

## Growing with KIBO - Wyoming K-2 CS Standards Alignment

### Alignment with Wyoming Content and Performance Standards in Computer Science Standards (2020)\*

Growing with KIBO is a complete, sequenced curriculum covering robotics, coding, and computational thinking. Each level of this curriculum— Novice, Intermediate, and Advanced—contains 20 hours of classroom lesson plans (for a total of 60 hours), providing a complete K–2 robotics progression aligned to current and evolving computer science standards. Contextualized STEAM projects and a focus on social-emotional development allow students to develop digital fluency, as they collaborate, connect, and express themselves creatively. Learn more at [www.kinderlabrobotics.com](http://www.kinderlabrobotics.com).

Note: Due to the screen-free, offline nature of students' work with KIBO, Growing with KIBO does not address the "NI" (Networks and Internet) standards strand.

\* Wyoming Department of Education (2020). *2019 Computer Science Content & 2020 Performance Standards with PLDs*. Retrieved from <https://edu.wyoming.gov/for-district-leadership/standards/computer-science/>.

Level	#	Lesson Title	Learning goals	Scope and Sequence Topics	Wyoming Standards addressed
All Levels	All	<i>Growing with KIBO</i> (entire curriculum)	Although KIBO curriculum does not engage with online work specifically, positive technology use and good digital citizenship are reinforced through the "6 C's" framework of educational practices, drawn from Dr. Marina Bers' research. These practices include: sharing and caretaking of materials; recognition of collaboration through collaboration webs and other artifacts; sharing circles ending each lesson; and more.	SEL, EDP	2.IC.SI.01: Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior. 2.AP.PD.02: Give credit to ideas, creations, and solutions of others while writing and developing programs.
Novice	1	Let's Build KIBO	Learning goals: students will learn what a robot is and that robots are designed by humans to solve problems. They will learn about the mechanical and robotic parts of the KIBO robot and understand that parts have functions.	Parts and Functions	2.CS.D.01: Independently select and use a computing device to perform a variety of tasks for an intended outcome (e.g., create an artifact). 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).
Novice	2	What is a Program?	Learning goals: students will learn that a program is a sequence of instructions. They will learn about the symbols that make up KIBO's programming language.	Sequencing Symbols	2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words).
Novice	3	Let's Program Each Other!	Learning goals: students will continue to learn about the symbols and sequencing of KIBO's programming language, reinforcing the work from lesson 2.	Sequencing Patterns Symbols SEL	2.AP.A.01: With guidance, identify and model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks (e.g., verbally, kinesthetically, with robot devices, or a programming language). 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words).

Novice	4	PB&J Game	Learning goals: students will learn that the sequence of the instructions in their programs matter. They will explore the importance of sequence by breaking down the steps required to make a peanut butter and jelly sandwich.	Sequencing Decomposition EDP	2.AP.A.01: With guidance, identify and model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks (e.g., verbally, kinesthetically, with robot devices, or a programming language). 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words).
Novice	5	Craft and Build Drop Test	Learning goals: students will learn about the steps of the engineering design process. They will create models out of craft and recycled materials, then they will test the sturdiness of their models by dropping them from ankle height. If the models don't survive, the students can follow the engineering design process to revise their designs.	EDP	2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language). 2.IC.C.01: Describe how people use different types of technologies in their daily work and personal lives.
Novice	6	Engineering Challenges	Learning goals: students will learn that robotic parts can be used in new ways to change their functions, through activity centers with "engineering challenges."	Parts and Functions EDP	2.CS.D.01: Independently select and use a computing device to perform a variety of tasks for an intended outcome (e.g., create an artifact). 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.IC.C.01: Describe how people use different types of technologies in their daily work and personal lives.
Novice	7	Build Dream Cars	Learning goals: students will use the engineering design process to design, build, and test their own robotic vehicles. They will create short sequences for their robots.	Sequencing EDP	2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words). 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language).
Novice	8	New Robot Parts	Learning goals: students will reinforce their understanding of KIBO's parts and how the parts give KIBO the ability to respond to specific commands. Optionally, students learn the operation of a new part (KIBO's Light Bulb).	Parts and Functions	2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).

