

TEACHER'S GUIDE

Thank you for inviting Ozobot into your classroom!

How can Ozobot help to teach students in your classroom?

Ozobot is a smart robot that can follow lines or roam around freely, detect colors, and can be programmed using visual codes. Your students will learn hands-on about robotics, math and programming. Ozobot teaches them in a fun way so they learn while being engaged and playing.

Ozobot can play on paper or on a tablet, so even if your school does not have access to tablets, you can still use Ozobot in your classroom. Lesson 1 is designed to be taught without a tablet. Lessons 2 and 3 are intended for use with a tablet, but may be adapted to be taught without a tablet as well. Only lessons 4 and 5 absolutely require a tablet.

The small size of Ozobot is a plus for the classroom. It's portable, but does not require students to walk around the classroom in order to program and interact with Ozobot. Each entire lesson can be done at their usual table. Students can work in groups (a ratio 2 to at most 4 students per Ozobot/tablet is ideal) and can gather around Ozobot, the lesson plan and an optional tablet.

Ozobot Bit has been tested for ages 8+. The original Ozobot has a similar construction, but it was not tested as a toy. However, even elementary school kids should be perfectly capable of using Ozobot with minimal adult supervision.

What is the curriculum about?

The base curriculum includes five lessons that teach three main topics: robotics, programming and math. The lessons are designed for students in 3rd to 5th grade. Even though all lessons touch on all of the three main topics, the emphasis of each of them is slightly different:

Lesson 1: robotics and programming

Lessons 2 + 3: learning math through robotics and programming

Lessons 4 + 5: learning programming through robotics

Each lesson covers several common core standards and they are listed at the beginning of each teacher handout. According to the STEM principles, each lesson has been designed to integrate topics across multiple subjects. Moreover, students work on projects with real-life backgrounds and connections to careers in STEM fields. Additionally, having students work on group projects around Ozobot fosters their ability to analyze, reason, and communicate ideas effectively as they pose, formulate, solve, and interpret solutions.

The curriculum is designed such that, with the exception of lesson 5, every lesson can be taught separately or in any order desired. However, it is a good idea to start with lesson 1, since it serves as an introduction to how Ozobot works. If you do teach the lessons out of order, then be sure to check the “More about Ozobot” section at the end of this document to get an overview of how to use Ozobot. The only exception is lesson 5, which requires lesson 4 to be taught first.

The base curriculum works with the current or any future versions of Ozobot. The next version of Ozobot will also have the capability of being programmed using a visual programming language and comes with an extended curriculum focused on learning programming through robotics that builds on the current base curriculum.

Where can I get Ozobots for the classroom?

You can order individual Ozobots on the Ozobot website (<http://shop.ozobot.com>) or contact us at learn@ozobot.com to order a classroom set for educators at a reduced price. We recommend one Ozobot for up to 4 students and 2 additional Ozobots as backups.

What else is needed for the lessons?

Ozobots

Please see above on how to purchase Ozobots for your classroom. Make sure to remove them from the package prior to class. Also check to have the Ozobots charged before each lesson. To make this easier, you may want to use a USB hub so several Ozobots can be charged at the same time. Lastly, make sure to place the Ozobots back into their carrying cases for protection once class is over.

Tablets

Tablets are needed for lessons 4+5 and recommended (but optional) for lessons 2+3. Not every student is required to have a tablet. We recommend to have as many tablets as Ozobots available and suggest to have students work in groups of at most 4 per Ozobot/tablet. The tablet can be either Android (OS 3.2 or higher with a screen size of at least 9in in diameter and a camera with autofocus) or iPad (iPad 2 or newer running iOS 6 or higher). Make sure tablets are fully charged before starting a class.

Apps

If tablets are used, you will need to download the Ozobot app for lessons 2+3 and the OzoGroove app for lessons 4+5. You can get these apps on the Google Play store for Android devices or on the iTunes App Store for iPads. The apps are free. Make sure to download the apps and familiarize yourself with them before class.

Lesson Plan

Each lesson has a lesson plan in PDF format for students as well as teachers. You can use the lesson plan as a resource for yourself or print it out for the students and let them learn self-guided. In either case, you will find solutions in the back of each lesson if necessary.

Printouts

Most lessons come with handouts for the students. They are attached to the student lesson. Note that, if you are using a tablet, you can have the students view and use some of the handouts on the tablet. Only the handouts that students have to work on with a marker need to be printed out. You might want to print extra copies so that students can start over after making mistakes. Lesson 1 also calls for blank sheets of papers.

Markers

Lessons 1 through 3 require students to use markers in colors black, red, light blue and light green. We recommend you use either Sharpie's wide chisel tip or Crayola markers. One set of markers per group of students is sufficient. If you are using permanent markers, please make sure to put an extra sheet of paper underneath to avoid permanent marks on the table surface.

Code Reference chart

It is a good idea to have the OzoCodes reference chart printed out for students to use in lessons 1-3. It is downloadable from Ozobot's website:

(<http://www.ozobot.com/wp-content/uploads/2014/10/Ozobot-OzoCodes-Reference.pdf>).

Other resources for students

There are many ways students can continue to learn using Ozobot even when class is over. The Ozobot app includes a Challenge mode within OzoDraw that is a good extension to lessons 1-3. Students can also use OzoGroove to create their own dances and deepen their programming skills learned in lessons 4 and 5.

There are also games on the Gamezone on the Ozobot website (<http://www.ozobot.com/gamezone/>) as well as brain teasers in the Learnzone (<http://www.ozobot.com/learnzone/>). Students can print them out to play and try to solve the brain teasers after they finished lesson 1, 2 or 3.

