3.2 Hardware – Input & Output Devices
QUESTIONS

3.2 Input and output devices				
1	Understand what is meant by an input device and why it is required			
2	Understand what is meant by an output device and why it is required			
3	(a) Understand what is meant by a sensor and the purposes of sensors			
3	(b) Identify the type of data captured by each sensor and understand when each sensor would be used, including selecting the most suitable sensor for a given context			

More Guidance:

3.2 Input and output devices

Candidates should be able to:	Notes and guidance
1 Understand what is meant by an input device and why it is required	• Including: – barcode scanner – digital camera – keyboard – microphone – optical mouse – QR code scanner – touch screen (resistive, capacitive and infra-red) – two-dimensional (2D) and three-dimensional (3D) scanners
2 Understand what is meant by an output device and why it is required	• Including: – actuator – digital light processing (DLP) projector – inkjet printer – laser printer – light emitting diode (LED) screen – liquid crystal display (LCD) projector – liquid crystal display (LCD) screen – speaker – 3D printer
3 (a) Understand what is meant by a sensor and the purposes of sensors	• Limited to: – acoustic – accelerometer – flow – gas – humidity – infra-red – level – light – magnetic field – moisture – pH – pressure – proximity – temperature
(b) Identify the type of data captured by each sensor and understand when each sensor would be used, including selecting the most suitable sensor for a given context	

7 A train station has a ticket inspector who checks each customer's ticket before they are allowed to get on the train.

The train station wants a system that will allow the tickets to be automatically checked.

(a) Identify **two** suitable input devices that can be used to automatically read the tickets.

1 .....

2 .....

[2]

(b) The train driver pushes a button to close the train door when all passengers have boarded the train. The train door will only close when there are no passengers in the doorway.

The system to check there are no passengers in the doorway uses a sensor and a microprocessor.

Explain how the sensor and the microprocessor are used to check whether the train door can be closed.

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..... [6]

3.2 Hardware – Input & Output Devices
QUESTIONS

5 A farm has an automated drinking system for its animals. The drinking system has a water bowl that contains the water. When the water bowl is empty, it is automatically refilled.

The system uses a sensor and a microprocessor.

(a) Identify the most appropriate sensor for this system.

..... [1]

(b) Describe how the sensor and the microprocessor are used to automatically refill the water bowl.

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..... [6]

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]

3.2 Hardware – Input & Output Devices
QUESTIONS

1 A shopping mall has an information point. Visitors can use it to find out which shops are in the mall and where they are located.

(a) Identify **one** input device that could be built into the information point.

Give an example of how that device would be used.

Input device .....

Example .....
[2]

(b) Identify **one** output device that could be built into the information point.

Give an example of how that device would be used.

Output device .....

Example .....
[2]

(c) Identify **one** example of primary storage that could be built into the information point.

State what would be stored in your example of primary storage.

.....

.....

.....

..... [2]

3.2 Hardware – Input & Output Devices
QUESTIONS

1 A bus station has a ticket machine.

A customer can use the ticket machine to select and pay for their ticket.

One input device built into the ticket machine is a touch screen.

(a) Identify **two** other input devices that could be built into the ticket machine.

Input device 1 .....

Input device 2 .....
[2]

(b) The ticket machine has a help icon that a user can touch to contact customer support.

The ticket machine has an output device that allows the user to hear the customer support person.

Identify an output device that would be used for this purpose.

..... [1]

(c) The touch screen for the ticket machine uses resistive technology.

(i) Describe how resistive touch screen technology operates to recognise a user's touch.

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..... [4]

(ii) Give **two** benefits of using resistive touch screen technology for the ticket machine.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(iii) Give **two** drawbacks of using resistive touch screen technology for the ticket machine.

Drawback 1 .....

.....

Drawback 2 .....

.....

[2]

(iv) Identify **one** other touch screen technology that could have been used.

..... [1]

(d) The computer in the ticket machine uses the stored program concept.

Describe the stored program concept.

.....

.....

.....

..... [2]

(e) The computer in the ticket machine has an operating system.

One function of the operating system is to provide an interface for the user.

State **three** other functions of the operating system.

Function 1 .....

