Name of Unit/Course: Computer Science for Innovators and Makers		
Overall Unit Information		**Self-Check**
Unit or Course Goal(s)	Computer Science for Innovators and Makers teaches students that programming goes beyond the virtual world into the physical world. Students are challenged to creatively use sensors and actuators to develop systems that interact with their environment. While designing algorithms and using computational thinking practices, students will code and upload programs to microcontrollers that perform a variety of authentic tasks. The unit broadens students' understanding of computer science concepts through meaningful applications. Teams select and solve personally relevant problems related to wearable technology, interactive art, or mechanical devices.	See A1

Standards	Name of standards: Foundation of Computer Programming Link to standards: https://www.gadoe.org/Curriculum-Instruction-and-Assessment/CTAE/Documents/MS-CS-Foundations-of-Computer-Programming.pdf Location information: GeorgiaStandards.org Grade/Year: 6-8 Subject: Technology/STEM Standard (as written): 1.2 Demonstrate an understanding of collaborative interactions in the digital world. 2.2 Demonstrate an understanding of key functional components (input/output devices, software applications, wi-fi and/or Ethernet, and IP addresses). 2.3 Demonstrate an understanding of the fundamental concepts for how computers process programming commands (hex, binary language, sequence of commands, conditional structures, looping structures). 3.2 Develop a working vocabulary of computational thinking including sequences, algorithms, binary, pattern matching, decomposition, abstraction, parallelization, data, automation, data collection, data analysis, Boolean, integer, branches (if...then...else), and iteration {loops (For, While)}. 3.3 Analyze the problem-solving process, the input-process-output-storage model of a computer, and how computers help humans solve problems. 3.4 Develop an algorithm to decompose a problem of a daily task. 4.1 Develop a working vocabulary of programming including flowcharting and/or storyboarding, coding, debugging, user interfaces, usability, variables, lists, loops, conditionals, programming language, and events. 4.2 Utilize the design process to brainstorm, implement, test, and revise an idea. 4.4 Design a user interface and test with other users using a paper prototype. 4.5 Implement a simple algorithm in a computer program. 4.6 Develop an event driven program. 4.7 Create a program that accepts user and/or sensor input and stores the result in a variable. 4.8 Create a computer program that implements a loop. 4.9 Develop a program that makes a decision based on data or user input. 4.10 Debug a program with an error. 5.1 Develop a working vocabulary of embedded computing including digital, analog, events,	See A2

	microcontrollers, sensors, light emitting diodes (LED), switches, servos, cloud computing, and internet of things. 5.3 Analyze and explain how computers communicate information with simple hardware inputs and outputs. 5.4 Create a product that analyzes how simple computer hardware can be used to develop innovative new products that interact with the physical world. 5.5 Design a computer program that senses something in the real world and changes an output based on the input. 6.3 Analyze and explain the functionality and suitability (or appropriateness) of a computational artifact. 6.4 Develop a program for creative expression or to satisfy personal curiosity which may have visual, audible, and/or tactile results. 6.5 Develop a program specifically with the goal of solving a problem, creating new knowledge, or helping people, organizations, or society.	
Learner Characteristics	This unit will be completed seventh graders. The section is full inclusion. 33 students will be included.	See B1
Technology requirements	Desktop Computer; Internet; Keyboard; Mouse. This equipment will be provided at school, but this is also the recommended setup for students at home. Microcontrollers, sensors, and actuators will be provided by the district/school.	See D5
Prerequisite Skills	Basic technology skills are preferred. These skills will be taught and introduced by teacher before unit is begun to make sure students are properly prepared.	See A4 & D6
Introductory Communication Plans	Students are expected to collaborate and work in teams on activities and projects. Students will complete reflections in their journal and will present their project presentations to culminate the unit. Student will receive feedback from the instructor on notebook checks, observations, and projects via their notebooks, our online collaboration area, and as annotations in PDF form.	See A4 B9 & B10

