Grade 4 – Unit 2 – Computational Thinking

Madison Public Schools

Unit Focus

This unit is an introduction to the world of programming. This introduction places a heavy emphasis on understanding general concepts of computer programming that are universally applicable to any programming language. Students will learn about programming and its impact on society through a variety of hands-on activities. Through both unplugged and plugged type activities, students will have the opportunity to learn what constitutes a code, how to write code and test and debug code.   In the PBA, students will be asked to write an effective algorithm in stacking solo cups.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer
Connecticut Goals and Standards *Computer Information Systems: 4* • Identify and explain programming structures. *CIS.6.1.B.1*	**T1** Explore and hone techniques, skills, methods, and processes to create and innovate **T2** Develop a product/solution that adheres to key parameters (e.g., cost, timeline, restrictions, available resources and audience).

	Meaning	
CSTA: Computer Science Standards (2017-) *CSTA: 3-5* • Create programs that include sequences, events, loops, and conditionals. *1B-AP-10* • Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences. *1B-AP-13* • Test and debug (identify and fix errors) a program or algorithm to ensure it runs as *1B-AP-15*	**Understanding(s)**	**Essential Question(s)**
	U1 Algorithms are precise sequences of instructions for processes that can be executed by a computer or other operator, and are implemented using programming languages. **U2** People write programs for computers to execute algorithms. **U3** Programmers debug and revise their programs to improve the stability and efficiency of the program and end user experience.	**Q1** How do I create a program? How can I make my program more efficient? **Q2** How do I trace through the operation of my program to find out where the problem is? What is a possible fix? To what extent does that make the program/game run better?

	Acquisition of Knowledge and Skill	
NGSS/NSTA Science & Engineering Practices *NGSS Science & Engineering Practices: 3-5* • Ask questions about what would happen if a variable is changed. *SE.3-5.1.1* • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. *SE.3-5.1.5* • Develop a diagram or simple physical prototype to convey a proposed object, tool, or process. *SE.3-*	**Knowledge**	**Skill(s)**
	K1 Vocabulary: Algorithm, program, bug, perseverance, debugging, frustrated, persistence, loop, repeat, iteration, conditionals, nesting	**S1** Write an algorithm. **S2** Write basic code using a block language. **S3** Debug code using a variety of different strategies. **S4** Use loops to code efficiently, using as few steps as possible to solve a problem.

Stage 1: Desired Results - Key Understandings		
5.2.5 **Student Growth and Development 21st Century Capacities Matrix** *Collaboration/Communication* - Product Creation: Students will be able to effectively use a medium to communicate important information (findings, ideas, feelings, issues, etc.) for a given purpose. *MM.3.2* *Self-Direction* - Perseverance: Students will be able to identify problem(s) and use appropriate strategies to continue toward a desired goal. *MM.4.2*		**S5** Use conditional statements to provide flexible responses to events.