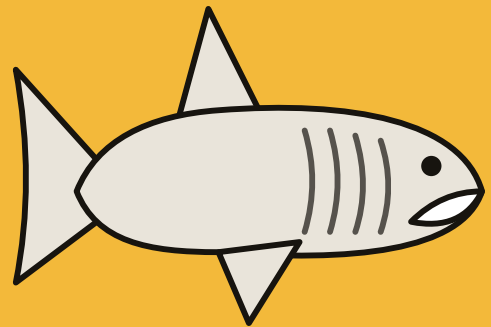


A SAVE OUR SEAS ACTIVITY BOOKLET

Plastic Detectives

Investigate where plastic comes from, where it ends up — and what we can do about it.



This booklet belongs to _____

CASE FILE

Your mission, detective

Plastic pollution is one of the biggest environmental puzzles of our time. In this booklet you'll read the evidence, crunch the data, crack puzzles and build a plan to cut plastic at your school.

Detective ID

TOP SECRET

PHOTO

Name _____

School _____

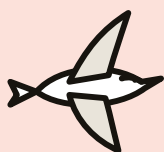
Class _____

Case opened _____

How to use this booklet

- Work through it in order, or pick the pages that fit your lessons.
- The **Species case files** page needs books or a safe website for research.
- Answers and teacher notes are on page 20.

Detective's tip



Good detectives always ask: **where does the evidence come from, and can I trust it?** Look out for the sources on each page.

Case contents

The plastic problem	3
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EVIDENCE 1 · READING

The plastic problem

Plastic has only been made in large amounts since the 1950s, but today it is almost everywhere. The world now makes **more than 400 million tonnes** of plastic every year — much of it for packaging that is used once and quickly thrown away.

Plastics are **polymers** — long chains of molecules — and most are made from **oil** and gas. They are cheap, light, strong and waterproof. Those are exactly the reasons it is so useful — and exactly why it is such a problem. It can last for hundreds of years and travels easily on wind and water.

Around the world, only about **9%** of plastic

waste is recycled. Much of the rest is buried in landfill or burned, and a large amount is **mismanaged**: dropped as litter, dumped, or lost from bins and rubbish sites.

Some of that plastic reaches rivers and seas. Scientists estimate that around **11 million tonnes** of plastic enter the ocean every year.

In the UK, households throw away an estimated **1.7 billion** pieces of plastic packaging every week. Every piece we avoid using is one that can never become litter.

Sources: OECD Global Plastics Outlook (2022); UN Environment Programme; Greenpeace & Everyday Plastic, The Big Plastic Count (2024).

Questions

1. Roughly how much plastic is made around the world every year? (1 mark)

2. Find and copy one word that means “not dealt with properly”. (1 mark)

3. Why do you think so little plastic is recycled? Give two reasons. (2 marks)

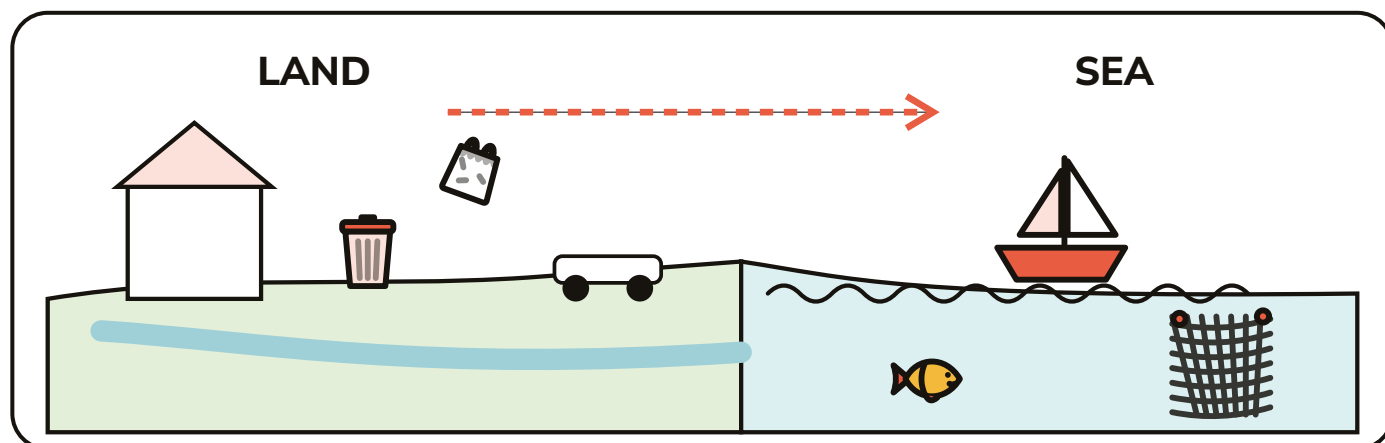
4. The writer says plastic’s strengths are also its weaknesses. Explain what this means. (2 marks)

5. Which fact in the article surprised you most, and why? (2 marks)

EVIDENCE 2 · GEOGRAPHY

Where does ocean plastic come from?