Novice	9	Hokey Pokey	Learning goals: students decompose and sequence a dance as individual commands as they program their robots to dance the Hokey Pokey.	Sequencing Decomposition Patterns	2.AP.A.01: With guidance, identify and model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks (e.g., verbally, kinesthetically, with robot devices, or a programming language). 2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words).
Novice	10,11	KIBO Dance Party	Let's have a KIBO dance party! Students will decorate their KIBO as a dancer to represent a chosen culture or community; then they will create a program to teach their KIBO to dance to the music of that community. Students build on the decomposition and sequencing work they did in the Hokey Pokey lesson. They'll use those new skills to explore and express what they learn about dancers from their own or other cultures. Allow two meetings for this integration project.	Integration (Social Studies)	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.AP.PD.02: Give credit to ideas, creations, and solutions of others while writing and developing programs. 2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language). 2.IC.SI.01: Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior.
Novice	12	Navigate Tape Paths	Learning goals: students will use sequencing and decomposition to create programs for KIBO to navigate simple and complex paths.	Sequencing Decomposition Patterns	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words).
Novice	13	KIBO Bowling	Learning goals: students use estimation and measurement along with sequencing to create a program to travel the length of the bowling lane in an effort to knock down all the pins.	Sequencing Patterns	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words).
Novice	14	Silly Animal Robot	Learning goals: students will create an algorithm with output to express an idea. They will use KIBO's movement, sound, and optionally the light bulb to express themselves.	Expressiveness Parts & Functions Input and Output	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).

Novice	15	How Far to the Star?	Learning goals: students will create algorithms with sequencing and decomposition. Students will measure using standard and non-standard units and scientific tools like rulers and measuring tape.	Sequencing Decomposition Patterns	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words).
Novice	16	Debugging	Learning goals: students will debug programs. Students will work collaboratively to create “debugging challenges” for each other. This activity emphasizes the test and improve step of the Engineering Design Process, while reinforcing the idea that a mistake is always fixable and can sometimes be inspiring!	EDP SEL	2.AP.PD.03: Independently and collaboratively debug (identify and fix errors) programs using a programming language. 2.CS.T.01: Recognize computing systems might not work as expected and identify and effectively communicate simple hardware or software problems and implement solutions (e.g., app or program is not working as expected, no sound is coming from the device, caps lock turned on) and discuss problems with peers and adults.
Novice	17	Act Out Feelings	Learning goals: students will create expressive programs and decorations for KIBO to express a feeling or emotion. This open-ended lesson allows students to draw on many of the skills they’ve developed in this curriculum and sets the stage for the culminating project beginning in the next lesson.	Expressiveness Input and Output SEL	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).
Novice	18-20	Community Robot	In this culminating project, students will draw on all their foundational robotics and programming knowledge to create KIBOs that help to welcome new friends into their community. Allow three meetings for this integration project.	Integration (Community and SEL)	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program’s sequence of events, goals, and expected outcomes. 2.AP.PD.02: Give credit to ideas, creations, and solutions of others while writing and developing programs. 2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language). 2.IC.SI.01: Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior.
<b>Level</b>	<b>#</b>	<b>Lesson Title</b>	<b>Learning goals</b>	<b>Scope and Sequence Topics</b>	<b>Wyoming Standards addressed</b>
Intermed.	1	Hello Again KIBO!	Learning goals: students will understand the concept of a repeat loop. Students will also engage freely with KIBO’s parts and commands to review their prior work. They will share what they remember from the Novice curriculum.	Repeat Loops EDP	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition.

Intermed.	2	Navigate With Repeat	Learning goals: students will use repeat loops to solve a program design problem. They will program KIBO to follow paths, using repeat loops to simplify their programs.	Sequencing Decomposition Program Design Patterns Repeat Loops Variables	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words). 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).
Intermed.	3	Bowling With Repeat	Learning goals: students will simplify an algorithm using repeat loops. They revisit the KIBO Bowling activity from the Novice curriculum, but now they include repeat loops.	Program Design Repeat Loops	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).
Intermed.	4	Listening KIBO	Learning goals: students learn about KIBO's sensor parts. They understand that sensors let KIBO take in information about the world. They will learn the operation of KIBO's sound sensor. They will create an expressive algorithm using the sensor to modify KIBO's behavior in response to input.	Expressiveness Conditionals Input and Output	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).
Intermed.	5	Happy and You Know It	Learning goals: students learn that output parts allows robots to put information out into the world. Students collaboratively create an expressive algorithm including both input and output. They learn the function of KIBO's Light Bulb output module.	Expressiveness Conditionals Input and Output SEL	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).
Intermed.	6,7	Retell a Story	KIBO can become a character in a favorite storybook! Students will create "storytelling robots" to act out a scene. This literacy-based activity builds on the idea of outputs and involves lots of arts-and-crafts building.	Integration (Literacy)	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.AP.PD.02: Give credit to ideas, creations, and solutions of others while writing and developing programs. 2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language). 2.IC.SI.01: Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior.