Function 2 .....

Function 3 .....

[3]

(f) The computer uses 12-bit binary registers to store data whilst it is being processed.

Customers are given a denary ticket number.

(i) Give the 12-bit binary value that is stored in the register for each denary ticket number.

100 .....

235 .....

301 .....

Working space

.....

.....

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.....

.....

[3]

3.2 Hardware – Input & Output Devices
QUESTIONS

1 **Five** components are shown.

Tick (✓) to show whether each component is an example of input, output or storage.

Component	Input (✓)	Output (✓)	Storage (✓)
actuator			
register			
sensor			
mouse			
Digital Versatile Disc (DVD)			

[5]

4 A company wants to manufacture a mobile phone.

(a) The company needs to decide which touch screen technology to use.

State **one** type of touch screen technology that you recommend the company use.

Justify your choice.

Touch screen type .....

Justification .....

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[4]

(b) The mobile phone uses Random Access Memory (RAM) and Read Only Memory (ROM).

RAM and ROM are both examples of the same type of storage.

Identify this type of storage and justify your answer.

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..... [2]

(c) The mobile phone has a USB port to allow a USB connection to a computer.

(i) Describe how data is transmitted using a USB connection.

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..... [2]

(ii) One benefit of a USB connection is that the cable can only be inserted into the port one way, so an incorrect connection cannot be made.

Give **three** other benefits of using a USB connection to connect a mobile phone to a computer.

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....
[3]

(d) When a user is reading a text on the mobile phone, they may also get a telephone call on the mobile phone. An interrupt signal is generated that results in an output to inform the user that a person is calling them.

Describe how the interrupt signal is processed to inform the user that a person is calling them.

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..... [4]

3.2 Hardware – Input & Output Devices
QUESTIONS

6 A museum has Quick Response (QR) codes that allow visitors to view videos for extra information about items in the museum.

The visitor is given a portable device with a display screen, that they can use to read each QR code.

(a) Describe how the QR code is read and processed to display the video for the visitor.

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..... [4]

(b) Tick (✓) to show whether the videos are MP3 files, MP4 files or MIDI files.

	Tick (✓)
MP3 files	☐
MP4 files	☐
MIDI files	☐

[1]

(c) The video files are compressed using lossy compression.

Give **two** benefits of using lossy compression to compress the video files.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(d) The portable device has a Light-Emitting Diode (LED) display screen to allow the visitor to watch a video.

Describe how the LED screen operates to display the video.

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..... [4]

4 Pradeep uses his personal computer to complete work at home.

(a) Pradeep uses a mouse and a keyboard to control the computer.

(i) Complete the descriptions of the principles of operation of a mouse and a keyboard using the most appropriate terms from the list. **Not** all terms in the list need to be used.

- absorbs
- ball
- biometric
- circuit
- colour
- digital
- direction
- Light-Emitting Diode (LED)
- Liquid Crystal Display (LCD)
- reflects
- speed
- switch
- transparency

An optical mouse shines a red light from a ..... underneath the mouse. The light ..... back from a surface through a lens in the mouse and is converted to a value. This value is transmitted to the computer. The computer then determines the ..... and ..... of the movement.

When the user presses a key on a keyboard, the key pushes the ..... on the circuit board. This completes a ..... . Signals are sent to the computer. The computer uses the data to calculate which key was pressed.

[6]

(ii) Identify **two** other input devices Pradeep could use with his personal computer.

Input device 1 .....

Input device 2 .....

[2]

(b) Pradeep uses a projector attached to the ceiling at his home to watch high-definition (HD) films.

The projector has broken. He wants to buy a replacement. He needs to choose between an LCD projector and a Digital Light Projector (DLP).

Explain why an LCD projector would be more appropriate for Pradeep.

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..... [3]

2 Magda has a mobile telephone.

She uses the touch screen on her telephone to send emails to her customers. The touch screen breaks, stopping Magda from using it to type her emails.

(a) Identify **one** other input device that would be built into the mobile telephone that Magda could use to send an email to her customers.

..... [1]

(b) The touch screen operates by using the conductive properties of the object that is used to touch the screen.