Most plastic in the sea starts its journey on land. Decide whether each source below is land-based, sea-based — or could be both (tick both boxes).



Source	Land	Sea
(A) Litter dropped in streets and parks	☐	☐
(B) Fishing nets lost or dumped at sea ("ghost nets")	☐	☐
(C) Wet wipes flushed down the toilet	☐	☐
(D) Microfibres from washing fleece and polyester clothes	☐	☐
(E) Dust worn off car tyres on roads	☐	☐
(F) Rope and crates lost from boats	☐	☐
(G) Balloons released into the sky	☐	☐
(H) Plastic pellets ("nurdles") spilled from factories, lorries or ships	☐	☐
(I) Rubbish blown out of overflowing bins	☐	☐

Think about it

How can plastic dropped in a city a long way from the coast end up on a beach? Use the words **drain**, **river** and **wind**.

Pick one source

Choose a source from the table. Suggest one way to stop that plastic reaching the sea.

EVIDENCE 3 • SCIENCE

Microplastics: the hidden plastic

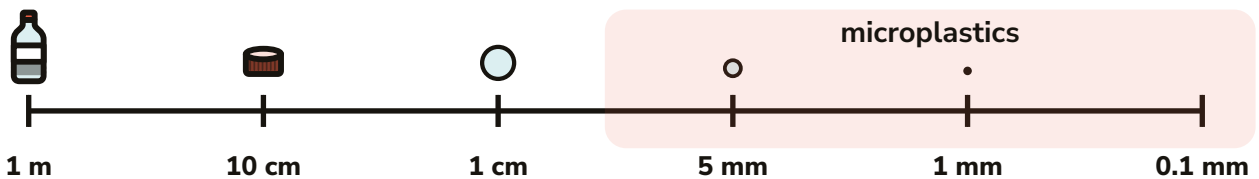
Primary microplastics

Made tiny on purpose, like the plastic pellets (**nurdles**) used to make plastic products, or glitter. Plastic microbeads in rinse-off products like face scrubs were banned in the UK in 2018–19.

Secondary microplastics

Created when bigger plastic breaks apart — bottles cracked by sunlight and waves, fibres rubbed off clothes in the wash, or dust worn off tyres.

How small is “micro”? Microplastics are pieces smaller than 5 mm.



Hidden plastic hunt

Plastic hides in surprising places. Does each item usually contain plastic? Tick **yes**, **no** or **it depends**.



Craft glitter

☐ Yes ☐ No ☐ Depends



Polyester fleece

☐ Yes ☐ No ☐ Depends



Wet wipes

☐ Yes ☐ No ☐ Depends



Crisp packet

☐ Yes ☐ No ☐ Depends



Takeaway paper cup

☐ Yes ☐ No ☐ Depends



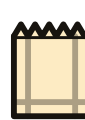
Tea bag

☐ Yes ☐ No ☐ Depends



Wooden pencil

☐ Yes ☐ No ☐ Depends



Paper bag

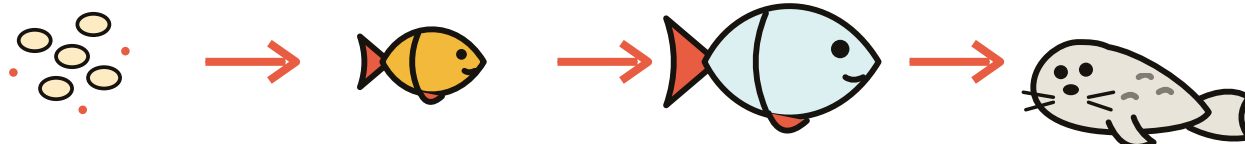
☐ Yes ☐ No ☐ Depends

Detective question:

Which of your answers were you least sure about? How could you find out?

EVIDENCE 4 • SCIENCE

Plastic in the food chain



Zooplankton

Small fish

Mackerel

Grey seal

Microplastics are so small that tiny animals called **zooplankton** can swallow them. Small fish eat the zooplankton, bigger fish eat the small fish, and so on up the food chain.