Intermed.	8	KIBO Carousel	Learning goals: students will create an algorithm with a repeat loop that goes “forever.” This powerful concept opens the door to automation - robotic systems that continue to perform their function over and over again.	Repeat Loops Variables	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words).
Intermed.	9	What Is My Program?	Learning goals: students will learn that robots can store and recall information from memory. They will watch KIBOs run unknown programs and make hypotheses about what those programs are.	Program Design Store and Recall EDP	2.AP.PD.01: Develop plans that describe a program’s sequence of events, goals, and expected outcomes. 2.DA.S.01: With guidance, develop and modify an organizational structure by creating, copying, moving, and deleting files and folders.
Intermed.	10	The Helpful Bot (Part 1)	Learning goals: students will use advanced sensor parts to control program behavior with conditional repeat loops. In this lesson and the next, students will create a “helpful robot” able to sense its surroundings so it can know how to help.	Repeat Loops Conditionals Variables Input and Output Advanced Sensors SEL	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words). 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).
Intermed.	11	The Helpful Bot (Part 2)	Learning goals: this lesson continues the work from the previous lesson, allowing students time to build and share their “helpful robots.”	Expressiveness Repeat Loops Conditionals Input and Output Advanced Sensors SEL	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words). 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).
Intermed.	12	Drawing Bot	Learning goals: students explore how robots can create visualizations as a form of output. Students will use code to draw by connecting markers to KIBO.	Program Design Models and Visualization Input and Output	2.AP.PD.01: Develop plans that describe a program’s sequence of events, goals, and expected outcomes. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.DA.IM.01: With guidance, interpret data and present it in a chart or graph (visualization) in order to make a prediction, with or without a computing device. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).

Intermed.	13	Predict the Drawing	Learning goals: students continue exploration of visualization with markers. Students closely observe the output of a drawing program to determine what program KIBO ran to create it.	Program Design Store and Recall Models and Visualization Input and Output	2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.DA.S.01: With guidance, develop and modify an organizational structure by creating, copying, moving, and deleting files and folders. 2.DA.IM.01: With guidance, interpret data and present it in a chart or graph (visualization) in order to make a prediction, with or without a computing device. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).
Intermed.	14	Eng. Challenges I	Learning goals: students will engage with KIBO's parts in new ways through activity centers with "engineering challenges." In part 1, students will explore the effect of using multiple inputs and outputs on one KIBO.	Parts and Functions Input and Output EDP	2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.CS.T.01: Recognize computing systems might not work as expected and identify and effectively communicate simple hardware or software problems and implement solutions (e.g., app or program is not working as expected, no sound is coming from the device, caps lock turned on) and discuss problems with peers and adults.
Intermed.	15	Eng. Challenges II	Learning goals: students will engage with KIBO's parts in new ways through activity centers with "engineering challenges." In part 2, students will explore ways to modify KIBO's wheels to change its movement.	Parts and Functions EDP	2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.CS.T.01: Recognize computing systems might not work as expected and identify and effectively communicate simple hardware or software problems and implement solutions (e.g., app or program is not working as expected, no sound is coming from the device, caps lock turned on) and discuss problems with peers and adults.
Intermed.	16	Eng. Challenges III	Learning goals: students will engage with KIBO's parts in new ways through activity centers with "engineering challenges." In part 3, students will use craft materials to build the tallest sturdy structure they can onto KIBO.	Parts and Functions EDP	2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.CS.T.01: Recognize computing systems might not work as expected and identify and effectively communicate simple hardware or software problems and implement solutions (e.g., app or program is not working as expected, no sound is coming from the device, caps lock turned on) and discuss problems with peers and adults.
Intermed.	17	KIBO Snowplow	Learning goals: students will design a robot and an algorithm to solve a problem. They will engage with the "test and improve" step of the Engineering Design Process, as they build KIBO snowplows to help clean up the town after a cotton-ball snowstorm.	Problem Solving EDP	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.AP.PD.03: Independently and collaboratively debug (identify and fix errors) programs using a programming language.

