**Microplastics Lesson # 2. Engineering for Good**

Define the Plastic Problem | Engineering for Good

What is the specific problem, related to the impact of plastics on the environment, that you will be solving? Students will define and refine the problem--related to effects of plastic on the environment--that they investigated when making their infographics. **This is lesson 3 of 10 in Engineering for Good, a NGSS-aligned, project-based learning unit.**

[Engineering for Good Unit](https://ca.pbslearningmedia.org/collection/engineering-for-good/)

Lesson Summary

Students will define and refine the problem--related to effects of plastic on the environment--that they investigated when making their infographics.

Time Allotment

30 minutes

Learning Objectives

Students will define and refine the problem--related to effects of plastic on the environment--that they investigated when making their infographics.

Essential Question

What is the specific problem, related to the impact of plastics on the environment, that you will be solving?

Introductory Activity **INTRODUCTION/HOOK**

1. Review the [Engineering Design Process](https://ca.pbslearningmedia.org/resource/eg-design-process/et-design-process/#.WY3_HWepXIU) diagram on page 3 of the [student notebook](https://docs.google.com/document/d/1ty4W8Oi74XMOcar7IEb_I9ygnsgY7H4gv4H1VnFFDQI/edit?usp=sharing). Discuss that the first step of the process is defining the problem, so that engineers will be able to design a successful solution.

2. Explain that to define a problem, engineers answer questions about why something is a problem, who it’s a problem for, and the intended outcome of the solution. The goal is to narrow their focus on a specific problem.

3. Tell students that today they will be further defining the problem they chose for their infographics, related to a negative impact of plastics on the environment.

Learning Activities **GUIDED PRACTICE**

1. Recall the marshmallow challenge from Activity 1. As a class, answer each of the following questions: What was the problem? Why was it a problem? Who needed to solve the problem? What was the desired outcome of the solution?

2. Based on the answers to the questions above, work together as a class to design a problem statement using the following sentence frame: “\_\_\_\_\_\_\_ needs a way to \_\_\_\_\_\_\_\_\_ so that \_\_\_\_\_\_\_\_\_\_.” (Example: Each team needs a way to build a tall spaghetti structure so that it holds a marshmallow on top and doesn’t fall over.)

3. Revisit the Engineering for Good challenge: Based upon what you learned about plastics (e.g. how plastics are produced, used, disposed of, etc.), design a solution to address a negative impact of plastics on our environment.

Culminating Activity **INDEPENDENT PRACTICE**

1. In their small groups, have students define their specific problem or need by answering the following questions on page 9 of their notebooks. They can use information they gathered to create their infographics to help answer the questions.

* What is the problem?   
  *Example: Plastic microbeads from face washes don’t get filtered out by water treatment plants and end up in rivers and the oceans.*
* Why is it a problem?   
  *Example: Animals that are filter feeders, like clams and oysters, accidentally consume the microbeads. Other animals may mistake the microplastics for food and eat them. The animals can’t digest the plastics and eventually die.*
* Who is it a problem for? (Who would use your solution?)*Example: Companies that make face washes with microbeads.*
* What is the desired outcome of your engineered solution? What would success look like?  
  *Example: The outcome would be an environmentally-safe alternative for microbeads in facial cleansers.*

2. Using the answers to their questions, have students write their problem statement on the bottom of page 9 in their notebooks. They can use the following sentence frame as a guide: “\_\_\_\_\_\_ needs a way to \_\_\_\_\_\_ so that \_\_\_\_\_\_.”   
(*Example: Companies that produce face washes with microbeads need a way to make their products with an environmentally-safe material so that microbeads don’t wind up in the rivers and oceans.*)

**ASSESSMENT/REFLECTION**

Did students come up with problem statements that accurately define a problem and set up the need for a solution regarding the issue they chose?