Middle School Pacing Guide

Levels 1-3

Overview

The **Middle School Computer Science Pacing Guide** is a helpful companion to the hundreds of free lessons available for you and your middle school students. We created it for two primary purposes:

- A blueprint for Middle School teachers who have students with varying degrees of skill, interest, and expertise in coding and robotics. Level 1 takes students through the basics of both types of coding students can do with Ozobot: color codes and Ozobot Blockly. Level 2 allows students to practice their color code and blockly skills in various contexts and build on their computational thinking and technical skillsets. Level 3 is for advanced students who are ready to push their programming with more sophistocated blocks of code. Coding skills build on one another within and throughout the levels to expose students to new content at increasing levels of complexity.

- A “playlist” of our best lessons, curated for you! This guide is a one-stop-shop for anyone looking to browse our most engaging lessons aligned to each grade-level. All of the content featured in our Middle School Pacing Guide was made with 6th, 7th, and 8th grade student’s needs and interests in mind. It contains developmentally-appropriate content that embeds coding and robotics in an engaging, thoughtful way to keep MS computer science fun for students, easy for you.

Lesson	Objective	Aligned CSTA Standard
1 Introduction to Ozobot: Get to Know Evo	Students will identify and name the hardware components of Ozobot Evo.	**CSTA.1A-CS-02:** Use appropriate terminology in identifying and describing the function of common physical components of computing systems (hardware).
2 Intro to Color Codes 01: Basic Training	Students will be able to program Ozobot by drawing lines and Color Codes. Students will be able to define what a Color Code is and explain how it is used.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.
3 Intro to Color Codes 02: Speed	Students will connect the input of a sequence of color with the output of a speed.	**CSTA.1B-AP-10:** Create programs that include sequences, events, loops, and conditionals.
4 Intro to Color Codes 03: Special Moves & Win/Exit	Students will program their bot to perform special moves with Color Codes.	**CSTA.1B-AP-10:** Create programs that include sequences, events, loops, and conditionals.
5 Intro to Color Codes 04: Direction	Students will be able to identify the direction their Ozobot is traveling in relationship to the code they use to turn a certain direction at an intersection.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.

Lesson	Objective	Aligned CSTA Standard
6 Intro to Color Codes 05: Skills Check 1 (Grades 6-12)	Students will synthesize their understanding of how Ozobot's hardware and software work together as a system to recognize basic color codes.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.
7 Intro to Color Codes 06: Timers	Students will draw Color Codes to program their bot to stop for 3 second intervals and observe how speed and time are related.	**CSTA.1B-AP-09:** Create programs that use variables to store and modify data.
8 Intro to Color Codes 07: Line Switch	Students will draw Color Codes to program their bot to move straight at a line end and move until it senses another line.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.
9 Intro to Color Codes 08: Counters	Students learn about the counters Color Codes to complete a challenge.	**CSTA.1B-AP-11:** Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.
10 Intro to Color Codes 09: Skills Check 2 (Grades 6-12)	Students apply the concepts and skills they learned in all lessons to program their bot to complete a challenge.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.

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11 Orientation with Ozobot	Students will design and run a simulation of Ozobot moving through 6 class periods at school on a Color Codes track, including at least 20 Color Codes.	**CSTA.1B-AP-11:** Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.
12 Introduction to Ozobot Blockly 01: Basic Training	Students will be able to defne debugging and explain why it is important. Students will be able to examine a block-based code and the behavior of their bot to find a bug in a program.	**CSTA.1B-AP-10:** Create programs that include sequences, events, loops, and conditionals.
13 Introduction to Ozobot Blockly 02: Sequences	Students will learn about sequences in programming, and program their Ozobot to perform a series of commands in order.	**CSTA.1B-AP-10:** Create programs that include sequences, events, loops, and conditionals.
14 Introduction to Ozobot Blockly 03: Loops	Students learn about the concept of loops and apply the concept with block-based coding to program their bot to dance.	**CSTA.1B-AP-10:** Create programs that include sequences, events, loops, and conditionals.
15 Introduction to Ozobot Blockly 04: Conditionals	Students learn about the concept of conditionals and apply the concept with block-based coding to program their bot to respond to their movements.	**CSTA.1B-AP-10:** Create programs that include sequences, events, loops, and conditionals.

