

Troubleshooting the SeaPerch ROV

Grade Level: 7th-12th

Length of Lesson: 1 day

Goals:

- Students will use real-world situations to understand the importance of troubleshooting in daily life
- Students will practice troubleshooting as a problem-solving method by identifying the cause of a malfunction in a given technological system

National Science Standards:

- ETS1.A: Defining and Delimiting an Engineering Problem
- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution

Materials:

- SeaPerch ROVs
- Pool, lake, large 50-gallon tub, etc. to test ROV
- Troubleshooting Design Model Worksheet (below)

Background:

Troubleshooting is a specific form of problem solving aimed at identifying the cause of a malfunction in a system. Often the problem can be traced to a single fault, like a broken wire, a burned-out fuse, or a bad switch. Good troubleshooters are systemic in eliminating various possible explanations as they focus on the source of the problem.

Lesson: LAUNCH

Let the students test their ROVs in a body of water such as a pool, lake, or even a large 50-gallon trash can filled with water. Students should test their motors, clamping, cable connection, and circuitry. If and when a problem is found, encourage students to write it on their **Troubleshooting Design Model Worksheet**.



Lesson: INVESTIGATE

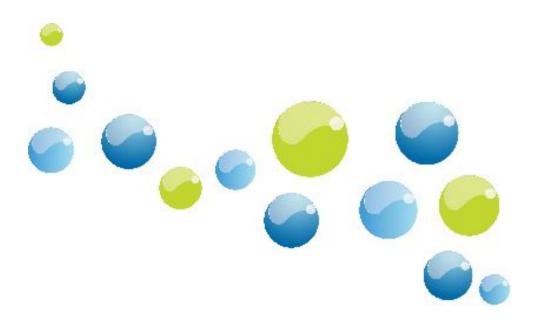
Once a problem (or problems) has been found, introduce students to the six steps of troubleshooting:

- 1. Define the problem
- 2. Brainstorm ideas to resolve the problem
- 3. Research the problem and generate ideas
- 4. Identify criteria and specific constraints
- 5. Explore possibilities to "fix" the problem
- 6. Select an approach

Students should use the **Troubleshooting Design Model Worksheet** to help them follow the correct approach to troubleshooting their ROV.

Lesson: PRACTICE

Once students have selected an approach to try, they should go through with the repair, and re-test their ROV. If the repair was effective, congratulate them on a successful troubleshooting. If not, remind students that it often takes several attempts to fix an issue, and encourage them to try again until they have fixed the issue.



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Troubleshooting Design Model Worksheet

Students will be able to troubleshoot problems with their ROV using the Troubleshooting Design Model.

1.	Describe the Problem:
2.	Generate Ideas:
3.	Select a Solution to Test:
4.	Test the Solution and Record What Happened:
5	If your solution didn't work, repeat steps as necessary and don't worry! Most scientists
٥.	troubleshoot many times before they reach a solution!

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