

Line Following Robot Teacher Quick Reference

- Watch this video to assemble the chassis: https://youtu.be/SBeGl_IgWwY
- Watch this video to learn how to use a breadboard: <https://youtu.be/6WReFkfrUIk>
- Use the PowerPoint presentation to walk your students through building the circuit one part at a time.
- Students often have trouble the first time they use a breadboard. Here are some things to watch out for (see PowerPoint and printable wiring diagram for details):
 - Always double-check to make sure parts are in the right rows.
 - Be careful that they use the correct resistors. The kit comes with four different types of resistors, each with different color-coded bands.
 - Make sure the diodes and transistors are facing the correct way in the breadboard. The circuit will not work if these parts are backwards.
 - Make sure the IR sensors are connected correctly. The small notch in one corner can be hard to see.
 - Make sure the batteries are not backwards in the battery pack. The “+” signs on the batteries should line up with the “+” signs in the battery pack.
 - Make sure parts with long skinny legs (diodes and resistors) do not bump into each other.
- To test the robots:
 - Hold the robot up off the ground
 - Turn the power switch “on” (slide it up towards row 1 of the breadboard)
 - If you see or smell smoke or the circuit feels hot, immediately turn the power switch off and check for breadboard problems
 - Hold a piece of white paper up to the IR sensors and the wheels should spin
 - Put the robot down on white posterboard and it should drive forward
 - Try putting different materials (like electrical tape, or use different color markers on white paper) in front of the sensors to see if the wheels spin (IR light is reflected) or stop (IR light is absorbed)
 - Use a material that absorbs IR light (like black electrical tape or permanent marker – but can your students discover other colors that work?) to make a line-following race course
- Troubleshooting:
 - If a wheel spins backwards, reverse the red and black wires for that motor
 - If a wheel does not spin at all, or always spins without stopping, check for breadboard errors
 - The sensors have a very short range (only a few millimeters). They will not work if they are too close to the surface (almost touching) or too far away from the surface, so you may need to adjust their height off the ground.
 - If the robot always overshoots curves, try more gradual curves, and/or making the line thicker and spacing the sensors farther apart.
 - If the robot gets stuck or stops for no reason, make sure your race course is totally flat. Posterboard with bumps or bubbles in it can cause the robot to get stuck.