OVERVIEW

Simulation

In the Aquatic Investigators Classroom Adventure, students will be become Aquanauts for the day and join an underwater mission to learn about the ocean and its inhabitants. They will be led by Commander Carpenter, a woman from NOAA who is leading an underwater research crew aboard Seabase Ballard. Commander Carpenter will introduce students to their mission and their vehicle for the day – the Makani Kai. Commander Carpenter will need student assistance to track down a Hawaiian Monk Seal named Eric that has gone missing from the Northwest Hawaiian Islands. The students will have two goals for the Adventure: one, search for Eric; and two, understand what is happening to his environment and habitat.

To start the Adventure, Commander Carpenter will inform the students that Eric's usual home has been overrun with trash. Students will analyze trash to determine where all the trash is coming from and learn how to hopefully prevent the spread of ocean debris in the future. Each group will analyze a different piece of trash: a plastic grocery bag, a plastic food container, a plastic water bottle, and a plastic book. After learning that the trash came from far away by traveling through ocean currents, students will use a research tool to sort different types of trash after learning about trash, recycling, and compost.

Commander Carpenter will thank the students for providing their analysis and starting the beach clean-up process; however, she will inform them Eric is still nowhere to be found. The students will need to research the changing ocean to understand why Eric left his home and where he may have gone.

Each student will individually complete a rotating set of research tools. Every student will engage with research tools that focus on the food chain and ecosystem disruptors such as decreasing phytoplankton population, habitat loss, and rising ocean acidity. At each phase during the rotation, a different team will come together as a group to use a different tracking tool to narrow down where Eric is most likely to be. Each team will help track large boat activity, fish populations, shark populations, and healthy coral.

Halfway through the mission, Commander Carpenter will check-in with the students to see how their research is going and to give them some updates. As she is speaking, a seaquake will hit Seabase Ballard and puts the life of Commander Carpenter and her crew in jeopardy. As the student will learn, a NOAA rescue team is too far away to save the crew. However, they and the MOD ROV (pronounced similarly to "pod cove") on the Makani Kai are close enough to save them. Students will receive information from a programming specialist, Lawson, on Seabase Ballard who will explain to them how to program the different tools on the MOD ROV to help

solve this emergency. The entire class will come together at the Engineering Station to select the tools that should be used on the MOD ROV. After selecting the Underwater Repair Toolkit, they will break out into their teams to code the four components: an underwater vacuum that removes sediment, a metal cutter that cuts the fallen tower, a crane that moves the tower, and a welder that seals the oxygen pipe. With their collaboration and quick thinking, the students will save Commander Carpenter and her team.

After the dramatic rescue, Commander Carpenter will encourage students to return to their research to keep searching for Eric. Students will submit more data through their computers until Commander

Carpenter lets them know that their research and their work on the Eric Tracker has narrowed the search for Eric to one likely location. As the students will learn, when NOAA sends in a team to search, they will find Eric! Thanks to the students' hard work, NOAA will learn more about the ocean, Commander Carpenter and her crew will be saved, and Eric will be located. Not bad for a day's work!

Engineering Activity

Following the steps of the Engineering Design Cycle, students will be tasked with designing a trash collection device that can help clean up bodies of water. Students should work in teams to first design their device on paper. These teams do not have to be the same teams as the simulation. Then, students will build and test their design using materials commonly found in classrooms, such as paper, pipe cleaners, plastic bags, rubber bands, etc. As an additional challenge, their trash collecting machine should be able to meet project design constraints. The suggested constraints for their trash collecting machine are the following: students cannot use their hands to collect the trash but can use their hands to operate the machine, the machine must stay afloat with trash onboard, and the machine must be able to hold at least three pieces of trash. If time allows, groups should present their design to the class to explain how it works and why certain elements were added.

This activity is introduced in the software. A tool will introduce the task and shows the steps in the Engineering Design Cycle. This can be displayed as a 1:1 or projected for the whole class. After going over the Design Cycle, students spend the rest of the time designing, building, and testing their prototypes. Teachers are welcome to add additional constraints for their students during the Engineering Activity.

This activity can be done in 30 minutes to one hour or extended to longer timeframes if desired. It can be completed individually or collectively (whole class, small groups, centers, or stations) and customized with any time and space criteria that meet the needs of the instructor.

Nonfiction Science Writing Activity

In the Nonfiction Writing Activity, students will be introduced to three types of nonfiction writing: a friendly letter, a how-to paragraph, and a call to action poster. They may write about what they learned and their experience during the simulation using one of the three writing options. For example, students may write a letter to their principal about the importance of recycling, a how-to paragraph on how to create a trash removal system for the ocean, or a call to action poster inviting classmates to join a composting club at their school. Additionally, the teacher or students may create their own prompts.

Similar to the Engineering Activity, the Writing Activity is introduced in the software. There are digital graphic organizers in the software that the students can reference. If preferred, those graphic organizers may also be printed from the Teacher Resources page. Once the students have chosen their Writing Activity, they will have the rest of the time to plan and write. The students write their drafts on paper. Teachers are welcome to create additional criteria for the Writing Activity.

This activity can be done in 30 minutes to one hour, depending on schedules.