In a study at the University of Exeter and Plymouth Marine Laboratory, scientists found microplastics in the droppings of captive grey seals — and in the wild-caught mackerel they had been fed. It was evidence that plastic can pass from prey to predator. Scientists are still researching how much plastic moves up food chains, and what harm it causes.

Source: Nelms et al., *Environmental Pollution* (2018).

1. What do the arrows in a food chain show? (1 mark)

2. Explain how microplastics eaten by zooplankton could end up inside a grey seal. (3 marks)

3. Why might it be hard for scientists to prove exactly where the plastic inside an animal came from? (2 marks)

4. Humans eat fish too. Write one question a scientist might want to investigate next. (2 marks)

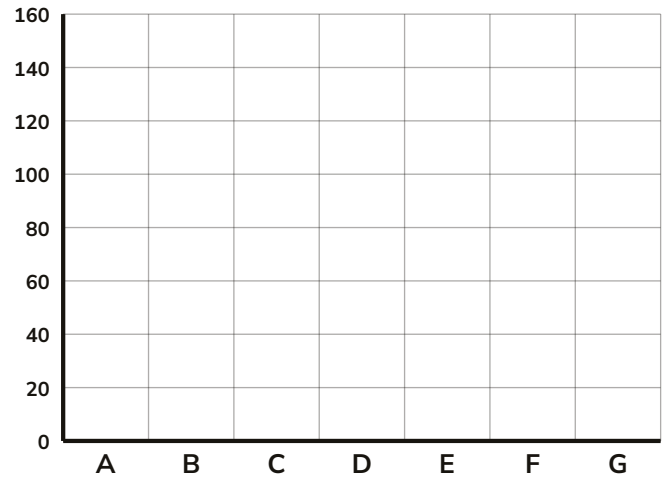
EVIDENCE 5 · MATHS

Data detective: beach survey

Volunteers counted the litter along 100 m of beach. Draw a bar chart of the results (label bars A–G in table order), then answer the questions.

Item (A–G)	Number
Plastic & polystyrene pieces	150
Crisp & sweet wrappers	70
String & rope	60
Caps & lids	50
Cigarette stubs	40
Drinks bottles	20
Cotton bud sticks	10
Total	400

Bar chart



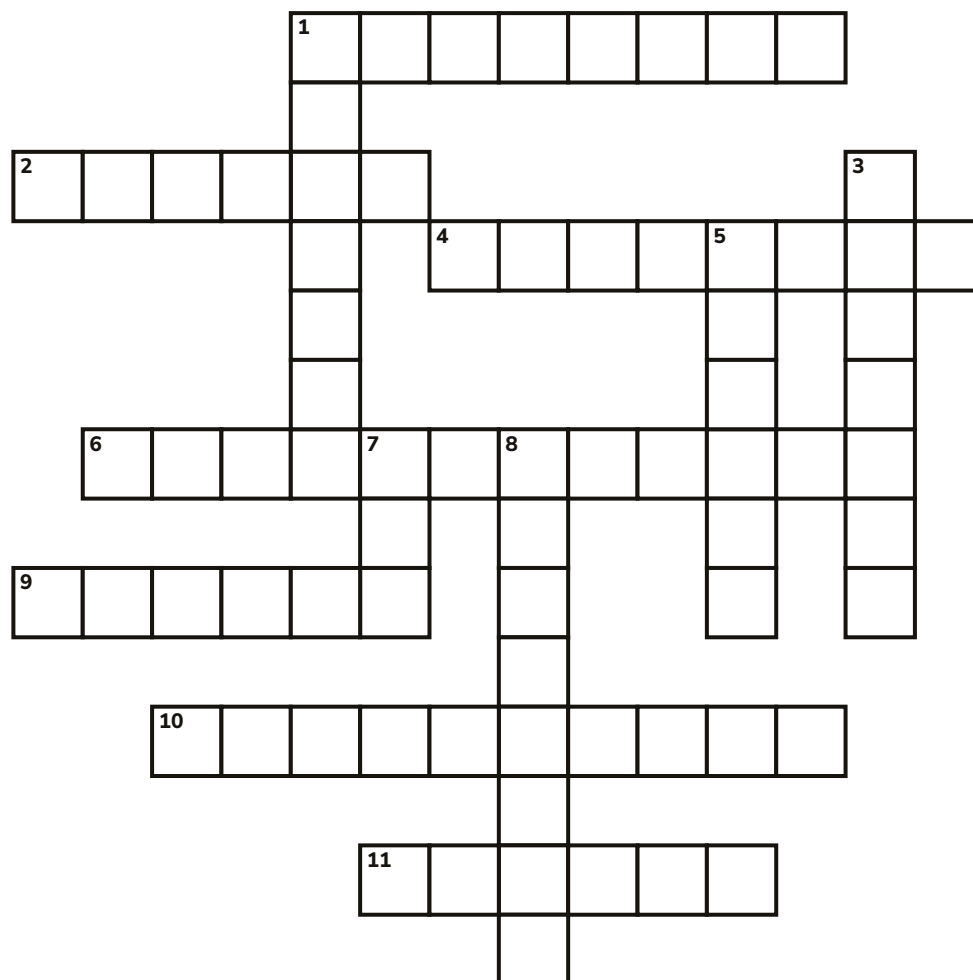
Example data for practice, in a similar pattern to real UK beach surveys.

