



Designing an Experiment

Grade Level: 6-8, can be adapted to high school

Time: 1 hour with possible multiday extensions to carry out research

SUMMARY

This lesson allows students to practice the scientific method. Students are presented with background information about marine debris – what it is, its origins, and current statistics. Students will engage in a brief discussion about its impacts. Afterward, students are given handouts to review the scientific process. Students are asked to come up with three research questions about the prevention or removal of marine debris. After instructor approval, the students choose one question and write a hypothesis and procedure for their experiment, as well as assess at least one obstacle to their research. Students should present to small groups about their question, what they hope to learn, how they arrived at their hypothesis, and their procedure. The lesson ends with a discussion about how to reduce marine debris via informed consumer purchases. This lesson is ideal for classes that already have some background knowledge of marine debris and the scientific method.

OBJECTIVES

- Write a research question
- Write a hypothesis
- Write an experimental procedure
- Share experimental process with a group
- Assess methods of reducing marine debris

STEM APPLICATIONS

- Design an experiment (Science, Technology)

VOCABULARY

- **Marine debris:** 'Any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes' (NOAA, 2007)
- **Independent variable:** Variable that is changed in a scientific experiment to test the effects on the dependent variable
- **Dependent variable:** Variable being tested in a scientific experiment

MATERIALS

- PowerPoint with background on marine debris and the scientific method (on NAMEPA website)
- Student Survey (attached)
- NAMEPA Plastics Pledge (page 26)

OPTIONAL EXTENSION

This lesson can be extended into multiple days for the students to carry out their research plans. The teacher can also make arrangements for the student to conduct their research outside of school time.

ACTIVITY

1. Elicit (5-7 min):

Hand out the survey to the students to assess their knowledge of marine debris and the scientific method. You can also open up the PowerPoint and go through the slides with the eight survey questions. Have the students complete the survey before finishing the PowerPoint. After about 5 minutes, choose a few students to share their answers. Review the correct answers using the answer key provided.

2. Explain (10 min):

Tell the students they will be designing an experiment about removing or preventing marine debris, or assessing the impacts marine debris has on marine wildlife or habitat. After the presentation, they should brainstorm questions they have that they would like to research. Present the rest of the PowerPoint about marine debris and the scientific method. Students should take notes during the presentation – they will need these for the next activity.

4. Elaborate (20 min):

Students can work independently or in pairs. They should brainstorm at least three research questions about removing or preventing marine debris, or assessing the impacts marine debris has on marine wildlife or habitat. An example to use could be: "What is the most common type of marine debris in the U.S.?" or "How many people would it take to effectively clear a one mile stretch of beach?" Remember, research questions need to be specific and testable. Once the students have written at least one suitable research question, have them form a hypothesis. After, they should develop a procedure. Students should use the notes they took during the presentation to write their background information.

5. Extend (10 min):

Have students get into groups of 4-5 and briefly share their plans with each other. Students should remark on the strengths and weaknesses of each other's research plans. Are all of these experiments specific and testable? How could the data collected from these experiments be beneficial in helping to prevent marine debris?

6. Evaluate (5 min):

A great way to end this lesson is by discussing ways to mitigate marine debris (reducing your waste, re-using materials, recycling, cleanups, etc.) and by having the students commit to reducing their plastic consumption by signing the NAMEPA Plastics Pledge (page 26).

DIVE DEEPER

For additional information about NAMEPA's educational programs and materials, visit www.namepa.net/education.

NOAA's Marine Debris website: marinedebris.noaa.gov.