Universal Design Principles Considered	• Chunking and Mastery Learning will be utilized for differentiation and remediation. • Various Web 2.0 tools will be available as resources such as Kahoot!, YouTube (videos), Edpuzzle (videos), and Nearpod. • Student choice is utilized in both the Secrets and Safe project and the Problem: Interactions project. • Browser extensions and Add-Ins will be utilized for students in need. • Flexible Grouping • All equipment and technology are to be ADA compliant.	See B4
Number of Modules or Weeks	9-12 weeks	See A3

Module 1 Plan *(Note: "module" and "lesson" used interchangeably. A module is typically 1-2 weeks long. Please design 4-6 weeks of blended or online instruction.)*		**Self-Check**
Module Objective(s)	Getting Started (One Week) Blended Learning	See A1 & A2
Module Assessment(s)	Assessments will be primarily observational. During the module, students will work on activities creating algorithms, flowcharts, and code tracing charts. These are all activities for the student to apply, analyze, and evaluate their work. Coding charts are designed to help students find bugs in their code. The teacher will serve as a facilitator of these processes and can assist students who are struggling.	See A2 A3 C1 C2 & C5
Description of Learning Activities	• Student will think of and document algorithms of daily activities like brushing their teeth. • Student will be introduced to flowcharts and flowcharting, eventually creating their own basic programming flowcharts (and basic programs) to test on the microcontroller. • Asynchronously — Student has access to their OneNote notebook which contains handouts and resources to enrich their classroom activities. A Kahoot! assessment will be shared with students to augment their learning.	See A2 A3 B3 B4 & B10
Formative Evaluation & Feedback	Observational assessment and feedback will be given as needed during this module. Feedback at this time will be verbal and the teacher will remediate with students who need extra help. Online resources and activities will be used when needed to supplement/augment learning.	See A3 C1 C3 & C5
Physical Learning Materials	• Isometric Notebook • Computer • Hardware • Ruler	See A3, A9, B1, B4, & B6

Digital Learning Objects	• PLTW website • PLTW emulator • Class OneNote notebook • Digital PLTW components • CTLS • Videos and Digital Handouts • Flipgrid for formative assessment (optional) • Kahoot! for study guides (asynchronously)	See A3, A9, B1, B4, & B6
Plans for Differentiation	• Flexible Grouping • Within groupings (pairs), students can assume the driver or navigator role (pair programming) to enrich their learning. If one role becomes overwhelming, the student can switch roles or partners if needed. • Differentiation of sample programs, flowcharts, and videos can be accessed both in and out of class. • Introduce assistive technologies that may help personalization for specific students.	See B1 B4 & B6

Module 2 Plan		**Self-Check**
Module Objective(s)	Blinking Message Activity (One Week) Blended Learning	See A1 & A2
Module Assessment(s)	Feedback for this module will be given digitally using our OneNote collaboration space. Discussion prompts will also begin in this module (via OneNote). This module is also where the first notebook check will occur, which will be the first formative grade.	See A2 A3 C1 C2 & C5
Description of Learning Activities	• Student will create a blinking message program on a Microbit microcontroller. • Student will turn in notebook for first periodic assessment. • Asynchronously — Student has access to their OneNote notebook which contains handouts and resources to enrich their classroom activities. A Kahoot! assessment will be shared with students to augment their learning.	See A2 A3 B3 B4 & B10
Formative Evaluation & Feedback	• Notebook Grade (formative grade) • Feedback will be given on the algorithms, flowcharts, code tracing charts, and programs developed during the activities. • Kahoot! assessment study-guides are provided for extension/enrichment (optional).	See A3 C1 C3 & C5
Physical Learning Materials	• Isometric Notebook • Computer • Hardware • Ruler	See A3, A9, B1, B4, & B6
Digital Learning Objects	• PLTW website • PLTW emulator • Class OneNote notebook • Digital PLTW components • CTLS • Videos and Digital Handouts • Flipgrid for formative assessment (optional) • Kahoot! for study guides (asynchronously)	See A3, A9, B1, B4, & B6

