[2]

(b) Andrew wants to print a single page A4 leaflet. He wants to print 10 000 copies.

State whether he should use an inkjet or a laser printer.

..... [1]

(c) Andrew wants to produce small 3D models of the company logo.

Explain how a 3D cutter could be used to produce the models.

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..... [2]

1 A library has a system that allows customers to check out the books that they wa

Each book has a barcode that can be used to identify the book.

(a) **(i)** Identify **two** input devices that may be used in the library's system.

Input device 1 .....

Input device 2 .....

[2]

(ii) Identify **two** storage devices that may be used in the library's system.

Storage device 1 .....

Storage device 2 .....

[2]

(iii) Identify **two** output devices that may be used in the library's system.

Output device 1 .....

Output device 2 .....

[2]

(b) The data stored by the library is archived at the end of each day. The archive is held on a server in the library office.

The data is encrypted with an 8-bit key. As some of the data is confidential, the library wants to make the encryption more secure.

(i) State how the library could make the encryption more secure.

.....

..... [1]

(ii) The term used to describe data before it is encrypted is plain text.

State the term used to describe encrypted data.

..... [1]

(iii) The library's archive system uses an error detection and correction syste... a parity check with an automatic repeat request (ARQ).

Describe how this system uses the parity check and ARQ.

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..... [6]

(c) The library has a website that customers can use to search for a book.

(i) The website has a background colour with the hexadecimal colour code #F92A10

The colour code is stored in two 12-bit binary registers.

Show how the colour code would be stored in the registers.

F92												
A10												

[6]

(ii) Videos on the library website show customers which books the librar in stock.

The library wants the file size of a video to be as small as possible.

Identify **and** describe a method the library could use to reduce the file size of a video much as possible.

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..... [4]

(d) The library often holds events that introduce new authors.

At the events, the library has a Liquid Crystal Display (LCD) screen that displays data, including an image and information about the author.

Describe how an LCD screen operates to display this data.

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..... [5]