Testing & Troubleshooting – Troubleshooting the SeaPerch ROV

Legacy SeaPerch Resource www.seaperch.org

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 ROV
- Water source (such as a pool or 50 - 100 gallon tank)
- 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 systemmatic 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 a problem is found, encourage students to write it on their Troubleshooting Design Model Worksheet.

Lesson: INVESTIGATE

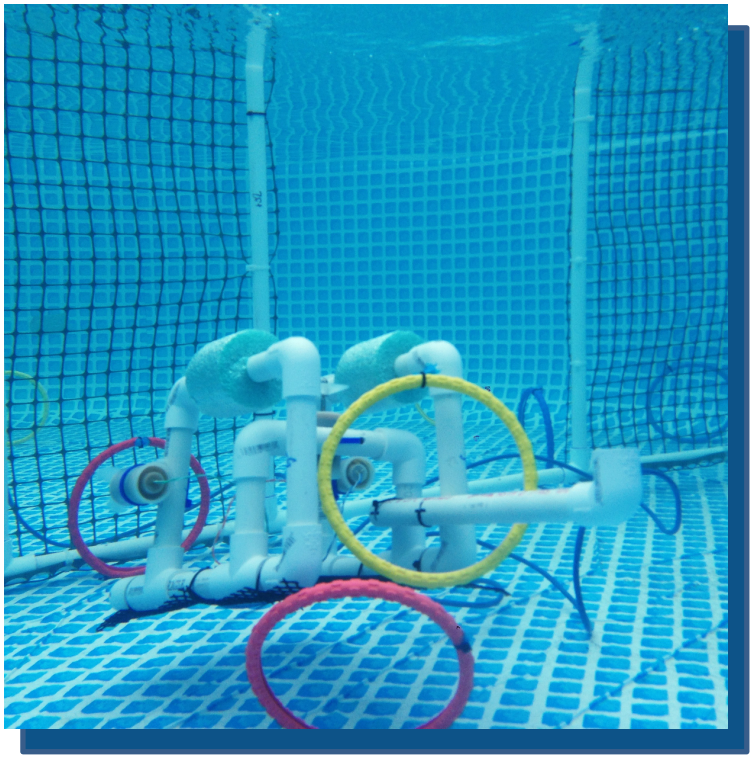
Once a problem (or problems) has been found, introduce students to the six steps of troubleshooting:

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.



Troubleshooting Design Model Worksheet

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

1. Describe the Problem:

_____

_____

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2. Generate Ideas:

_____

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_____

_____

3. Select a Solution to Test:

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_____

_____

4. Test the Solution and Record What Happened:

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5. If your solution didn't work, repeat steps as necessary… and don't worry! Most scientists troubleshoot many times before they reach a solution!