Southern York County School District

One Warrior at a Time

Course/Subject: CS Discoveries - Coding	Grade Level: 8

Textbook(s) / Instructional Materials Used: Online resources at www.code.org

Month(s): 1 Marking Period	Unit 6 -- Physical Computing

Physical Computing

Big Ideas	Standards	Essential Questions & Lesson Essential Question	Concepts	Vocabulary	Competencies
The Problem Solving Process for Programming Event Driven Programming Hardware Input and Output Physical Prototyping Javascript	1B-AP-08 - Compare and refine multiple algorithms for the same task and determine which is the most appropriate. 1B-AP-11 - Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process. 1B-AP-12 - Modify, remix or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features. 1B-AP-15 - Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended. 1B-AP-16 - Take on varying roles, with teacher guidance, when collaborating with peers	• How does software interact with hardware? • How can computers sense and respond to their environment? • What kind of information can be communicated with simple hardware outputs? • How do programmers work with larger amounts of similar values? • How can complex real-world information be represented in code? • How can simple hardware be used to develop innovative new products?	Analog Digital Array For Loop Parameter Circuit Prototype **Objectives:** Identify computing innovations within a given field. For a given device, articulate the likely inputs and outputs. Suggest improvements to help a device better solve a specific problem.	Analog Digital Array For Loop Parameter Circuit Prototype	Set Properties of UI Code Manipulate LED Alternative Inputs Use Code to Control a Physical Device Prototype Software and Hardware App and Game Design Debug Circuits Debug Code

	during the design, implementation and review stages of program development. 1B-CS-01 - Describe how internal and external parts of computing devices function to form a system. 1B-CS-02 - Model how computer hardware and software work together as a system to accomplish tasks. 1B-IC-18 - Discuss computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices. 1B-IC-21 - Use public domain or creative commons media and refrain from copying or using material created by others without permission. 2-IC-20 - Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options. 2-IC-23 - Describe tradeoffs between allowing information to be public and keeping information private and secure. 2-AP-13 - Decompose problems and subproblems into parts to facilitate the design,		Set the properties of UI elements using code. Respond to user input using an event handler. Connect and troubleshoot external devices. Turn on and off an LED with code. Use code to control a physical device. Compare and contrast multiple ways to take input. Describe the elements of an event handler. Model different methods of taking user input. Attach an event handler to a hardware input. Choose the appropriate event for a given scenario.		

	implementation, and review of programs. 2-AP-15 - Seek and incorporate feedback from team members and users to refine a solution that meets user needs. 2-AP-16 - Incorporate existing code, media, and libraries into original programs, and give attribution. 2-AP-17 - Systematically test and refine programs using a range of test cases. 2-AP-18 - Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. 2-AP-19 - Document programs in order to make them easier to follow, test, and debug. 3A-AP-20 - Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries. B-NI-05 - Discuss real-world cybersecurity problems and how personal information can be protected. **ISTE** 5a - Students formulate problem definitions suited for technology-assisted methods such as data		Develop programs that respond to analog input. Scale a range of numbers to meet a specific need. Represent a sensor value in a variety of ways. Implement different features of a program by following a structured project guide. Develop a program that responds to events from a hardware input. Create a function that uses parameters to generalize behavior. Use event handlers to respond to user interaction. Design a piece of software that uses hardware for non-traditional input and output.		

	analysis, abstract models and algorithmic thinking in exploring and finding solutions. 5b - Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making. 5c - Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving. 5d - Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. 2b - Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices. 4a - Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. 4c - Students develop, test and refine prototypes as part of a cyclical design process.		Prototype a program that integrates software and hardware. Access an element in an array using its index. Use the color LED array to individually control each color LED. Use the color() and intensity() methods to control each color LED. Create and modify an array. Use an array to produce sound on the buzzer. Recognize an array as a list of elements that can be operated on sequentially. Modify the exit condition of a for loop to control how many times it repeats.		

			Use a for loop to iterate over an array. Recognize the use and need for accelerometer orientation (pitch and roll). Identify and explain the difference between the shake, data and change events. Refer back to and use their past knowledge of the counter pattern. Use parameters to generalize the purpose of a function. Create and debug simple circuits. Develop an interactive physical prototype that combines software and hardware. Consider the needs of diverse users when designing a product.		

			Independently scope the features of a piece of software. Prototype a physical computing device. Implement a plan for developing a piece of software that integrates hardware inputs and outputs.		