3.3 Hardware – Data Storage
QUESTIONS

3.3 Data Storage				
1	Understand what is meant by primary storage			
2	Understand what is meant by secondary storage			
3	Describe the operation of magnetic, optical and solid-state (flash memory) storage and give examples of each			
4	Describe what is meant by virtual memory, how it is created and used and why it is necessary			
5	Understand what is meant by cloud storage			
6	Explain the advantages and disadvantages of storing data on the cloud in comparison to storing it locally			

More Guidance:

3.3 Data storage

Candidates should be able to:	Notes and guidance
1 Understand what is meant by primary storage	• Primary storage is directly accessed by the CPU • Including the role of: – random access memory (RAM) – read only memory (ROM) • Including why a computer needs both RAM and ROM, and the difference between them
2 Understand what is meant by secondary storage	• Secondary storage is not directly accessed by the CPU and is necessary for more permanent storage of data
3 Describe the operation of magnetic, optical and solid-state (flash memory) storage and give examples of each	• Magnetic storage uses platters which are divided into tracks and sectors. Data is read and written using electromagnets • Optical storage uses lasers to create and read pits and lands • Solid-state (flash memory) uses NAND or NOR technology. Transistors are used as control gates and floating gates
4 Describe what is meant by virtual memory, how it is created and used and why it is necessary	• Pages of data are transferred between RAM and virtual memory when needed
5 Understand what is meant by cloud storage	• Cloud storage can be accessed remotely in comparison to storing data locally • Physical servers and storage are needed to store data in cloud storage
6 Explain the advantages and disadvantages of storing data on the cloud in comparison to storing it locally	

3.3 Hardware – Data Storage
QUESTIONS

8 Storage can be described as being magnetic, solid-state or optical.

(a) Give **two** features of magnetic storage.

1 .....

.....

2 .....

.....
[2]

(b) Give **three** features of solid-state storage.

1 .....

.....

2 .....

.....

3 .....

.....
[3]

(c) Give **one** example of each type of storage.

Magnetic .....

Solid-state .....

Optical .....
[3]

3.3 Hardware – Data Storage
QUESTIONS

13 Storage and memory are important components of a computer system.

(a) Primary storage is one type of storage in a computer system.

(i) Tick (✓) **one** box to show which is an example of primary storage.

A	compact disk (CD)	☐
B	hard disk drive (HDD)	☐
C	random access memory (RAM)	☐
D	solid-state drive (SSD)	☐

[1]

(ii) Give **one** characteristic of primary storage.

..... [1]

(b) Virtual memory can be created in a computer system.

Complete the description about virtual memory.

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.

binary hard disk drive (HDD) hexadecimal operating system

pages random access memory (RAM) read only memory (ROM)

sectors software tracks virtual memory

Virtual memory is used when the ..... is full. It is created by partitioning the ..... . Data is divided into ..... that can be sent from ..... to the ..... to be temporarily stored until they are required.

[5]

3.3 Hardware – Data Storage
QUESTIONS

6 A company uses cloud storage to store its data.

(a) Tick (✓) **one** box to show which is **not** a characteristic of cloud storage.

A Data is accessed through a network ☐

B Data is stored locally ☐

C Data is stored remotely ☐

D Physical servers are used to store the data ☐

[1]

(b) Explain **two** advantages for the owners of the company of storing its data in cloud storage.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

(c) Explain **one** disadvantage to employees of the company storing data in the cloud.

.....

.....

.....

..... [2]

9 A computer has secondary storage.

(a) The table contains statements about secondary storage.

Complete the table by writing the type of secondary storage that applies to each statement. Some types of secondary storage may apply to more than one statement.

Type of secondary storage	Statement
.....	data is stored using pits and lands
.....	data is stored using control gates and floating gates
.....	data is stored using electromagnets
.....	data is stored using a laser
.....	data is stored on a platter that is divided into tracks and sectors

[5]

(b) Explain **two** differences between primary storage and secondary storage.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

3.3 Hardware – Data Storage
QUESTIONS

3 Secondary storage devices are used to store data in a computer.

(a) Circle **three** components that are secondary storage devices.

central processing unit (CPU) compact disk (CD)

hard disk drive (HDD) random access memory (RAM) read only memory (ROM)

register sensor solid-state drive (SSD)

[3]

(b) Tick (✓) **one** box to show which statement about secondary storage is correct.

A It is directly accessed by the CPU. ☐

B It is magnetic storage only. ☐

C It is used to permanently store software and data files. ☐

D It is volatile. ☐

[1]

10 A computer has pages A, B and C that are stored in RAM. Page D needs to be sent to the RAM but the RAM is full.

Page B is **not** needed immediately.

Explain how virtual memory can be used in this scenario.

.....

.....

.....

.....

.....

.....

.....

..... [4]

3.3 Hardware – Data Storage
QUESTIONS

3 A new computer comes with primary and secondary storage.

(a) Data storage is measured using binary denominations.

Complete each conversion.

8 bytes = ... nibbles

512 kibibytes (KiB) = ... mebibytes (MiB)

4 gibibytes (GiB) = ... mebibytes (MiB)

1 exbibyte (EiB) = ... pebibytes (PiB)

[4]

Working space

.....

.....

.....

.....

(b) Random access memory (RAM) is an example of primary storage.

