**Worksheet 1 - Investigating CPUs**

**Starter**

What is a CPU?

What is its function in a computer system?

Can you name everything that you have used today that has either a CPU or a simpler microprocessor in it?

**Objectives**

By the end of this lesson you will know the components of a generic CPU and understand their purpose. You will also appreciate the wide range of devices that have a processor in them and what the physical component looks like.

**Circus of Computing Devices. (Time required: 15-30 minutes)**

**You will need:**

A range of devices including non-functional mobile phones, games consoles and CPUs from laptops and PCs, Raspberry Pi computers if available.

**What to do:**

Draw a table similar to the one below to make notes about each device. Spend about 5 minutes looking at each device or component. When you have looked at every item, reconvene as a whole group and discuss your findings.

|  |  |  |
| --- | --- | --- |
| **Device/Component** | **Size in mm approx.** | **Typical processing tasks** |
|  |  |  |

**Mini Plenary**

Which device surprised you the most?

Which of the devices do you feel is likely to have the heaviest processing load and why?

What is included in the system to keep the processor cool and protect it from physical damage?

that you cannot see. In the next part of the lesson, we will put these under an imaginary microscope.

**CPU Jigsaw**

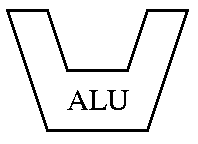
**You will need:**

A set of CPU “jigsaw pieces”.

**What to do:**

You are going to piece together the components of a Von Neumann processor. This is characterised by having a single **Control Unit (CU)** and single **Arithmetic Logic Unit (ALU).** The term **Memory Unit (MU)** is used to describe computer memory that holds instructions and data for the programs that are currently being run. This is also called **Random Access Memory** or **RAM.** There other types of memory present in a computer system such as **cache memory** for holding recently used instructions and data, **Read Only Memory (ROM)** for holding programs that are run every time the computer boots up and **Secondary Storage Memory** to store programs and files permanently.





Program Counter

Memory Address Register

Accumulator

Memory Data Register

Level 1 Cache

Level 2 Cache

RAM (Memory Unit)

Control Bus

Address Bus

Data Bus

Peripherals - Input and output subsystem

System (peripheral) Bus

Secondary storage

**Plenary**

Things to think about:

Does having more RAM improve the performance of a CPU?

Although the sections of the bus system have different names, are they all joined together?

What are “levels” of cache and why is there more than one? How does cache memory function?

Some simple computers do not have an installed hard drive for example, an embedded system in a washing machine. Why don’t they need it?

**Homework/ extension**

You are going to investigate the range of devices that have CPUs and microprocessors installed. Carry out internet research to find out how these products use computer technology:

* Smartphone
* Washing machine
* Car
* Medical equipment in an intensive care unit
* Tablet computer
* Hand held games console

Choose **two** of these categories and find out as much information as you can about them. Produce either a **webpage** or **presentation** of your findings.