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*For Teachers*

Microplastics

Contents

[1 It’s part of CONNECT 3](#_Toc97722284)

[1.1 Overview of Microplastics 3](#_Toc97722285)

[1.2 Involve a STEM professional 4](#_Toc97722286)

[1.3 Involve families 4](#_Toc97722287)

[2 CARE: The Challenge 5](#_Toc97722288)

[2.1 Lesson plan 5](#_Toc97722289)

[3 DO: Design 6](#_Toc97722290)

[3.1 Lesson plan 6](#_Toc97722291)

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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 offersing 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 unit 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

Across the world, millions of single-use plastic items like bottles and packaging are thrown away everyday. These plastic objects break down into tiny bits - microplastics. These microscopic particles pollute our oceans and threaten marine life. They 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 |

Microplastics integrates with a Year 7 science unit about ‘Substances & particles’. It is designed to take around two lessons. We recommend using it after teaching mixtures.

Diagram

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Yellow boxes = existing lessons. Green boxes = Microplastics activities.

## Involve a STEM professional

Microplastics provides an easy-to-use, effective approach for involving a scientist or engineer. This will give students insight into STEM careers and make the issue real.

If you are working with a STEM professional, give them the ‘Information for STEM professional’. It has full details of the activities they can support:

**DO: Invent** to help students practice the enquiry skill, by guiding students as they practice it.

The detailed running notes below describe these roles.

Some scientists can also support the first activity:

**CARE: The challenge** A scientist or engineer can talk about the problems of plastic pollution.

## Involve families

Microplastics allows you to engage parents or other family members in talking about science. This could especially benefit those students whose families have little experience of science.

**CARE: The challenge** In the ‘home’ task, families audit where they use single-use plastics in their home and decide how they could reduce their use. They discuss how easy they think this will be.

# CARE: The Challenge

Students are introduced to the problem of microplastic pollution. They are set a challenge – to enter a competition and design a way to reduce ocean microplastic pollution. They do a home activity to audit their use of single-use plastics.

If you are using a STEM professional, see the running notes**in bold**.

Advanced preparation:

* Print out a copy of **04 HOME Microplastics CARE** for each studentor make the sheets available online.

## Lesson plan

|  |  |
| --- | --- |
| Stage/purpose | **Running notes** |
| **AT SCHOOL** Introduce microplastics and the competition | Use the presentation **03 LESSON Microplastics CARE.** The students learn about microplastics and watch an optional video clip about a scientist talking about the problems they pose (4-6). The students meet an engineer, who talks about the problem of removing microplastics from the ocean and introduces the competition (7-9). The home task is set (10).  **If you are using a STEM professional they could talk about the problems of plastic pollution rather than using the video clip.** |
| **AT HOME** Families audit their plastic use | Families follow the instructions on the document **04 HOME** **Microplastics CARE**. They decide where they use single-use plastics at home and how they can use less. They discuss how difficult this is and why. |

# DO: Invent

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

If you are using a STEM professional, use the running notes **in bold**.

Print the student sheets from the document: **06 STUDENT SHEETS Microplastics.**

**SS1**: Size and scale (one per pair)

**SS2**: Competition entry (one per student)

## Lesson plan

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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 represents water coming out of a washing machine. Ask them to discuss in small groups how they might stop microplastics escaping from washing machines. Listen to their ideas and record them (6).  Guide them towards the idea of the need for filtration. You can demonstrate this by filtering the beaker of water and glitter. To do this they will need to know how small microplastics are – leading to the scale and size activity.  **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 a simulation of the size and scale or 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 describe 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 where water containing microplastics flows. 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 and so stay in the filter. The filter needs to be emptied now and then to remove the microplastics. A good place to put the waste is in the rubbish bin, so it is less likely to enter the water supply. |

