Standard: CS.HS.01 Grade Band: 3-5

Grade	Standard
3	Identify a variety of ways computer **hardware** and **software** work together as a system to accomplish a task.
4	Identify and describe a variety of ways computer hardware and software work together as a system to accomplish a task, using appropriate technical terminology (e.g., **input**, **output**, **processors**, **sensors**, storage).
5	Model and explain how information flows through hardware and software to accomplish a task.

Grade	Essential Skills
3	Distinguish between **hardware** and **software**. Explain how software and hardware depend on each other to function correctly.
4	Describe the different types of **input** that a computing system may receive and the **components** that could be involved (e.g., mouse, keyboard, **sensors**) Identify the **processor** as the component which manipulates input into **output** and describe the different ways in which a **computing system** may produce output and the components that could be involved (e.g., monitor, printer, speaker)
5	Create a model that shows the path of an input through a **computing device** and its conversion to an output.

Explanation
Accomplishing almost any task with a **computing device** involves **hardware** and **software**. Students should trace the basic elements in a system from **input** and **sensors** to **processors** and storage to **output**. Students should be able to explain the interactions between hardware and software. For example: the keyboard (hardware) detects a key press, which the **operating system** and word processing **application** (software) displays as a new character that has been inserted into the document and is visible on the monitor (hardware).

Think of this as similar to….
Your eyes and ears are sensors. When you see and hear an audience clapping after your performance, your brain processes the input you see and hear as positive feedback and decides how to respond. Your brain tells your muscles to bend at the waist to produce the output, which is a bow.

Essential Questions
How do the **components** of a **computing device** work together to receive **inputs** and create **outputs**?

Implementation Examples—What would this look like in the classroom?

Grade(s)	Title	Description	Link	Content Connection & Notes
3	**Computers All Around**	**Grade 3**--Students identify hardware and software, distinguish between them and explain how they depend on each other to operate a computing device. Students consider the ways computer hardware and software affect our daily lives.	Computers All Around	
3	**Computer Processing**	**Grade 3**--Students are introduced to the four basic functions that computers perform and think about the advantages that computers have over humans in taking in input, processing and storing data, and providing output. Students identify how humans interface with computers using hardware and how software helps computers interpret that input to process and provide the output the user wants. Students are challenged to invent a new input/output prototype of their choosing.	Computer Processing	This lesson also aligns with **CS** CS.D.01
4	**I Have, Who Has?**	**Grade 4**--Students are given a card with one component of a computing device, and a question about a different part of a device. A student has to find the card which answers the question they have, as well as the card which they have the answer to. Students identify the component they have as input, output, processor, or storage. Students identify connections and potential interactions among the components.	I Have, Who Has?	This lesson also aligns with **CS** CS.D.01
4	**How Computers Work**	**Grade 4**- -Students think through what a computer is, what the parts of a computing device are, and how they work together to perform tasks. They explore inputs, outputs, processors and storage and the way they interact. Students who are ready can also explore binary and circuits and logic.	How Computers Work	This lesson also aligns with **CS** CS.D.01
4	**Inside your Computer**	**Grade 4**--Students follow the steps a computer takes with every click of the mouse. They explore the roles of the critical components of a computer-- the peripherals (including the mouse, monitor, etc.), the input/output subsystem (which controls what and how much information comes in and out), and the central processing unit (the brains), as well as human-written programs and memory.	Inside your Computer	

Grade(s)	Title	Description	Link	Content Connection & Notes
5	**Flow Chart**	**Grade 5**--Students create a diagram or flow chart to indicate how a keyboard, desktop computer, monitor, and word processing software interact with each other. The keyboard (hardware) detects a key press, which the operating system and word processing application (software) displays as a new character that has been inserted into the document and is visible through the monitor (hardware). Students could also create a model by acting out the interactions of these different hardware and software components.		This lesson also aligns with **CS** CS.D.01
5	**Nervous System--Human and Computer**	**Grade 5**--Students describe how animals and people receive different types of information through their senses. Signals are then sent to and processed by the brain which prompts responses to that information. They compare this to how the information travels through a computer from mouse (sensor) to processor (brain) and prompts a response (output). Create a Venn diagram or similar display to compare how information travels in humans/animals vs computers..		This lesson also aligns with **CS** CS.D.01 and with **NGSS** 4-LS1-2
5	**Simulate Plotting on a Coordinate Plane**	**Grade 5**--Students take on the role of a part of a computer (display, CPU, or memory) and model its function and interactions with other components when plotting a value on a coordinate plane.	Simulate Plotting on a Coordinate Plane	This lesson also aligns with **CS** CS.D.01 and with **MATH** 5.G.1

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These annotations are a collaboration between Maryland Center for Computing Education and the Maryland State Department of Education.