Lesson 1.1: How Does a Computer Work

Objectives

In this lesson, students will:
- ❖ Gain an understanding of the main computer parts and how they interact with each other.

Agenda

1. How Does a Computer Works	10 mins
2. Main Computer Parts	30 mins
3. Wrap Up and Reflections	10 mins

Preparation

- ❏ Projector and speakers for video and class activity
- ❏ View the video on How the Computer Works.

Resources & Links

- ❏ Video link to "Inside your Computer": https://www.youtube.com/watch?v=DKGZlaPlVLY

1. How Does a Computer Work

Prompt students if they know any computer parts or components.

Explain that we are going to learn how computers work by studying different components and concepts with weird names such as peripherals, BIOS, CPU, programs, and memory.
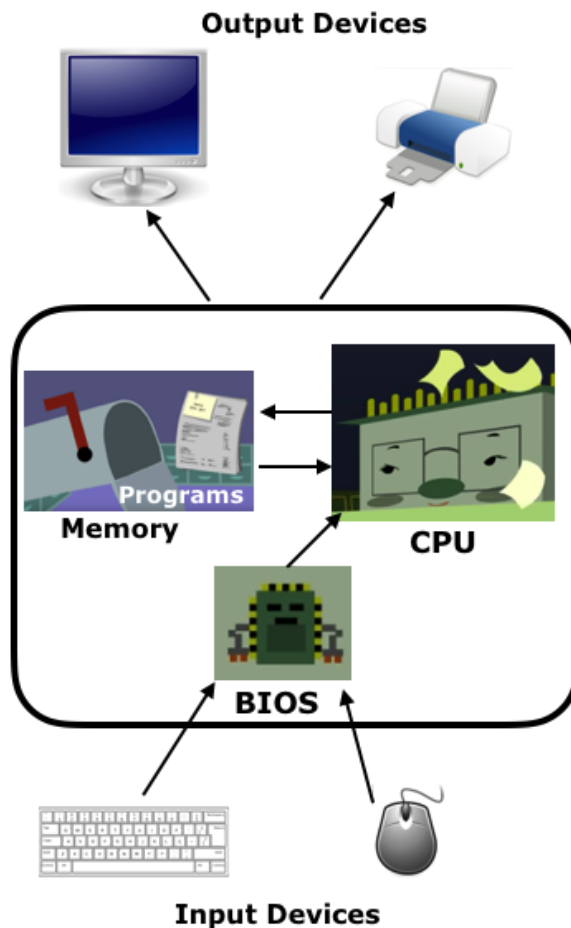
Let's start by watching a video: https://www.youtube.com/watch?v=DKGZIaPlVLY

2. Main Computer Parts

Engage students in an interactive discussion and instruction of the main computer parts and how they interact with each other:

Output Devices

Programs
Memory

CPU

BIOS

Input Devices

Peripherals

Think of peripherals as the stuff around the main computer. Sometimes peripherals are built into the computer itself like the camera and microphone on a laptop or tablet.

They are divided into **Input Devices** and **Output devices**.   Input devices take in data from outside the computer. Output devices convert information from the computer into physical output.

What are some examples of input devices?   Microphones, keyboards, smartphone screens. And output devices?   Printers, monitors, smartphone screens.

BIOS (Basic Input/Output System)

The BIOS provides a way for the computer to interact with its environment. It controls what and how much information comes in and out. When something urgent needs attention, it interrupts the CPU.

CPU (Central Processing Unit)

Think of the CPU as the brain of the computer.   The CPU runs the show: it fetches and runs programs, it stores data, it deals with input and output devices, it changes data in memory.
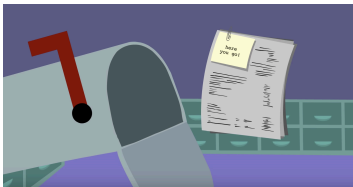
When you run a Scratch project, the CPU runs your scripts.

Programs

Programs are a set of instructions that tell the computer what to do. They are written in programming languages the computer can interpret or compile like Java, C++, Python, and Scratch.

Memory

Memory is the storage space in the computer where data to be processed and the instructions are stored.   When you create a variable in Scratch, the value is stored in memory.

Credits: Images from Ted Ed video "Inside Your Computer", Lesson by Bettina Bair, animation by Flaming Medusa Studios.

Engage students in the following quiz as an interactive class exercise. (Answers are at the end to allow the quiz to be projected for the class to see).

1. The BIOS is most like the computer's
   A Brain
   B Eyes and hands
   C Stomach
   D Lungs
   E None of the above

2. The CPU can handle _____ of instructions a second
   A Thousands
   B Millions
   C Billions
   D Gazillions
   E None of the above

3. Programs are encoded and stored in memory as
   A 1's and 0's
   B Raw text
   C HTML
   D Electrons
   E All of the above

4. The CPU's job is
   A To store information
   B To deal with input and output from peripherals
   C To edit files in memory
   D To fetch and run instructions
   E All of the above

5. The critical components of your computer's architecture are:
   A Wires, Plastic, Silicon
   B Programs, Bits, Bytes, HTML
   C Peripherals, BIOS, CPU, Programs, Memory
   D Mouse, Motherboard, Integrated Circuits, Wires
   E None of the above

6. Why are programs saved in a different format than the human readable programming languages that they are written in?

Answers:

1. **B Eyes and hands**
2. **C Billions**
3. **A 1's and 0's**
4. **E All of the above**
5. **C Peripherals, BIOS, CPU, Programs, Memory**
6. **Human programs take up a lot of space and contain a lot of unnecessary information to the computer; so they are compiled to make them smaller and stored as bits of zeroes and ones in the computer memory**

3. Student Activity: Input or Output Device?

This activity can be assigned as homework.

2. Student Journals

Introduce students to the idea of the design journal, a physical or digital notebook where they can brainstorm ideas and share personal reflections, similar to a personal journal or diary.

Explain that students will be prompted to update their design journals throughout their Computer Science adventure, and encourage them to add to their journals anytime during the process of learning about Computer Science. The design journal is a good place to capture ideas, inspiration, notes, sketches, questions, frustrations, triumphs, etc.

3. Wrap Up and Reflections

Most lessons end with a set of reflection points. The paper and pen icon means to do these as journal entries to encourage all students to participate.
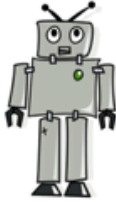
Reflection Points as Journal Entries
● In your journal, write 3 things you learned today.   ● What else would you like to learn about computers?

Student Activity: Input or Output Device?

Check ✔ the correct column to indicate if the device is an input or output device

Hint: some rows may have 2 check marks.

	Input Device	Output Device		Input Device	Output Device
(microphone)			(printer)		
(keyboard)			(mouse)		
smartphone screen			(monitor)		
smartphone camera			(robot)		

Credits: All images, unless cited, obtained from public domain.