Trinity Area School District
Computer Science for Innovators and Makers Grade 7

Course: Computer Science for Innovators and Makers **Grade: 7** **Designer(s): Matt White**	**Course Overview:** Computer Science for Innovators and Makers (IM) 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 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 a personally relevant problem related to wearable technology, interactive art, or mechanical devices.

Overarching Big Ideas, Enduring Understandings, and Essential Questions
(These "spiral" throughout the entire curriculum.)

Big Idea	Standard(s) Addressed	Enduring Understanding(s)	Essential Question(s)
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Big Ideas, Enduring Understandings, and Essential Questions Per Unit of Study
(These do NOT "spiral" throughout the entire curriculum, but are specific to each unit.)

Month of Instruction	**Title of Unit** **<u>Lesson 1- Blink!</u>**	**Big Idea(s)**	**Standard(s) Addressed**	**Enduring Understanding(s)**	**Essential Question(s)**	**Common Assessment(s)***	**Common Resource(s)* Used**
August to October	Activity 1.1- The Brain Activity 1.2-What to Do Activity 1.3- How to do it Activity 1.4-Crush the Bug	Physical Computing Systems Algorithmic Thinking Block Based Coding Microbits Debugging	2-A-7-2 - Algorithms and Programming 2-A-7-4 - Algorithms and Programming 2-A-3-9 - Algorithms and Programming 2-A-6-10 - Algorithms and Programming 2-C-4-12 - Computing Systems 2-C-6-13 - Computing Systems 2-D-7-15 - Data and Analysis	The use of algorithms is essential in effective programming. It is essential to debug a computer problem.	How do you express yourself and your creativity through computer science? How can algorithmic thinking skills be used across multiple disciplines? How can computer programs solve programs?	Lesson 1 Summative Assessment	Microsoft Make Code

	Project 1.5- The Blinking Message Lesson 1 Summative Assessment		2-D-4-17 - Data and Analysis 2-I-7-19 - Impacts of Computing 2-I-1-22 - Impacts of Computing 2-N-4-25 - Networks and the Internet				
Month of Instruction October/ November	**Title of Unit** **<u>Lesson 2- The Ins and Outs!</u>** Activity 2.1- Need Input Activity 2.2- Respoinding Input Activity 2.3- Get Connected	**Big Idea(s)** Inputs Paired Programming Programming Inputs Analog and Digital Inputs Outputs Actuators LED LED Boards	**Standard(s) Addressed** 2-A-7-2 - Algorithms and Programming 2-A-7-3 - Algorithms and Programming 2-A-7-4 - Algorithms and Programming 2-A-5-5 - Algorithms and Programming 2-A-5-6 - Algorithms and Programming	**Enduring Understanding(s)** Inputs in the physical world include things such as keyboards, cell phones, light switches, and garage door openers. Paired programming is an effective way to accomplish programming tasks. Outputs include things such as school signs,	**Essential Question(s)** How do you express yourself and your creativity through computer science? What do programming best practices look like? Why are interactions between machines, humans, and the environment	**Common Assessment(s)*** Lesson 2 Assessment	**Common Resource(s)* Used** ▪ Microcontroller (micro:bit) and USB cable ▪ Flex sensor ▪ Pressure sensor ▪ Photocell resistor ▪ Battery holder with 2

	Project 2.4- Secrets and Safes Lesson 2 Assessment	Buzzer Standard Servo Continuous Servo Bluetooth Code Tracing	2-A-5-7 - Algorithms and Programming 2-A-3-9 - Algorithms and Programming 2-A-6-10 - Algorithms and Programming 2-C-7-11 - Computing Systems 2-C-4-12 - Computing Systems 2-C-6-13 - Computing Systems 2-D-7-15 - Data and Analysis 2-D-4-17 - Data and Analysis 2-I-7-19 - Impacts of Computing 2-I-1-20 - Impacts of Computing 2-I-7-22 - Impacts of Computing 2-N-7-24 - Networks and the Internet 2-N-4-25 - Networks and the Internet	message boards, and classroom bells.	beneficial, problematic, or both		AAA batteries ▪ Banana-plug wires ▪ Alligator clips ▪ Copper tape - 2" ▪ Aluminum foil - 2" x 1"

Month of Instruction	Title of Unit	Big Idea(s)	Standard(s) Addressed	Enduring Understanding(s)	Essential Question(s)	Common Assessment(s)*	Common Resource(s)* Used
December/January	**Lesson 3- Program the Physical World!** Activity 3.1- Clean up your Code Problem 3.2- Interactions Unit Assessment	Abstraction Physical Computing Objects Programming Languages	2-A-7-2 - Algorithms and Programming 2-A-7-3 - Algorithms and Programming 2-A-7-4 - Algorithms and Programming 2-A-5-5 - Algorithms and Programming 2-A-5-6 - Algorithms and Programming 2-A-5-7 - Algorithms and Programming 2-A-3-9 - Algorithms and Programming 2-A-6-10 - Algorithms and Programming 2-C-7-11 - Computing Systems	Ethical considerations must be taken into account when creating solutions or opportunities Physical computing objects can be designed to solve real-world problems. A plan for solving a problem must be well thought out	How do you express yourself and your creativity through computer science? Do all professions need computer science? Does society need computer science and physical computing projects? How are ethics, safety, and computing projects related?	Unit Assessment	

			2-C-4-12 - Computing Systems 2-C-6-13 - Computing Systems 2-D-7-15 - Data and Analysis 2-D-4-17 - Data and Analysis 2-I-7-19 - Impacts of Computing 2-I-1-20 - Impacts of Computing 2-I-1-22 - Impacts of Computing 2-I-6-23 - Impacts of Computing				