1. What percentage of all the items were plastic & polystyrene pieces? (1 mark)
2. What fraction of the items were caps & lids? Give it in its simplest form. (1 mark)
3. Write the ratio of wrappers to drinks bottles in its simplest form. (1 mark)
4. What is the mean number of items per category? Round to one decimal place. (2 marks)
5. Which category is most likely to have come from fishing boats? Explain why. (2 marks)
6. Suggest why small plastic pieces are the biggest category. (2 marks)

PUZZLE

Plastic detective crossword

Most of the answers can be found somewhere in this booklet.



Across

- 1 Tiny drifting living things at the start of many ocean food chains (8)
- 2 A tiny plastic pellet used to make plastic products (6)
- 4 Fishing net lost or abandoned at sea (5,3)
- 6 A piece of plastic smaller than 5 mm (12)
- 9 Fill a container again instead of buying a new one (6)
- 10 Tiny thread shed when synthetic clothes are washed (10)
- 11 UK seabird used to check how much plastic is in the North Sea (6)

Down

- 1 A long chain of repeating molecules; all plastics are made of these (7)
- 3 Turn waste material into something new (7)
- 5 Reptile that can mistake a floating bag for a jellyfish (6)
- 7 Fossil fuel that most plastic is made from (3)
- 8 A site where rubbish is buried in the ground (8)

MATHS

Does the swap pay off?

Reusable swaps often cost more at the start. Use maths to find out whether they save money — and plastic — in the long run.

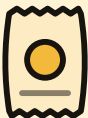


Sam buys a **70p** bottle of water every school day. A reusable bottle costs **£8**, and there's free tap water at school. There are **190** school days in a year.

1. After how many school days will the reusable bottle have paid for itself? (2 marks)

2. How much money would Sam save in one school year after buying the reusable bottle? (2 marks)

3. If all 30 pupils in Sam's class made the same swap, how many plastic bottles would they avoid in a year? (1 mark)



A family buys a multipack of **6** individually wrapped snack bars every week. Instead, they could pack loose fruit or home-made snacks in a lunchbox.

4. How many wrappers would the family avoid in a year (52 weeks)? (1 mark)

5. Why might the swap not be possible or fair for every family? Give one reason. (2 marks)

Your own swap calculator

Single-use item	Reusable swap	Uses per week	Items saved per year

LOGIC

The beach clean mystery

Four friends each helped at a beach clean at a different beach in Britain, and each found mostly one kind of litter. Use the clues to work out who went where and what they found.

The beaches: Whitby (England) St Ives (England) Tenby (Wales) Oban (Scotland)

Clues

- 1 The person who found mostly rope was at Oban.
- 2 Chloe did not go to Oban or Whitby.
- 3 Ben found mostly cotton buds.
- 4 Dev went to a beach in England, but not St Ives.
- 5 The person at Tenby found mostly crisp packets.

Tip: put a ✓ in the grid when something is true and a ✗ when it can't be.

	Whitby	St Ives	Tenby	Oban	Bottle caps	Crisp packets	Rope	Cotton buds
Amara								
Ben								
Chloe								
Dev								
Bottle caps								
Crisp packets								
Rope								
Cotton buds								

Case solved

Friend	Beach	Found mostly
Amara		
Ben		
Chloe		
Dev		

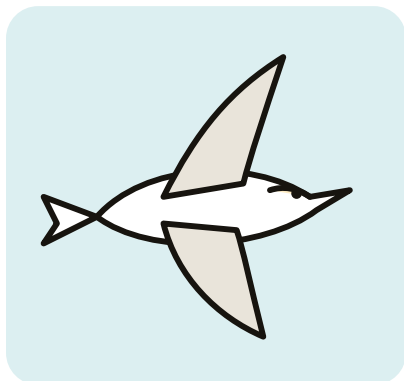
Detective challenge

Write your own extra clue that would still be true. Would the puzzle work if you took away clue 2? Explain.