State whether the touch screen is a resistive, capacitive or infra-red touch screen.

..... [1]

(c) Magda is listening to music on her mobile telephone when she receives a telephone call. A signal is sent within the telephone to stop the music and output that a call has been received.

Give the name of this type of signal.

..... [1]

7)

3.2 Hardware – Input & Output Devices
QUESTIONS

Georgia uses a digital camera. The digital camera takes a photograph that is then converted into a digital image.

Complete the paragraph about the operation of a digital camera, using the most appropriate terms from the list. **Not** all terms in the list need to be used.

- analogue-to-digital
- binary
- charge-coupled
- digital-to-analogue
- lens
- light
- mirror
- pixel
- reflection
- sensor
- storage

When Georgia pushes the button to take a photograph, an aperture opens at the front of

the camera to allow ..... to stream in through

the ..... . This is captured by a sensor called a

..... device. The .....

converter then converts each ..... into a digital value.

[5]

4 The paragraph explains the operation of different touch screen technologies.

Complete the paragraph using the list of terms. **Not** all terms in the list need to be used.

- capacitive
- change
- circuit
- conductive
- coordinates
- grid
- heat
- infra-red
- insulating
- light
- manufacture
- pressure
- resistive

In ..... touch screen technology, an electrostatic field is present on the surface of the touch screen. The ..... properties of a user cause a ..... in the field. The ..... of the user's touch can be calculated.

In ..... touch screen technology, a user pushes the top layer of the screen and makes it connect with the bottom layer to complete a ..... .

This type of touch screen is cheaper to ..... .

[7]

7 **Five** statements are given about devices.

Tick (✓) to show if each statement applies to a 3D scanner, barcode reader or a Quick Response (QR) code reader. Some statements may apply to more than **one** type of device.

Statement	3D scanner (✓)	Barcode reader (✓)	QR code reader (✓)
uses position and alignment markers for orientation when scanning			
scans the shape and appearance of an object			
uses reflected light from a laser to convert a black-and-white pattern into binary			
can often be built into an Electronic Point Of Sale (EPOS) terminal, for example, a supermarket checkout			
it is an example of an input device			

[5]

8 A keyboard is a type of input device that can be used to enter data into a computer.

Complete the paragraph that describes one method of operation for a keyboard, using the most appropriate terms from the given list. **Not** all terms in the list need to be used.

- Binary
- Breaks
- Calculated
- Character
- Circuit
- Current
- Information
- Network
- Press
- Processor
- Signal
- Switch

A keyboard has a key matrix underneath the keys. When a key is pressed, it presses a

..... that completes a ..... . This allows

..... to flow. The location of the key pressed is

..... . The location of the key pressed is compared to a

..... map to find the ..... value for the key that

has been pressed.

[6]

3 An optical mouse is a type of input device that can be used to input data into a computer system.

(a) Complete the paragraph about the operation of an optical mouse, using the most appropriate terms from the given list. **Not** all terms need to be used.

- Ball
- Battery
- LCD
- LED
- Lens
- Magnifies
- Matrix
- Microswitch
- Photoelectric
- Photographic
- Reduces
- USB

An optical mouse shines an ..... from the bottom of the mouse onto a surface. Light bounces straight back from the surface into a ..... cell. This has a ..... that ..... the reflected light to allow detection of smaller movements. When a button on the mouse is clicked, a ..... is pressed. A ..... connection is used to carry the data to the computer.

[6]

(b) Identify **two** other input devices that can be used to enter data into a computer.

1 .....

2 .....

[2]

3.2 Hardware – Input & Output Devices
QUESTIONS

3 The given table shows the name or description of four devices. The table is incomplete.

Complete the missing device names and descriptions.

Device name	Description
.....	Uses either thermal bubble or piezoelectric technology
Actuator	....
.....	Uses thousands of tiny mirrors that can move very quickly to create an image
Mouse	....

[4]

4 A supermarket sells many products. Each product has a barcode.

(a) Explain how the barcode is read at the supermarket checkout and how the price of the product is found.

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..... [6]

(b) The supermarket stores data using a Solid State Drive (SSD).

(i) Explain how an SSD stores data.

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..... [3]