Date(s):	**Unit 0 Lab 1**	**World's Slowest Computer**
Prerequisite Knowledge: Pixels/Monitor		
Enduring Understanding: **AAP-2 -** The way statements are sequenced and combined in a program determines the computed result. Programs incorporate iteration and selection constructs to represent repetition and make decisions to handle varied input values.		
Learning Objective(s): **LO AAP-2.A** - Express an algorithm that uses sequencing without using a programming language **LO AAP-2.G** - Express an algorithm that uses selection without using a programming language **LO AAP-2.J** - Express an algorithm that uses iteration without using a programming language		
Standard(s): **9-12.CT.8** Develop a program that effectively uses control structures in order to create a computer program for practical intent, personal expression, or to address a societal issue		
Differentiation: Pseudocode, Levels of Difficulty, Paired Work, Group share		

AIM: How do computers run/execute instructions? **SWBAT**: Students will be able to analyze commands and rules of a programming language to execute a set of instructions to complete a task.	**Notes/Q's/CFUs/CM**
WARM UP (3-5 MINS): Do Now: Discuss with your partner/group ● Write all the steps you took to get to this classroom today.	**What does execute mean?** The execution of a program or a sequence of instructions is another way to say you to run the program.
ACTIVITY 1 (30-35 MINS): Teacher will describe the World's Slowest Computer Activity. The instructions sheet (print 2 to a page and double sides to use just one sheet of paper) will need to be distributed to the students. Teacher will have students draw on their whiteboard the grid and the memory registers. Teacher will introduce some vocabulary and describe the roles and students will achieve consensus on which roles. Roles will switch each set of instructions. Teacher: "Today we're going to be the World's Slowest Computers. Each of you will be a processor in your computer. And we'll run programs and figure out what they do. Whether you're completely new to computer science, or have done Scratch or Python or C++, you can do this. It's important to remember the World's Slowest Computer is a real computer in every sense of the word. With enough memory, it can do everything that a normal computer does. So everything that you do is actual computation, not a simulation. Every movement, every decision you make, directly mirror the operation of conventional and theoretical computers.	***Note to Teacher:*** During program execution, communication and sequencing is important. Circulate and make sure that instructions are delivered accurately. Since we are not using sponges for the Sponge Computer, students should be aware that instructions for *yellow* and *green* sides are open for interpretation. *Possible Student Common Misunderstanding:* Students may not know to overwrite variables as they are given new values. Elicit that "setting" a variable to a new number "resets" what it is defined to be. Students may number rows and columns in ascending or descending

"Like actual computers, some are fast, some are slow. But they all work. So we'll measure your speed as you work, in something called Hertz, which is the number of instructions you can execute per second. Faster is better, but only if it gives us the right answer. Quick gibberish would still be gibberish. "First we'll initialize the computer. This means setting up the screen and the memory so it is ready to execute computer programs. At each station, you have a 10x10 grid. That is your monitor. Make sure that each square is blank, like a dark screen. Now I want you to number the rows from 0-9 and columns from 0-9. It doesn't really matter which is the row and which is the column, but your whole group needs to be on the same page so you don't get confused. Write it down on your grid. Raise your hands when your group is ready." [waits for all groups] Teacher: "Next, we'll set up the computer memory. We'll call these registers. Label each register from A to P. FYI, each register can hold one and only one integer. Decimal numbers will be truncated. So we have sixteen registers, A, B, C,... up to P. Again, raise your hands when your group is ready." Teacher: "Now, each of you will take on a role. I will list them here, and you decide amongst yourselves what you will do for your team. We'll switch up the roles each day, so don't worry about picking something you don't like. "The first role is the Compiler. The Compiler will read each instruction from the computer program to the group. No one else has access to the book. "The second role is the Memory Reader and Writer. The Reader will read off the values from the memory registers. When the program instructions ask for a new value to be written to the registers, the Writer will do that. Both the Reader and the Writer can perform calculations. "The third role is the Graphics Card. The Graphics Card will be responsible for updating the screen as instructed. "The fourth role is the Error Checker. This is a critical role because you don't really know until the end if you're doing it right. By the point you realize you've made a mistake, it's impossible to figure out where that error happened, so you'll probably have to restart from the beginning. "Any questions on any of these roles?" Teacher can display answer on board after confirming all groups have finished the activity.	ways. The images produced will be the mirror images or reflections of what it should be. Do not correct students. Instead, elicit why following the same steps accurately led to different results (initialization error). Students may misunderstand "Go to step ***cell d*** and continue." Elicit that the instructions should be interpreted as going back to the step number that cell d is assigned to. CM: Students may see a pattern and may loop all the way to the end. Good discussion on pattern recognition as well as recognizing and handling edge cases. ***Note to Teacher:*** Students may not know what a pixel is. Explain that it is the basic unit of programmable color. Like how points make up a line, pixels make up an image. **Q: "Describe any patterns you noticed. How did you use this to help you execute the program?"** ***Anticipated student answers:*** 1) If statements may be difficult to understand, and they incorporate multiple steps. 2) Some groups may discover patterns ("loops"). This is what modern computers do. They have multiple processors, which they use to run extra loops and throw away unnecessary answers.
EXIT SLIP & LOG OUT (2-3 MINS) Answer in Google Classroom: If a group is not finished with their program, students should first write down the program number and instruction (page) number they ended at. Then, record the state of their computer. One person will back up the computer by taking a picture of the whole thing. Another person will shut down the computer by taking the monitor paper and all the Post-Its.	

HOMEWORK: No HW assigned.	

Day 2 (if necessary)

AIM: How do computers run/execute instructions? **SWBAT**: Students will be able to analyze commands and rules of a programming language to execute a set of instructions to complete a task.	**Q's/CFUs/MISUNDERSTANDINGS**
WARM UP (15 MINS): Do Now: Computing in the News. Read/research today's topic. Discussion in 5-7 mins. Teacher: engage discussion on current topic. Students: Write/group share and class share.	CITN gives students a mental break and encourages engagement.
MINI LESSON (3-5 MINS) Teacher: Review any common misconceptions. Display whichever pattern all groups completed in previous classes so students know they are on the right track or need to make adjustments moving forward.	
ACTIVITY 1 (20 MINS): Students: Continue working on the patterns. Going through the algorithm and generating the patterns.	
EXIT SLIP & LOG OUT (2-3 MINS) Answer in Google Classroom: Students can work on the HW as their exit ticket if they finish early depending on time.	
HOMEWORK: HW#1 assigned.	