Computer Systems: Hardware and Software

Make sure you can write simple, 1 mark definitions of:
- computer system,
- hardware
- software

There is an important relationship between hardware and software:
- hardware needs software to make it useful - to display, process or store data
- software needs hardware to run on - to give it the ability to do the job it was written to do

Computer systems are made up of hardware and software.

Hardware is the physical parts of a computer system - the things you can touch. This includes **input devices** such as a keyboard, mouse, microphone or graphics tablet and **output devices** such as monitors, speakers or printers. It also includes the components inside the computer which make it work and the memory.

Software is the non-physical parts of a computer system. It is the programs which run on a computer. You can't touch these, but the computer system couldn't do its job without them.

By **computer system** we mean any computer device. A desktop or laptop computer is an obvious system, and it's often easiest to think about these during this unit. These are called **general purpose computer systems** - they can do lots of different things.

Phones, tablets and other mobile devices are other obvious examples of general purpose computers. They can't do quite as much, but they can still do lots of different jobs.

The term computer system also refers to systems which are less obvious: the computers which help run cars; those which run the tills in a shop or the ATM on the high street; or the computer systems in fridges, TVs or microwave ovens. These are called **embedded systems**.

Activity 1:
a) Write definitions of the terms **computer system**, **hardware** and **software**
b) Write definitions of and give three examples each of **input devices** and **output devices**
c) Explain the **relationship** between hardware and software
d) Explain the **differences** between a **general purpose computer system** and an **embedded computer system**. Give examples of each.

Types of Software

There are two types of software you need to know about:

In exams they usually don't want brand names when giving examples. So "word processing software" is OK; "Word" isn't

1. **System software** are the programs that a computer system needs to make it function. This includes the operating system, program language translators and utility software. They **manage** the computer system

2. **Application software** is any software which allows a user to complete a task. For example, word processing software, image manipulation software or a web browser. This is called **end-user software**.

Operating Systems

An **operating system** is a collection of pieces of software which **control** a computer system and **manage** the hardware and software resources on it. Operating systems are an important example of **systems software.**

Operating systems are essential. Without them there is no way of controlling a computer system. Theyprovide an **interface** between the user and hardware - a way for the user to control the computer system

Operating systems manage five things:

- **applications** – any programs which run on the system
- **memory** – access to main memory and storage for applications and other processes
- **processor** – managing which processes have access to the **Central Processing Unit** (CPU) at any one time. This schedules the processor to complete tasks and allows elements of multi-tasking to occur, particularly with processes going in the background
- **input and output devices** – such as keyboards and monitors, allowing data to be sent to/from devices
- **security systems**, including anti-virus and firewall software and how different users log on to the system as well as dealing with software updates

Modern OS use **Graphical User Interfaces** which are designed to be as easy as possible for non-specialist users to operate.

Examples of operating systems include Windows, macOS, Linux, Android, iOS etc…

An **interface** is the way that a user views and uses the OS. Most modern OS use a **Graphical User Interface** (GUI) with icons and windows onscreen

Five key OS jobs:
1. **A**pps
2. **M**emory
3. **P**rocessors
4. **I**/O devices
5. **S**ecurity

Utility Software

Utility software are programs which are used by end-users alongside the Operating System. They aren't needed to manage the computer system, but make it easier for users to use the OS effectively.
Examples of utility software include:

- **compression utilities** – software to reduce file size
- **file management software** – to allow users to find, open, rename and delete files and to use folders to organise them efficiently
- **disk management software** – software to format, defragment and manage and repair hard drives
- **security software** – for example, anti-virus and firewall software
- **encryption software** – to help keep data private
- **file backup systems** – for example, to create restore points

Utility software helps the user to set up and use the Operating System more efficiently. Some of this involves scheduling the Operating System to do jobs automatically – for example, downloading security updates or running backups

Activity 2:
a) Explain the difference between system and application software
b) Explain why an Operating System is needed
c) Describe the five main jobs of an operating system
d) Give four examples of utility software