Intermed.	18-20	Nature Guide Robot	In this final project, children will draw on all of their intermediate robotics and programming knowledge in order to create KIBOs that can navigate and guide humans through a natural environment.	Integration (Science)	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.AP.PD.02: Give credit to ideas, creations, and solutions of others while writing and developing programs. 2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language). 2.IC.SI.01: Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior.
<b>Level</b>	<b>#</b>	<b>Lesson Title</b>	<b>Learning goals</b>	<b>Scope and Sequence Topics</b>	<b>Wyoming Standards addressed</b>
Advanced	1	Hello Again, KIBO!	Learning goals: students will review and reconnect with KIBO in a range of open-ended stations. They will reinforce the steps of the Engineering Design Process. They will share what they remember from the Novice and Intermediate curricula.	EDP	2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).
Advanced	2	Robot Relay Race	Learning goals: students will design an algorithm to solve a problem using KIBO's sensors, repeat loops, and conditionals. They will collaborate on a robotic relay race.	Problem Solving Program Design Repeat Loops Conditionals Advanced Sensors	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).
Advanced	3	Drive Around Town (Introducing IF)	Learning goals: students will learn that the IF statement allows algorithms to include conditional behavior. Using a conditional statement, students will design an algorithm to cause KIBO to drive to different places depending on the input from KIBO's light sensor.	Problem Solving Program Design Conditionals Advanced Sensors	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).



Advanced	4	Night and Day Animals	Learning goals: students will create algorithms using KIBO's sensors to model aspects of a natural system (nocturnal and diurnal animals).	Expressiveness Conditionals Models and Visualization Advanced Sensors	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.DA.IM.01: With guidance, interpret data and present it in a chart or graph (visualization) in order to make a prediction, with or without a computing device. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.DA.CVT.01: With guidance, collect data and independently present the same data in various visual formats.
Advanced	5	KIBO Flower	Learning goals: students will create algorithms that include nested conditionals within repeat loops. Students will again create algorithms using KIBO's sensors to model aspects of a natural system (flowers responding to sunlight).	Expressiveness Nesting Models and Visualization Input and Output	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.DA.IM.01: With guidance, interpret data and present it in a chart or graph (visualization) in order to make a prediction, with or without a computing device. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.DA.CVT.01: With guidance, collect data and independently present the same data in various visual formats. 2-AP-12: Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. (P5.1, P5.2)
Advanced	6	KIBO Alarm	Learning goals: students will create algorithms with nested conditionals and loops using sensor input. Students use these algorithms to solve a design problem: creating robotic alarm systems to protect an environment or object.	Problem Solving Program Design Nesting Models and Visualization Advanced Sensors	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.DA.IM.01: With guidance, interpret data and present it in a chart or graph (visualization) in order to make a prediction, with or without a computing device. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game). 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.DA.CVT.01: With guidance, collect data and independently present the same data in various visual formats.

Advanced	7,8	Superhero Robots	In this integration project, children will draw on all of their advanced robotics and programming knowledge in order to create superhero KIBOs that use sensors and outputs to help people.	Integration (Community and SEL)	<p>2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition.</p> <p>2.AP.PD.01: Develop plans that describe a program’s sequence of events, goals, and expected outcomes.</p> <p>2.AP.PD.02: Give credit to ideas, creations, and solutions of others while writing and developing programs.</p> <p>2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language).</p> <p>2.IC.SI.01: Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior.</p>
Advanced	9	Engineering Challenges I	Learning goals: students will engage with KIBO’s parts in new ways through activity centers with “engineering challenges.” In part 1, students will modify KIBO’s wheels to cause KIBO to drive in curved paths.	Problem Solving Parts and Functions EDP	<p>2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition.</p> <p>2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).</p> <p>2.CS.T.01: Recognize computing systems might not work as expected and identify and effectively communicate simple hardware or software problems and implement solutions (e.g., app or program is not working as expected, no sound is coming from the device, caps lock turned on) and discuss problems with peers and adults.</p>
Advanced	10	Engineering Challenges II	Learning goals: students will engage with KIBO’s parts in new ways through activity centers with “engineering challenges.” In part 2, students will attach explore the idea of simple machines by extending KIBO’s mechanisms.	Problem Solving Parts and Functions EDP	<p>2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition.</p> <p>2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine).</p> <p>2.CS.T.01: Recognize computing systems might not work as expected and identify and effectively communicate simple hardware or software problems and implement solutions (e.g., app or program is not working as expected, no sound is coming from the device, caps lock turned on) and discuss problems with peers and adults.</p>