Plans for Differentiation	• Flexible Grouping • Within groupings (pairs), students can assume the driver or navigator role (pair programming) to enrich their learning. If one role becomes overwhelming, the student can switch roles or partners if needed. • Differentiation of sample programs, flowcharts, and videos can be accessed both in and out of class. • I will also use assistive technologies that will help personalization for specific students.	See B1 B4 & B6

Module 3 Plan		**Self-Check**
Module Objective(s)	Input and Output (One Week) Blended Learning	See A1 & A2
Module Assessment(s)	• Mastery based assessment will be used to assess the class activities. Enrichment activities will be given to students both online and through hands-on activities utilizing the hardware used in class. • Formative assessment will be administered through OneNote, verbally, and through students' notebooks. Students' completed flowcharts and programs will be evaluated and feedback will be provided online using OneNote.	See A2 A3 C1 C2 & C5
Description of Learning Activities	• Student will begin to think about interactions between humans and machines. • Student will be introduced to the input devices used in the course and how they work. • Student will compare digital vs. analog input. • Asynchronously — Student has access to videos showing how the input devices look and what information they provide.	See A2 A3 B3 B4 & B10
Formative Evaluation & Feedback	Student work will be evaluated, and feedback given through OneNote and notebooks.	See A3 C1 C3 & C5
Physical Learning Materials	• Isometric Notebook • Computer • Hardware • Ruler	See A3, A9, B1, B4, & B6

Digital Learning Objects	• PLTW website • PLTW emulator • Class OneNote notebook • Digital PLTW components • CTLS • Videos and Digital Handouts • Flipgrid for formative assessment (optional) • Kahoot! for study guides (asynchronously)	See A3, A9, B1, B4, & B6
Plans for Differentiation	• Flexible Grouping • Within groupings (pairs), students can assume the driver or navigator role (pair programming) to enrich their learning. If one role becomes overwhelming, the student can switch roles or partners if needed. • Differentiation of sample programs, flowcharts, and videos can be accessed both in and out of class. • Assistive technologies will be applied that may help personalization for specific students.	See B1 B4 & B6

Module 4 Plan		**Self-Check**
Module Objective(s)	Getting Connected (One Week) Blended Learning	See A1 & A2
Module Assessment(s)	• Mastery based assessment will be used for the class activities. • Formative assessment will be administered through OneNote and notebooks. Students completed flowcharts and programs can be evaluated and feedback provided online using OneNote (formative). • Engineering Notebook Second Assessment (formative).	See A2 A3 C1 C2 & C5
Description of Learning Activities	• Student will be introduced to and will experiment with various output devices. • Student will experiment with various ways to interface with their microcontroller. • Student will continue to practice tracing code. • Student will continue to use flowcharts and algorithmic thinking to develop solutions. • Student will turn in notebook for second periodic assessment. • Asynchronously — Student has access to videos showing how the out devices look and what information they do.	See A2 A3 B3 B4 & B10
Formative Evaluation & Feedback	Student work will be evaluated, and feedback given through OneNote and notebooks.	See A3 C1 C3 & C5
Physical Learning Materials	• Isometric Notebook • Computer • Hardware • Ruler	See A3, A9, B1, B4, & B6

Digital Learning Objects	• PLTW website • PLTW emulator • Class OneNote notebook • Digital PLTW components • CTLS • Videos and Digital Handouts • Flipgrid for formative assessment (optional) • Kahoot! for study guides (asynchronously)	See A3, A9, B1, B4, & B6
Plans for Differentiation	• Flexible Grouping • Within groupings (pairs), students can assume the driver or navigator role (pair programming) to enrich their learning. If one role becomes overwhelming, the student can switch roles or partners if needed. • Differentiation of sample programs, flowcharts, and videos can be accessed both in and out of class. • Assistive technologies will be utilized that may help personalization for specific students.	See B1 B4 & B6

