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*For Scientists*

Energy savers

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# It’s part of CONNECT

In the race towards exams, it can be easy to forget the other goals of science education: scientific literacy and STEM careers. You can work towards these missing goals with help from CONNECT. It’s an EC-funded project offering a new kind of resource, called a **Science Action**. It’s aset of activities to integrate a real-life challenge into an existing topic and it ticks lots of boxes:

* Applies a science concept
* Teaches an enquiry skill
* Provides an authentic end of topic assessment
* Shows students how science affects their world
* Gets students interacting with a scientist or engineer (supplied by the project)
* Encourages students to talk about science with their family

## Overview of Microplastics

Everyday millions of single-use plastic items like bottles and packaging are thrown away. Microplastics are the tiny bits that form when plastic objects break down. These microscopic particles pollute our oceans, where they are a threat to marine life and can even end up inside our bodies when we eat fish, or drink water.

In the Microplastics Science Action, students imagine they are entering a design competition about microplastics in our oceans. Their challenge is to come up with a way to reduce pollution, using their knowledge of mixtures, and a scientific enquiry skill: choosing an appropriate method for an experiment or for solving a problem.

There are two activities:

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| Activity | **Learning objective** | **What students do** | **Who can be involved** |
| CARE: The challenge | Care about the issue  Understand the scientific context | Find out where the family uses single-use plastics and how they could reduce their use. | Teacher,  STEM professional  Family |
| DO: Invent | Coordinate scientific knowledge and skill in a performance assessment. | Learn about size and scale and use the enquiry skill: ‘Choose an appropriate method’ to design a filter to remove microplastics from the waste water of a washing machine. | Teacher  STEM professional |

# The activities

## CARE: The Challenge

Students are introduced to the problem of microplastic pollution. They are set a challenge – to enter a competition by designing a way of reducing ocean microplastic pollution. At home they audit their use of single-use plastics.

You could talk to students about the problem of plastic pollution, how microplastics are formed and why we are unsure about the risks they pose to human health. You could do this face to face, record a short video or talk to the students remotely.

## DO: Invent

In this activity, students learn about size and scale and practice the scientific enquiry skill: Choose appropriate methods. They design their invention and enter the competition.

It is recommended that you view the resources for this activity: **05 LESSON Microplastics DO and 06 STUDENT SHEETS Microplastics.**

There are several ways you can help students, depending on your experience:

* Explaining size and scale
* Guiding students as they discuss appropriate methods to remove microplastics from water
* Give praise and feedback to students

The teacher’s lesson plan for this activity is shown below:

|  |  |
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| Stage/purpose | **Running notes** |
| **INVENT AN IDEA**  Students discuss initial ideas | Ask the class to share some of the pledges they made to reduce their use of single-use plastic.  Use the presentation **05 LESSON Microplastics DO.**  Remind them about the competition (4) and explain that microplastics are shed from clothes when they are washed (5).  Give each small group a beaker of water that contains a small amount of glitter. Explain that this is representing water that comes out of a washing machine. Ask them to discuss in small groups how they could stop a way of microplastics escaping from washing machines. Listen to their ideas and record them (6).  Guide them to realise that they will need to use filtration. You can demonstrate this by filtering the beaker of water and glitter. But, to do this they will need to know how small microplastics are.  **The STEM professional can help the students in their discussions and explain how filtration works.** |
| **SCALE AND SIZE**  Students discuss initial ideas | Use the link to show the class a simulation that explores size and scale and different objects (https://learn.genetics.utah.edu/content/cells/scale/). Then use the slides to link this to the size of microplastics (7-10).  Give pairs of students a copy of SS1. They work through the tasks.  **The STEM professional can present slides 7-10, and/or help students with SS1.** |
| **ENTER THE COMPETITION**  Students complete the entry form | Return to the competition (11). Students now complete SS2 alone to complete the design of their invention by using the prompts on the sheet.  **The STEM professional can help students with SS2.**  Assess their answers. It should include the following:   * Design of filter: made of plastic because paper would break down in the water. To remove all microplastics the holes need to be smaller than smallest microplastic (1 µm). * Placement of filter: In a place that water containing microplastics flows through. If it is outside the machine, it is easier to empty.   How it works: Water and dissolved substances are small enough to pass through the holes in the filter, but microplastics are too large so stay in the filter. The filter would have to be emptied now and then to remove the microplastics. A good place to put them would be in the rubbish bin, so they would be less likely to enter the water supply. |

# Presenting your work

You may be asked to talk to the class about your work. Here are some tips for keeping students engaged:

* Start with an interesting visual or question
* Communicate the information as a story
* Make it interactive and ask questions

And here’s some guidance to help you keep things simple:

* Use actual examples instead of abstract ideas
* Don’t use too much data
* Check the terminology you use with the teacher

