### **Hardware and Abstraction**

### **Duration: 1 Week**

### **Summary**

This lesson describes computing hardware both for practical understanding of how devices work, and to further illustrate the Big Idea of abstraction in that hardware itself is based on levels of abstraction, and that computing abstracts the underlying hardware.

The reading and video lectures describe hardware elements such as processors, memory, and storage, along with operating systems, applications, and the cloud. The assessments have the student label computer hardware parts and explain how they work, as well as explaining how abstraction is used in computing hardware.

### **Learning Objectives**

* Identify multi levels of abstraction in computing hardware by explaining how hardware is made up of bits combined to chips that are combined to hardware such as memory, storage, and CPUs. [AP CSP P3, LO 2.2.3]
* List and identify major computer components.
* Describe the functions of major computer components.
* Describe the primary functions of the operating system.

### **Course Material**

* Watch: [Computer Basics](http://www.youtube.com/watch?v=7cXEOWAStq4&feature=youtu.be) [2:39]
* Watch: [Hardware Basics](http://www.youtube.com/watch?v=4eNTlwnnhss&feature=youtu.be) [2:20]
* Watch: [Hardware In-Depth](http://www.youtube.com/watch?v=C1rT7CMm_to&feature=youtu.be) [16:01]
* Watch: [Operating Systems](https://www.youtube.com/watch?v=pTdSs8kQqSA&feature=youtu.be) [2:13]
* Watch: [Computer Applications](https://www.youtube.com/watch?v=MYgy4rjV4J0&feature=youtu.be) [2:18]
* Watch: [The Cloud](https://www.youtube.com/watch?v=gu4FYSFeWqg) [3:28]
* Read: [Computing Hardware](http://computing-concepts.cs.uri.edu/index.php/Computing_Hardware)
* Read: [Operating Systems](http://computing-concepts.cs.uri.edu/index.php/Operating_Systems)

### **In Class**

* Optional: [Computer Hardware Unplugged (How Computers Work)](http://cse4k12.org/how_computers_work/index.html)
* Optional: [Computer Hardware Unplugged (Simulate Computer)](https://sites.google.com/site/childrenandtechnology/presentation-3-simulate-computer)

### **Assessments**

* Conceptual Quiz:
  + [Computing Hardware](https://docs.google.com/document/d/1VGUlsTqpy-U9l8TpMWX5LHpPcV1vCARGn536EkM0pxA/edit?usp=sharing) (requires access)
* Practical Assignment:
  + [Hardware and Abstraction](https://drive.google.com/open?id=1hjatPHpX4DgiAEOUrn1dnNZmxMkuvs9hTAMoIerQvBY) | [Grading Rubric](https://drive.google.com/open?id=1VUV3IVAyvIjCS7dupO50mrS0uRoax3shxiPc1Y9x7Y4) | [Answer Key](https://docs.google.com/document/d/1KD3KARqZ76xaDpE41HrvAgfO_ae7twTwy1jUCmuSjfw/edit?usp=sharing)