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16 Introduction to Ozobot Blockly 05: Skills Check 1	Students will check their understanding of sequences, loops, and conditionals to program their bot with Ozobot Blockly to complete a maze with obstacles.	**CSTA.1B-AP-10:** Create programs that include sequences, events, loops, and conditionals.
17 Introduction to Ozobot Blockly 06: Line Navigation	Students will discover the blocks in the Line Navigation category in Level 3 of Ozobot Blockly and practice using these blocks to complete a maze challenge.	**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.
18 Introduction to Ozobot Blockly 07: Debugging	Students learn about the concept of debugging and practice the concept with block-based coding to find and correct errors in different programs.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs
19 Introduction to Ozobot Blockly 08: Skills Check 2	Students will check their understanding of sequences, conditionals, and line navigation to program their bot with Ozobot Blockly to complete a bot wash.	**CSTA.2-AP-11:** Create clearly named variables that represent different data types and perform operations on their values.
20 Pop Star	Students will understand and apply the concept of functions in Blockly, demonstrating how to create reusable blocks of code for efficient programming.	**CSTA.2-AP-14:** Create procedures with parameters to organize code and make it easier to reuse.

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21 Robotics Game Design Deconstruction Part 1	Ozobot moves around a map by itself, 'bounces' off of colors, and 'wins' on the color red using conditional statements to find the winning spot.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
22 Robotics Game Design Deconstruction Part 2	Students program Ozobot using blocks from Line Navigation to follow a maze until it sees the red line-end and breaks out of a loop.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
23 Robotics Game Design Deconstruction Part 3	Aim Ozobot toward the winning color while avoiding the losing color in a game that teaches how to program winning and losing game mechanics using the Deconstruction method.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
24 Robotics Game Design Deconstruction Part 4	Ozobot bounces off teammates' colored paper in a race against time until it reaches red. Students learn variables for tracking time and have Ozobot report the total.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
25 Slot Car Race Track	Students will effectively use line-following commands in Blockly to navigate their Ozobot around a race track, enhancing their understanding of autonomous navigation.	**CSTA.2-CS-02:** Design projects that combine hardware and software components to collect and exchange data.

Lesson	Objective	Aligned CSTA Standard
1 Ozobot Review: Hardware and Programming	This lesson is intended for the beginning of an intermediate or advanced unit of study, and covers Ozobot's hardware, Color Code guidelines and Ozobot Blockly basics.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.
2 Intro to Color Codes 05: Skills Check 1 (Grades 6-12)	Students will synthesize their understanding of how Ozobot's hardware and software work together as a system to recognize basic color codes.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.
3 Engineering and Design Process Part 1 of 3	Students will apply the Engineering and Design Process to determine a path for Ozobot.	**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.
4 Engineering and Design Process Part 2 of 3	Students will use the Engineering Design Process to solve a problem with a time limit.	**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.
5 Engineering and Design Process Part 3 of 3	Students will use the Engineering Design Process to develop a model that uses Ozobot's point counter.	**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.

Lesson	Objective	Aligned CSTA Standard
6 Introduction to Ozobot Blockly 08: Skills Check 2	Students will check their understanding of sequences, conditionals, and line navigation to program their bot with Ozobot Blockly to complete a bot wash.	**CSTA.2-AP-11:** Create clearly named variables that represent different data types and perform operations on their values.
7 Code to Touchdown	Students will create a randomization code and see how many points your Ozobot can score in a modified game of football.	**CSTA.1A-AP-09:** Model the way programs store and manipulate data by using numbers or other symbols to represent information.
8 Cookie Jar (Part 1 of 3)	Students will use loops to create an efficient program for Ozobot to count to 20.	**CSTA.1B-AP-08 :** Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
9 Cookie Jar (Part 2 of 3)	Students will code a unique conditional statement using variables to store and modify data.	**CSTA.1B-AP-09:** Create programs that use variables to store and modify data.
10 Cookie Jar (Part 3 of 3)	Students will create functions to repeat a set of insctructions and execute an efficient program.	**CSTA.1B-AP-10:** Create programs that include sequences, events, loops, and conditionals.

Lesson	Objective	Aligned CSTA Standard
11 Ozobot's Color Quest Part 1 of 5	Students will deconstruct a program containing conditional logic and variables to understand how to utilize Ozobot's sensors to play the Color Quest Game.	**CSTA.2-CS-01:** Recommend improvements to the design of computing devices, based on an analysis of how users interact with the devices.
12 Ozobot's Color Quest Part 2 of 5	Students will demonstrate their understanding of compound conditionals within conditional logic, applying their knowledge to analyze and manipulate complex programming structures.	**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.
13 Ozobot's Color Quest Part 3 of 5	Students will develop foundational skills in building a program utilizing variables and math operations to construct a robot calculator and a points tracker for the Color Quest Game.	**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.
14 Ozobot's Color Quest Part 4 of 5	Students will understand and apply the concept of functions to improve code efficiency and readability by integrating functions into the Color Quest Game program.	**CSTA.2-CS-02:** Design projects that combine hardware and software components to collect and exchange data.
15 Ozobot's Color Quest Part 5 of 5	Students will work collaboratively to create a final comprehensive project, incorporating sequencing, conditional logic, loops, variables, math operations, and functions into their game design.	**CSTA.2-AP-15:** Seek and incorporate feedback from team members and users to refine a solution that meets user needs.

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16 Fooled by the Bug	Students will develop their debugging skills by identifying and fixing errors in a bugged code, then documenting their programs with detailed comments.	**CSTA.2-AP-19:** Document programs in order to make them easier to follow, test, and debug.
17 Automatic Braking	Students will run tests on various speed settings and how they affect the number of collisions and create a program that uses proximity sensors to prevent crashing into other Ozobots.	**CSTA.2-AP-12:** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
18 Adaptive Cruise Control	Students will define Adaptive Cruise Control (ACC) and state some of its advantages, then construct an ACC program for Ozobot and observe the bot's behavior when running the program.	**CSTA.2-AP-12:** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
19 The Interactive Flowchart Part 1 of 3	Students will create and test an interactive Ozobot Blockly program where Ozobot demonstrates the flow in a sequence flowchart.	**CSTA.2-DA-08:** Collect data using computational tools and transform the data to make it more useful and reliable.
20 The Interactive Flowchart Part 2 of 3	Students will design a selection flowchart for a unique situation they choose then create variables and functions in an Ozobot Blockly program that is easy to follow.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.

Lesson	Objective	Aligned CSTA Standard
21 The Interactive Flowchart Part 3 of 3	Students will develop an Ozobot Blockly program using variables, functions, and conditionals. Students will apply the concepts of input and output in the context of a flowchart.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
22 Soccer Challenge Mat: Lesson 1 Basketball Challenge Mat: Lesson 1	Challenge Mats provide multiple entry points for students to apply their Computer Science skills in an immersive, scenario-based environment. Each lesson typically begins with a story to put the programming challenge into the context of the environment. Students collaborate in small groups to accomplish various tasks in Ozobot Blockly Levels 3, 4, and 5. For Level 3, we recommend using either the Mars and/or Ocean mat.	**CSTA.2-AP-15:** Seek and incorporate feedback from team members and users to refine a solution that meets user needs.
23 Soccer Challenge Mat: Lesson 2 Basketball Challenge Mat: Lesson 2		**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.
24 Soccer Challenge Mat: Lesson 3 Basketball Challenge Mat: Lesson 3		**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
25 Soccer Challenge Mat: Lesson 4 Basketball Challenge Mat: Lesson 4		Link to Purchase

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1 Ozobot Review: Hardware and Programming	This lesson is intended for the beginning of an intermediate or advanced unit of study, and covers Ozobot's hardware, Color Code guidelines and Ozobot Blockly basics.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.
2 Intro to Color Codes 05: Skills Check 1 (Grades 6-12)	Students will synthesize their understanding of how Ozobot's hardware and software work together as a system to recognize basic color codes.	**CSTA.1B-CS-02:** Model how computer hardware and software work together as a system to accomplish tasks.
3 Introduction to Ozobot Blockly 08: Skills Check 2 (Grades 6-12)	Students will check their understanding of sequences, conditionals, and line navigation to program their bot with Ozobot Blockly to complete a bot wash.	**CSTA.2-AP-11:** Create clearly named variables that represent different data types and perform operations on their values.
4 Evo the Troll	Students will analyze what information should be kept private VS shared publicly then modify a program by editing inputs and outputs of functions.	**CSTA.2-IC-23:** Describe trade-offs between allowing information to be public and keeping information private and secure.
5 Introduction to Infrared Communications with Ozobot Part 1 of 3	Students will program Ozobot to react to objects in front and behind it. Students will demonstrate understanding of blocks in Levels 3 and 4 of Ozobot Blockly.	**CSTA.2-AP-10:** Use flowcharts and/or pseudocode to address complex problems as algorithms.