Where do I get help?

If you have any questions about how Ozobot works, you may wish to check our series of "How to" videos. You can find them on YouTube (<https://www.youtube.com/user/OZOBOT/playlists>) or within either app. There is also an extensive FAQ section on the Ozobot website (<http://www.ozobot.com/faq/>) or in the apps.

We are also always happy to help. Please contact us with questions or suggestions at learn@ozobot.com.

More about Ozobot

The lessons cover how to use and take care of Ozobot, but just in case you need to look it up again or if you are teaching the lessons out of order, you will find all the instructions below. Also make sure to visit the help resources (above).

Ozobot's On/Off button

Ozobot has only one button, the On/Off button and it can be found in the middle on one of the sides of Ozobot.

Protect Ozobot

Ozobot comes with protective skins that can be placed onto Ozobot and stay on during use. While not in use, Ozobot should be placed into the carry case for protection.

Screen Brightness

When using a tablet, make sure that the screen brightness is set to 100% (maximum brightness). Ozobot needs the brightest screen possible to function properly. Remember to calibrate whenever screen brightness or external light conditions change (see below on how to do this).

How to take care of Ozobot

It may happen that Ozobot starts behaving strangely. For example, Ozobot may stop to be able to follow lines. To prevent this from happening, do the following maintenance every time you start playing with Ozobot or whenever you change your location, the tablet or type of paper:

1) Calibrate

What does this mean? Ozobot's "eyes" (the sensors) are very sensitive to the surrounding light. So much so that, if the paper changes or if you go closer to the window, it affects how Ozobot sees what's underneath. To let Ozobot know what his surroundings are, you need to calibrate:

On paper:

1. Press and hold the ON/OFF button until Ozobot blinks white.
2. Place Ozobot on the black dot on the plastic calibration zone card that came with your packaging (If you are playing with markers on white paper, you can also draw a 1 1/2 inch solid dot with a black sharpie and place Ozobot at the center of it to calibrate).
3. When Ozobot blinks green, it means that it has successfully calibrated. Start over if Ozobot blinks red.

Like this, Ozobot knows how white the paper in the background of the lines is and how much light is in the room.

On a tablet:

1. Open the Ozobot app, go to home if you are not there already, and press the "Ozobot Tuneup" button.
2. On the Tune Up page, press the "Calibrate Sensors" button. Follow the 3 steps shown on the bottom of the screen.

You will have to calibrate this way every time you start playing on a tablet. This also means that you will have to calibrate every time you switch from playing on paper to playing on a tablet. And the reverse is also true: you will have to calibrate on paper (see above on how to do that) every time you switch from playing on a tablet to playing on paper.

If your Ozobot still behaves strangely, try moving away from any bright lights. Ozobot's sensors are very sensitive and too much light from the surroundings will confuse Ozobot.

If this still doesn't make a difference, try the following:

2) Clean the wheels

Ozobot is very small, so just a bit of dust or grease can get into the drivetrain. It's like driving through a dirty, muddy field with a car. You would certainly want to give the car a good cleaning afterwards. But don't try to clean Ozobot with soap and water, this would most certainly break Ozobot. Instead, take a clean white sheet of paper and move Ozobot's wheels gently back and forth on the paper. Done, Ozobot's wheels are clean!

3) Charge the battery

Ozobot's motor is fueled by a tiny battery, much like cell phones, but smaller. If Ozobot blinks red, then the battery needs charging very soon. Plug the special USB cable to a computer and plug Ozobot to the cable. When the battery is almost charged fully, Ozobot starts blinking green. Ozobot shows a solid green light when the battery is completely charged.

Tune the motors

If you start noticing that Ozobot doesn't turn properly or doesn't drive in a straight line when not in line-following mode, tuning the motors may help to correct this behavior. On a tablet, open the Ozobot or OzoGroove app and go to main menu -> tune up -> tune motors and follow the directions.

Using Codes

Ozobot can read a lot of codes, on paper and on tablets. There are two different kinds of codes that Ozobot can read:

1. flash codes: these codes only work on a tablet and they are the ones used in the Ozobot app in OzoDraw Challenge. These codes are the round ones and flash a sequence of colors very quickly. Ozobot stops, reads them and executes the commands.
2. static codes: these work on paper and on a tablet and are built using a sequence of short color segments.

There are a few guidelines for using the codes to ensure that Ozobot is able to read them. The Code Quick Guide is part of the materials for lesson 3 and the following is a recap:

1. Ozobot can only understand static codes if they are placed on a black line. Flash codes can be used on paths of any color.
2. In OzoDraw, drag codes from the code bar onto a black line. Make sure to align the codes with the line, otherwise Ozobot won't be able to read them. If you need to reposition them, just drag the codes to the new location. You might also have to rotate them, and rotation can be a bit tricky. There are two ways to do it:
 1. Place your thumb onto the code and your index finger next to it. Keep your thumb in place and move your index finger around the code to rotate.
 2. Place index and middle finger on either side of the code. Move both fingers in a circular motion around the center of the code to rotate.
3. Don't place codes too close to intersections or curves. If Ozobot has trouble reading a code, try placing it away from intersections or curves.
- 4+ 5. Some of the codes are to be used on line-ends (2-color codes), and the rest need a black line before and after the code to work properly.
6. For some codes, it matters if Ozobot reads them from left to right, or from right to left. Try out the snail dose/ nitro boost code for example.
7. In OzoDraw, if you want to use flash codes instead of static ones, tap on the code once. Tap another time and it's a static code again.
8. In OzoDraw, if you don't need a code anymore, long press that code and it disappears.