

# Learning objectives

Common Seas has worked with partners to create a set of universal Ocean Plastics Learning Objectives, utilising the frameworks developed by UNESCO and those working for Ocean Literacy. These learning objectives are listed below and are subscribed to by Common Seas Ocean Plastics Academy partners. We hope that these overarching learning objectives are useful to other individuals and organisations planning their own education programming to help a plastic waste free future.

Ocean Plastics learning objective	Lessons				
	1	2	3	4	5
<b>Cognitive learning objectives</b>					
• The learner understands the fundamental properties of plastics, including the use of additives.	✓				
• The learner understands the scope and geographical scale of plastic use and plastic pollution historically as well as current predictions.					
• The learner understands the pathways through which plastics enter the ocean and marine life.				✓	✓
• The learner understands the social, environmental and economic cost of plastics across its entire life cycle.		✓		✓	✓
• The learner can identify and evaluate ways to improve the sustainability of plastics at different stages of the product life cycle <sup>1</sup> .				✓	
<b>Socio-emotional learning objectives</b>					
• The learner can reflect on their own use of plastics, and how this use might affect the marine environment.		✓	✓	✓	
• The learner actively seeks alternative designs, behaviours and practices that reduce their contribution to plastic pollution.				✓	
• The learner can communicate the societal and environmental impacts of plastic use, referring to the scientific evidence base.			✓		
• The learner is able to influence the behaviours and practices of others in their community in terms of plastic use and management.					
• The learner can collaborate at a range of scales to campaign for the reduction of plastic pollution.					
<b>Behavioural learning objectives</b>					
• The learner is able to access and improve waste management systems in their local area.					
• The learner can plan and implement campaigns that lead to a reduction in plastic pollution at a range of scales.					
• The learner is able to evaluate media narratives about plastic pollution and present a balanced judgement to their peers.					
• The learner is able to make informed decisions as a consumer to reduce plastic pollution.					
• The learner is able to research different approaches to design, including circularity and biomimicry.					

<sup>1</sup> Including improved design, alternative materials, waste management and individual behaviour.

# Applicable standards

## National Curriculum for England Key Stage 3

KS3 Science Element of the curriculum	Lessons				
	1	2	3	4	5
<b>Materials</b> <ul style="list-style-type: none"> <li>• Properties of polymers</li> </ul>	✓	✓	✓		
<b>Energy Changes</b> <ul style="list-style-type: none"> <li>• Heating and thermal equilibrium: how a temperature difference between two objects leads to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation, and how such transfers tend to reduce the temperature difference. Use of insulators.</li> </ul>		✓			
<b>Scientific working skills</b> <ul style="list-style-type: none"> <li>• Make predictions using scientific knowledge and understanding.</li> <li>• To select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.</li> <li>• To use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety.</li> <li>• To make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements.</li> <li>• Presenting observations and other data using appropriate methods.</li> <li>• Translating data from one form to another.</li> <li>• Interpreting observations and other data, including identifying patterns and trends, making inferences and drawing conclusions.</li> </ul>		✓			
<b>Interactions and interdependencies</b> <ul style="list-style-type: none"> <li>• How organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</li> </ul>				✓	
<b>Genetics and evolution</b> <ul style="list-style-type: none"> <li>• How changes in the environment may leave individuals within a species, and some entire species less well adapted to compete successfully and reproduce, which in turn may lead to extinction.</li> </ul>				✓	
<b>Knowledge</b> <ul style="list-style-type: none"> <li>• How organisms affect, and are affected by their environment, including the accumulation of toxic materials.</li> </ul>					✓

## Lesson 1: How are plastics made?

### Overview

In this chemistry Key Stage 3 (KS3) lesson, students will learn how monomers and polymers dictate the properties of plastics. This lesson focuses on how plastics are made. Included are teacher resources for students to make their own polymer, using PVA and borax, to observe how changing the structure of a substance changes its properties.

### Learning outcomes

- State that plastics are made from oil
- Describe the steps involved in making oil
- State what a monomer and a polymer is
- Describe how changing a substance's structure can change its properties

### Resources



**Slideshow 1:**  
How are plastics made?



**Activity Overview 1a:**  
How to make slime



**Student Sheet 1a:**  
Plastic production table

**Student Sheet 1b:**  
Plastic card sort

**Student Sheet 1c:**  
How to make slime



**Thinglink:**  
Seven types of plastic

## Lesson 2: Why are plastics useful?

### Overview

In this chemistry Key Stage 3 (KS3) lesson, students investigate the different properties of plastics. In groups students design an investigation testing either thermal insulation or tensile strength. Included are teacher resources with an investigation template.

### Learning outcomes

- Describe how plastics can be both harmful and useful
- Identify independent, dependent, and control variables
- Develop investigation skills including control variables and repeats
- Evaluate results in a graph

### Resources



**Slideshow 2:**  
Why are plastics useful?



**Activity Overview 2a:**  
Plastics independent investigations



**Student Sheet 2a:**  
Plastics independent investigations

## Lesson 3: What happens after you throw it away?

### Overview

In this chemistry Key Stage 3 (KS3) lesson, students investigate rates of decay. The lesson is focused on students designing their own investigation. Included are teacher resources allowing students to test how a conventional plastic bag decays compared to a compostable bag (using a potato as a substitute), in different conditions.

### Learning outcomes

- Recognise that most plastic ends up in either landfill or the sea.
- Order materials based on the time they take to degrade.
- Describe alternatives to using plastics
- Create an investigation on how to increase the speed of decay.

### Resources



**Slideshow 3:**  
What happens to plastic when you throw it away



**Activity Overview 3a:**  
Degradation test



**Student Sheet 3a:**  
How long will it take to degrade?

**Student Sheet 3b:**  
Biodegradable plastic bags  
academic paper

**Student Sheet 3c:**  
Design a biodegrade test

**Student Sheet 3d:**  
Dr Imogen Napper's study



**External Link:**  
Inspiring Stories: Imogen Napper

## Lesson 4: How does plastic affect the environment?

### Overview

In this biology Key Stage 3 (KS3) lesson, students learn how plastics affect the marine environment. This lesson is focused on the physical harm caused by plastics to marine organisms. Included are teacher resources that promote students to become advocates for reducing plastic waste to protect our oceans.

### Learning outcomes

- Order most common types of plastic waste
- Describe how plastic waste impacts the environment
- Predict how plastic waste impacts a variety of marine organisms
- Formulate solutions to plastic waste issues

### Resources

**Slideshow 4:**

How does plastic affect the environment?

**Student Sheet 4a:**

Sources of marine plastic

**Student Sheet 4b:**

Plastics in the ocean

**Student Sheet 4c:**

Marine life cards

**External Link:**

Sea turtle with a straw up its nostril

## Lesson 5: Plastics and bioaccumulation

### Overview

In this biology Key Stage 3 (KS3) lesson, students will learn about plastics and bioaccumulation. This lesson is focused on how chemical pollutants cause harm to marine organisms. Included are teacher resources to model bioaccumulation and an orca case study.

### Learning outcomes

- State that pollutants can enter an organism's body from the environment
- Describe how energy and pollutants are passed through a food chain / web
- Evaluate whether plastics contribute to bioaccumulation
- Analyse data to identify trends

### Resources

**Slideshow 5:**

Plastics and bioaccumulation

**Mark Scheme 5a:**

Plastics and bioaccumulation assessment

**Student Sheet 5a:**

Plastics and bioaccumulation assessment

**Subject Update:**

How to: improve students online research skills