Advanced	11	Engineering Challenges III	Learning goals: students will engage with KIBO's parts in new ways through activity centers with "engineering challenges." In part 3, students will design a KIBO robot and program to push the most "prizes" out of a ring.	Problem Solving Program Design Parts and Functions EDP	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.CS.T.01: Recognize computing systems might not work as expected and identify and effectively communicate simple hardware or software problems and implement solutions (e.g., app or program is not working as expected, no sound is coming from the device, caps lock turned on) and discuss problems with peers and adults. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).
Advanced	12,13	KIBO Explorer	In this integration project, children will build a large-scale relief map for KIBO to explore, gaining experience in how slopes, friction, and surfaces affect KIBO's movement.	Integration (Geography)	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.AP.PD.02: Give credit to ideas, creations, and solutions of others while writing and developing programs. 2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language). 2.IC.SI.01: Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior.
Advanced	14	Programming Design Challenges I	Learning goals: in a series of "programming design challenges," students will draw on a variety of computational thinking and programming techniques. In part 1, students devise a program to make KIBO continually move around the classroom on its own.	Problem Solving Program Design Nesting Advanced Sensors	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program's sequence of events, goals, and expected outcomes. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).

Advanced	15	Programming Design Challenges II	Learning goals: in a series of “programming design challenges,” students will draw on a variety of computational thinking and programming techniques. In part 2, students will synchronize the movements of multiple KIBOs to create a group of dancing robots.	Expressiveness Program Design SEL	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program’s sequence of events, goals, and expected outcomes. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).
Advanced	16	Programming Design Challenges III	Learning goals: in a series of “programming design challenges,” students will draw on a variety of computational thinking and programming techniques. In part 3, students will experiment with creating programs using multiple sensors.	Program Design Conditionals Nesting Advanced Sensors	2.AP.PD.01: Develop plans that describe a program’s sequence of events, goals, and expected outcomes. 2.CS.HS.01: Demonstrate and describe the function of common components of computing systems (hardware and software) (e.g., use a browser, search engine). 2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.M.01: Using grade appropriate content and complexity, decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions (e.g., develop a set of instructions on how to play your favorite game).
Advanced	17	KIBO Number Line	Learning goals: students use algorithms and moving robotic systems to model mathematical concepts. KIBO will travel along a physical number line to model counting, addition, and subtraction. Students will create algorithms including repeat loops to solve problems.	Problem Solving Repeat Loops Variables Store and Recall Models and Visualization	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.DA.S.01: With guidance, develop and modify an organizational structure by creating, copying, moving, and deleting files and folders. 2.DA.IM.01: With guidance, interpret data and present it in a chart or graph (visualization) in order to make a prediction, with or without a computing device. 2.AP.V.01: Model the way programs store and manipulate data by using numbers or other symbols to represent information (e.g., thumbs up/down as representations of yes/no, arrows when writing algorithms to represent direction, or encode and decode words using numbers, pictographs, or other symbols to represent letters or words). 2.DA.CVT.01: With guidance, collect data and independently present the same data in various visual formats.
Advanced	18-20	My Story	In this final project, children will draw on all of their advanced robotics and programming knowledge in order to create KIBOs that represent their own experience at important moments in their lives. They will use concepts of input and output to create expressive robotic designs that share and communicate feelings and ideas.	Integration (Community and SEL)	2.AP.C.01: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing, conditionals, and repetition. 2.AP.PD.01: Develop plans that describe a program’s sequence of events, goals, and expected outcomes. 2.AP.PD.02: Give credit to ideas, creations, and solutions of others while writing and developing programs. 2.AP.PD.04: Use correct terminology (debug, program input/output, code) to explain the development of a program or an algorithm (e.g., in an unplugged activity, hands on manipulatives, or a programming language). 2.IC.SI.01: Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior.