Lesson 1: Line Following Codes

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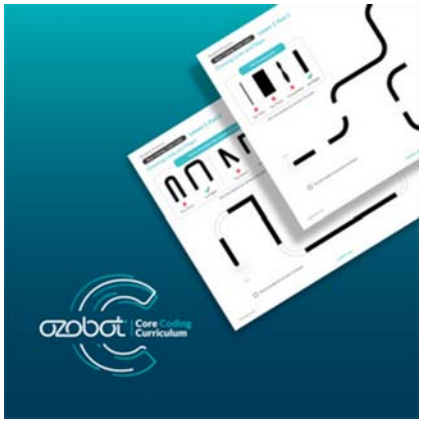


Grades: **PK—5**

Subjects: **Computer Science**

Coding Methods: **Color Codes**

Robots: **Evo**

Brief Summary

This lesson will introduce the concept of coding and robotics. Students will learn how to code an Ozobot's movement using color codes.

Pre-Reader/ESL: **No**

Required Materials

- 1 Evo per group
- 1 Black and colored markers per group
- 1 Plain large white paper or white butcher paper per group
- 1 Computer/projector (to show videos) per group

Lesson Objectives

- verbally state what coding is.
- turn on the Ozobot.
- draw and execute a line code.

Preparation

Background Knowledge

(None)

Lesson Tips

- The Basic Training lessons serve students and teachers as the introductory courses in computer science and robotics. While no computer science or robotics background is needed, be sure to set behavioral and material expectations with your students.
- For some students with fine motor issues, Color Code Stickers may reduce frustrations. There are

- some included in the classroom kit and you can order more using the order form in your Classroom
- Kit Binder.
- Additionally, we have found that correcting mistakes or adding Color Codes to an area of a line
- where no space was left, Avery™ Easy Peel White Inkjet Address Labels are extremely helpful.
- Finally, graph paper may be helpful for students just starting out drawing Color Codes. The boxes
- are the perfect size for drawing Color Code boxes, and provide the ideal width of line for Ozobot to
- follow.
- While Basic Training Lessons are broken up into four lessons, which can be taught individually, or all together. Each lesson will be no longer than 15-20 minutes, but if taught all at once, the time will be reduced since you will only need to distribute materials one time.
- Before the lesson begins, ensure your students know how to calibrate the Ozobot. Follow our Calibration Tips: https://files.ozobot.com/stem-education/ozobot-calibration-tips.pdf
- Introduce the following computer science vocabulary:
- Coding- forming a set of instructions to be executed by a computer, for younger learners, coding can be defined as telling a computer what to do.
- Robotics- the area of computer science that deals with robots
- Execute- to run the code you wrote
- Debugging- to fix any errors, or bugs, in code.
- Before launching your first lesson:
- 1. From “Lessons for this Class,” select “View Materials” to see the lesson plan and materials needed.
- 2. Print the Lesson Plan to have on-hand while the lesson is being run.
- To Launch a Lesson (for Color Code lessons):
- 1. Plug your Classroom Communicator into your computer or USB power source
- 2. Plug your Evos into their charger and plug the charger into the wall.
- 3. Select “Launch Lesson” and follow instructions to connect your Classroom Communicator
- 4. The student groups on your screen will each generate a color sequence to match it the front lights of their assigned Evo. Keep Evos in their charger until all of their front lights have changed color to match the assigned group
- 5. Have students collect the Evo with lights matching the color sequence next to their group number (you may need to project your screen to your class so they can see their Evo’s color sequence)
- 6. The lesson timer will begin when students remove their Evo from the charger.
- 7. Follow the lesson plan according to the PDF instructions and see Live Lesson Insights from Ozobot Classroom as your students complete the activity.
- 8. The lesson timer will stop when an activity is completed, or you can select “End Lesson”
- 9. View the Post-Lesson Summary
- 10. To turn Evos off after being connected, press and hold the power button for 10 seconds and return Evos to their chargers
- 11. Disconnect your Classroom Communicator

Direct Instruction (Teacher Facing Instructions):

1 Introduce the Ozobot. Tell students, “A robot is a machine that can be programmed to do certain tasks. They are used for many different things, including keeping humans safe from dangerous or boring jobs, getting into small places, doing jobs faster and better than humans can, and much more. From exploring space and the ocean to helping out with household chores, robots can be found all over. They come in all different shapes and sizes.”

2 Show some videos of robots in action. Feel free to find your own videos/articles/ materials that are suitable for your individual classes’ interests!
Amazon’s speedy shipping robots: goo.gl/daVH7m
The Mars Curiosity Rover: goo.gl/1mjUrb
A robot that goes to school in place of a student with a medical condition: goo.gl/EnVgKa
This train doesn’t run on tracks; it has been programmed to follow lines: goog.gl/dKvajH

3 Introduce the concept of coding. Coding and Computer Science is telling computers and robots what to do. Explain that the class will code the Ozobot, or tell it what to do, by drawing a path for it to follow with a black marker.