Give **three** examples of data that is commonly stored in RAM.

1 .....

2 .....

3 .....

[3]

(c) Describe the purpose of secondary storage.

.....

.....

.....

..... [2]

3.3 Hardware – Data Storage
QUESTIONS

3 **Five** statements are shown about Random Access Memory (RAM), an internal Solid State Drive (SSD) and a USB flash memory drive.

Tick (✓) to show which statements apply to each component. Some statements may apply to more than **one** component.

	Component		
Statement	**RAM (✓)**	**Internal SSD (✓)**	**USB flash memory drive (✓)**
it is a type of primary storage			
it is volatile			
it uses NAND and NOR technology			
it does **not** have any moving parts			
it is **not** directly connected to the central processing unit (CPU)			

[5]

3 Three types of storage media are magnetic, optical and solid state.

(a) One example of solid-state storage is a Solid State Drive (SSD).

Identify **one** other example of solid-state storage.

..... [1]

(b) Optical storage uses a laser to store and read data from a disk.

Explain how the laser is used to store and read data from the disk.

.....

.....

.....

.....

.....

..... [3]

(c) A business is creating a new mobile device that has an SSD as secondary storage.

(i) Give **three** reasons why an SSD is the most suitable secondary storage for their mobile device.

Reason 1 .....

.....

Reason 2 .....

.....

Reason 3 .....

.....

[3]

(ii) Identify **two** examples of software that can be stored on the SSD.

Example 1 .....

Example 2 .....

[2]

3.3 Hardware – Data Storage

QUESTIONS

11 (a) The paragraph describes the process of printing a document using an inkjet printer.

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

- binary
- buffer
- drum
- information
- interrupt
- laser
- liquid
- nozzles
- operating system
- powder
- thermal bubble
- toner

Data is sent from the computer to the printer. The data is held in a print

..... that is temporary storage until the data is

processed to be printed.

Inkjet printers operate by having a print head that moves

..... side to side across the page. These

spray ..... ink droplets onto the page. These ink

droplets can be created using piezoelectric or .....

technology.

If the paper jams in the printing process, the printing stops and an

..... is sent to the computer.

[5]

(b) A printer is one example of an output device.

Give **three** other examples of output devices.

Example 1 .....

Example 2 .....

Example 3 .....

[3]

(c) Give **three** examples of input devices.

Example 1 .....

Example 2 .....

Example 3 .....

[3]

7 Cassie stores data for her business every day. She stores the data using optical data storage.

(a) Identify **three** examples of optical data storage.

Example 1 .....

Example 2 .....

Example 3 .....

[3]

(b) **Six** statements are given about the operation of three different types of storage.

Tick (✓) to show which statements apply to each type of storage. Some statements may apply to more than **one** type of storage.

	Type of storage		
Statement	**Magnetic (✓)**	**Optical (✓)**	**Solid state (✓)**
this storage has no moving parts			
this storage uses a laser to read and write data			
this storage uses a read/write head			
this storage burns pits onto a reflective surface			
this storage uses NAND and NOR technology			
this storage stores data in tracks and sectors			

[6]

3.3 Hardware – Data Storage
QUESTIONS

7 **(a)** Tick (✓) **one** box to identify if an internal Solid State Drive (SSD) is an example of primary, secondary or off-line storage. Justify your choice.

Tick (✓)

☐	Primary
☐	Secondary
☐	Off-line

Justification .....

.....

.....

.....

[3]

(b) Describe the operation of an SSD and how it stores data.

.....

.....

.....

.....

.....

.....

.....

..... [4]

3.3 Hardware – Data Storage
QUESTIONS

12)

Tick (✓) to show which statements apply to each type of storage. Some statements can apply to more than one type of storage.

Statement	HDD (✓)	SSD (✓)	USB flash memory drive (✓)
it has no moving parts			
it is non-volatile			
it can use NAND gates to store data			
it uses magnetic properties to store data			
it has the smallest physical size			
it has the slowest read/write speeds			

[6]

2 Data storage can be magnetic, solid state or optical.

(a) **Six** statements are given about data storage.

Tick (✓) to show if the statement applies to magnetic, solid state or optical storage. Some statements may apply to more than one type of storage.

Statement	Magnetic (✓)	Solid state (✓)	Optical (✓)
no moving parts are used to store data			
pits and lands are used to store data			
data is stored on platters			
flash memory is used to store data			
parts are rotated to store data			
data can be stored permanently			

[6]

3.3 Hardware – Data Storage
QUESTIONS

(b) (i) Give **one** example of magnetic storage.

..... [1]

(ii) Give **one** example of optical storage.

..... [1]

(iii) Identify which type of storage would be the most suitable for use in a web server and justify your choice.

Type of storage .....

Justification .....

.....

.....

.....
[3]

(c) Describe the operation of USB flash memory and how it stores data.

.....

.....

.....

.....

.....

..... [3]

3.3 Hardware – Data Storage
QUESTIONS

13)

Greta stores data on several off-line storage devices, including an external hard disk drive (HDD), a USB flash memory drive and a compact disc (CD).

(i) Identify the type of storage for each device.

External HDD .....

USB flash memory drive .....

CD .....

[3]

(ii) Describe the operation of a HDD and how it stores data.

.....

.....

.....

.....

.....

.....

.....

..... [4]