Module 5 Plan		**Self-Check**
Module Objective(s)	Secrets and Safe Project (Two Weeks) Blended Learning	See A1 & A2
Module Assessment(s)	• Mastery based assessment will be used for the project (summative). • Formative assessment will be administered through OneNote and notebooks. Students completed flowcharts and programs can be evaluated and feedback provided online using OneNote (formative).	See A2 A3 C1 C2 & C5
Description of Learning Activities	• Student will be introduced to the Design Process. • Student will use the Design Process to design a security system. • Asynchronously — Student has access to online resources and Kahoot!.	See A2 A3 B3 B4 & B10
Formative Evaluation & Feedback	Student work will be evaluated, and feedback given through OneNote and notebooks.	See A3 C1 C3 & C5
Physical Learning Materials	• Isometric Notebook • Computer • Hardware • Ruler	See A3, A9, B1, B4, & B6
Digital Learning Objects	• PLTW website • PLTW emulator • Class OneNote notebook • Digital PLTW components • CTLS • Videos and Digital Handouts • Flipgrid for formative assessment (optional) • Kahoot! for study guides (asynchronously)	See A3, A9, B1, B4, & B6

Plans for Differentiation	• Flexible Grouping • Within groupings (pairs), students can assume the driver or navigator role (pair programming) to enrich their learning. If one role becomes overwhelming, the student can switch roles or partners if needed. • Differentiation of sample programs, flowcharts, and videos can be accessed both in and out of class. • Assistive technologies will be utilized that may help personalization for specific students.	See B1 B4 & B6

Module 6 Plan		**Self-Check**
Module Objective(s)	Problem: Interactions (Two Weeks) Blended	See A1 & A2
Module Assessment(s)	• Mastery based assessment will be used for the project (summative). • Formative assessment will be administered through OneNote and notebooks. Students completed flowcharts and programs can be evaluated and feedback provided online using OneNote (formative).	See A2 A3 C1 C2 & C5
Description of Learning Activities	• Student will examine the role of ethics and safety relating to computer science. • Student will solve problems related to human interaction and computer systems. • Student will turn in notebook for third periodic assessment. • Asynchronously — Student has access to online resources and Kahoot!.	See A2 A3 B3 B4 & B10
Formative Evaluation & Feedback	Student work will be evaluated, and feedback given through OneNote and notebooks.	See A3 C1 C3 & C5
Physical Learning Materials	• Isometric Notebook • Computer • Hardware • Ruler • Consumables for the physical build	See A3, A9, B1, B4, & B6
Digital Learning Objects	• PLTW website • PLTW emulator • Class OneNote notebook • Digital PLTW components • CTLS • Videos and Digital Handouts • Flipgrid for formative assessment (optional) • Kahoot! for assessment and study guides	See A3, A9, B1, B4, & B6

Plans for Differentiation	• Flexible Grouping • Differentiation of sample programs, flowcharts, and videos can be accessed both in and out of class. • Assistive technologies will be utilized that may help personalization for specific students.	See B1 B4 & B6

Module 7 Plan		**Self-Check**
Module Objective(s)	Presentation Week (One Week) Blended	See A1 & A2
Module Assessment(s)	• Mastery based assessment will be used to assess group presentations (summative).	See A2 A3 C1 C2 & C5
Description of Learning Activities	• Student will present their design solutions on a schedule determined by teacher.	See A2 A3 B3 B4 & B10
Formative Evaluation & Feedback	Student work will be evaluated, and feedback given through OneNote.	See A3 C1 C3 & C5
Physical Learning Materials	• Isometric Notebook • Computer • Hardware	See A3, A9, B1, B4, & B6
Digital Learning Objects	• PLTW emulator • Digital PLTW components • Flipgrid for presentations (optional) • PowerPoint for presentation	See A3, A9, B1, B4, & B6
Plans for Differentiation	• Students may use Flipgrid to present their solutions (optional). • Student may choose to present using different software if deadlines are met.	See B1 B4 & B6