4 Display the Ozobot. Turn Ozobot over (while it is powered on) and see what's underneath. On the bottom, you can see eight lights shining out of them. An optical sensor lives in each of these openings. These sensors are Ozobot's "eyes." Each of the sensors sees how bright the paper underneath is. This way, Ozobot can differentiate the black and white parts of the paper to know where the line is! Explain that these are seven line following sensors. The sensor between the wheels is the color sensor, which will be utilized in latter Basic Training lessons.

5 Tell students, "Ozobot is a robot you can program yourself! One way to program Ozobot is to use markers, paper, and Color Code to tell Ozobot where to go and what to do."

6 Model how to draw a line code, and how to execute the code by turning on the Ozobot and placing it on the line. Tell students to help Ozobot get from the start to finish by drawing lines that are "just right" for Ozobot to follow (¼ in (5mm)). Point out the chisel tip if using Ozobot markers. When you draw corners and curves, it is still necessary to make the line ¼ in (5mm) thick for Ozobot to follow it. Point out the power button and practice turning it on and off with your students.

7 Display Lesson 1: Part 1 and Part 2 worksheets. Explain to students that their goal is to use the marker draw a line code to get their bot to get from start to finish.

Lesson Closure (Optional)

Gather students for a discussion. Ask students:
How did you code your Ozobot?
How did the Ozobot read the code?
How do you know if the Ozobot executed the code?
Did your bot follow the entire path? Why/why not?

Student Practice (Student Facing Instructions):

1 Look at Lesson 1: Part 1. Draw a line code to get your bot from start to finish. Execute the code. Did your bot make it? Check the box. If not, try again.

Goals: Ozobot will hit the thumbs up.

2 Look at Lesson 1: Part 2. Draw a line code to get your bot from start to finish. Execute the code. Did your bot make it? Check the box. If not, try again.
Goals: Ozobot will hit the thumbs up.

Lesson Extension (Optional)

1 Draw your own line code! Practice more turns, curves and lines.
Goals: Open ended- no RTI needed, or use length traveled in mm, or time spent line following.

Supplements

Additional Attachments

- https://docs.google.com/presentation/d/18bf5Q71weh_tilSU6O1EI3KhlrNUe2utKpX7nOxb-VU/edit?usp=sharing
- Ozobot-Edu-CCC-BasicTraining-L1 (2).pdf

Academic Standards

- CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
- CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically
- CCSS.MATH.PRACTICE.MP7 Look for and make use of structure
- ISTE 1c Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
- ISTE 1d Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, and use and troubleshoot current technologies and are able to transfer their knowledge to exploring emerging technologies.
- ISTE 4a Students know and use a deliberate design process for generative ideas testing theories, creating innovative artifacts, or solving authentic problems.
- ISTE 4d Students exhibit a tolerance for ambiguity, perseverance, and the capacity to work with openended problems.

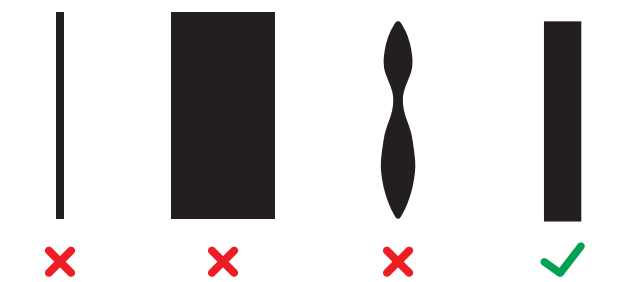
Line Following Codes

Lesson 1: Part 1

Name: _____

Drawing Lines and Maps

TIPS: Drawing Lines



Too Thin! Too Thick! Inconsistent! Just Right

DO: Use markers to connect the path.

☐ My bot made it from start to finish!

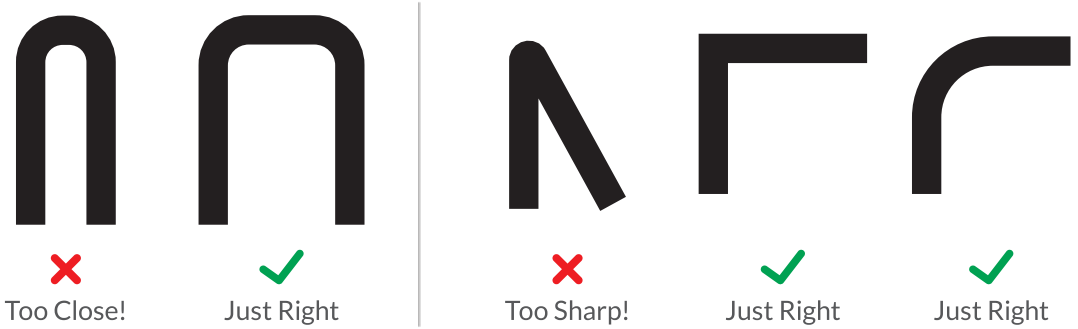
Line Following Codes

Lesson 1: Part 2

Name: _____

Drawing Lines and Maps

Tips for Drawing Lines: Corners and Curves



DO: Use markers to connect the path.

☐ My bot made it from start to finish!