Lesson	Objective	Aligned CSTA Standard
6 Introduction to Infrared Communications with Ozobot Part 2 of 3	Students will program one Ozobot to send or emit an IR signal, and one Ozobot to receive that IR signal and perform an action.	**CSTA.2-AP-10:** Use flowcharts and/or pseudocode to address complex problems as algorithms.
7 Introduction to Infrared Communications with Ozobot Part 3 of 3	Students will demonstrate understanding of the Communication blocks in Ozobot Blockly. Students will use a model to illustrate an everyday example of infrared communication.	**CSTA.2-AP-10:** Use flowcharts and/or pseudocode to address complex problems as algorithms.
8 OzoChoreo	Students will code an "Influencer Bot" program and a "Follower Bot" program to broadcast and receive a message between two Ozobots, leveraging the IR sensors.	**CSTA.2-CS-02:** Design projects that combine hardware and software components to collect and exchange data.
9 Infrared Secrets (Part 1 of 2)	Students will demonstrate understanding of infrared communication by coding a program to transmit a secret message and a program to receive it using Ozobot's IR emitters.	**CSTA.2-AP-12:** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
10 Infrared Secrets (Part 2 of 2)	Students will modify the original program to differentiate the secret message by creating a randomized variable, demonstrating how information can be altered or passed incorrectly when telling secrets.	**CSTA.2-AP-11:** Create clearly named variables that represent different data types and perform operations on their values.

Lesson	Objective	Aligned CSTA Standard
11 Ozobot's Breakout Part 1 of 5: Movement	Students will use conditionals to create autonomous movement, then modify an existing program to improve responsiveness and accuracy.	**CSTA.2-AP-12:** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
12 Ozobot's Breakout Part 2 of 5: Timer	Students will use variables to program a timer for a Minesweeper-style game.	**CSTA.2-AP-11:** Create clearly named variables that represent different data types and perform operations on their values.
13 Ozobot's Breakout Part 3 of 5: Points	Students will plan a points system using conditional logic, variables and math. Students will build a points system for the game.	**CSTA.1B-AP-10:** Design projects that combine hardware and software components to collect and exchange data.
14 Ozobot's Breakout Part 4 of 5: Multiplayer	Students will utilize functions, conditionals, and variables to create a multiplayer game.	**CSTA.2-CS-02:** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
15 Ozobot's Breakout Part 5 of 5: Game Design	Students will design and build a game that includes points, timers, autonomous movement, proximity sensors, and multiple players.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.

Lesson	Objective	Aligned CSTA Standard
16 Hockey Simulator Level 1- Movement	Students will analyze an Ozobot Blockly program to discover the bot's reactions to conditional statements.	**CSTA.2-AP-12:** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
17 Hockey Simulator Level 2- Puck Handling	Students program Ozobot's proximity sensors to support learning of conditional logic by programming Ozobot to puck handle.	**CSTA.2-AP-10:** Use flowcharts and/or pseudocode to address complex problems as algorithms.
18 Hockey Simulator Level 3 - Maneuvering	Level 3 of Hockey Simulator reinforces conditional logic and sensor input/output by programming Ozobot how to navigate the rink.	**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs
19 Hockey Simulator Level 4 - Scoring	Level 4 teaches variables and reinforces conditional logic and sensor input/output by programming Ozobot to score points.	**CSTA.2-AP-11:** Create clearly named variables that represent different data types and perform operations on their values.
20 Hockey Simulator Level 5 - Game Design	Students work on algorithm design, problem solving, and debugging through game design.	**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.

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21 Ozobot Learns the ABCs	Students will deconstruct a program to discover how various blocks work. Students will practice using conditional logic to program Ozobot to travel around the playing field autonomously.	**CSTA.2-AP-16:** Incorporate existing code, media, and libraries into original programs, and give attribution.
22 Mars Challenge Mat: Lesson 1 Ocean Challenge Mat: Lesson 1	Challenge Mats provide multiple entry points for students to apply their Computer Science skills in an immersive, scenario-based environment. Each lesson typically begins with a story to put the programming challenge into the context of the environment. Students collaborate in small groups to accomplish various tasks in Ozobot Blockly Levels 3, 4, and 5. For Level 3, we recommend using either the Mars and/or Ocean mat.	**CSTA.2-AP-15:** Seek and incorporate feedback from team members and users to refine a solution that meets user needs.
23 Mars Challenge Mat: Lesson 2 Ocean Challenge Mat: Lesson 2		**CSTA.2-AP-17:** Systematically test and refine programs using a range of test cases.
24 Mars Challenge Mat: Lesson 3 Ocean Challenge Mat: Lesson 3		**CSTA.2-AP-13:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
25 Mars Challenge Mat: Lesson 4 Ocean Challenge Mat: Lesson 4		Link to Purchase

Content Integration Options		
STEAM	**ELA**	**Holiday**
Engineering Design Process Lesson 1	Narrative in Action Part 1	Ozobot for President! (Advanced)
Engineering Design Process Lesson 2	Narrative in Action Part 2	Holiday Series: Thanksgiving/Gratitude Party
Engineering Design Process Lesson 3	Narrative in Action Part 3	Holiday Series: Reinbot Landing Practice
		Holiday Series: Hanukkah
		Holiday Series: Kwanzaa
		Holiday Series: Lunar New Year
		Black History: 6-8 Grade