RESEARCH

Species case files

Scientists use some animals to measure how polluted the sea is. Read the example case file, then research a UK sea animal of your own.



Northern fulmar

EXAMPLE

Type	Seabird, related to albatrosses
Wingspan	Just over 1 metre
Where	North Atlantic; nests on UK cliffs
Diet	Fish, squid and zooplankton caught at the sea surface
Plastic link	Fulmars feed at the surface and often swallow floating plastic. Scientists check the stomachs of fulmars found dead on North Sea beaches to measure how much plastic is in the sea.
Amazing fact	Fulmars can spit a smelly oil at predators that come too close to their nest!

DRAW IT

Name:

Type	
Size	
Where	
Diet	
Plastic link	
Amazing fact	
Source	

Research tip: Good starting points for safe research include the Marine Conservation Society, The Wildlife Trusts and the RSPB websites. Always record where your information came from.

CAMPAIGN

Marine Wildlife Day pitch

Every year on **16 April**, Save Our Seas announces one marine animal to celebrate on Marine Wildlife Day. Which animal should be next? Make your pitch!

My animal is...

Three reasons it should be chosen

1

2

3

Design a badge**How does plastic pollution affect your animal – or its food or home?**

Campaign slogan

Hashtag#

Three ways your school could celebrate

•

•

•

SKETCH A POSTER OR SCHOOL ASSEMBLY SLIDE FOR YOUR ANIMAL

INVESTIGATION

Home plastic audit

For one week, keep a tally of every piece of single-use plastic your household throws away or recycles. Then analyse your evidence.

Type of plastic	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
Drinks bottles								
Food wrappers & packets								
Pots, tubs & trays								
Bags & film								
Other								
Daily total								

1. Which type of plastic did your household use most? (1 mark)

2. On which day did you use the most plastic? Why do you think that was? (2 marks)

3. Estimate how many pieces your household might use in a whole year. Show your working. (2 marks)

Set a reduction target

Choose one type of plastic to cut down on next week.

We will reduce _____

by swapping to _____

Target: from _____ to _____ a week

Week 2 result

Teachers: Some families have fewer choices about packaging than others. The aim is to notice patterns and try one realistic change, not to judge anyone's bin.

EVIDENCE 6 • SCIENCE

Can it be recycled?

Many plastic items have a number inside a triangle. It tells you what type of plastic it is — but **not** whether it can be recycled where you live.

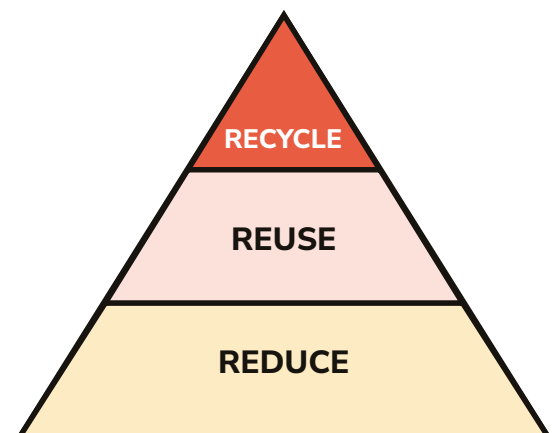
	Type	Found in	Collected from UK homes?
	PET	Drinks bottles, fruit punnets	Usually
	HDPE	Milk bottles, shampoo bottles	Usually
	PVC	Pipes, some blister packs	Rarely
	LDPE	Carrier bags, bread bags, film	Not yet everywhere (English councils by 2027) — or use supermarket drop-offs
	PP	Yoghurt pots, margarine tubs, bottle tops	Usually (all English councils from 2026)
	PS	Polystyrene cups and takeaway boxes	Rarely
	Other	Mixed plastics, some bioplastics	Rarely

Collections vary between councils — always check your local council's website. In the UK, look for the “Recycle” or “Don’t recycle” label on packaging.

1. Find three plastic items at home or school. Write down their numbers and what they are. (3 marks)

2. Why is it better to *reduce* and *reuse* than to recycle? (2 marks)

The waste hierarchy



The widest part is the best option. Recycling is good — but using less in the first place is better.

ENGLISH

Write to your headteacher

Persuade your headteacher to make one change that would cut single-use plastic at school. Use evidence from this booklet.

1. Your request

What exactly do you want to change?

2. Your evidence

Facts, figures or your own survey results.

3. The other side

What might be difficult? How could it be solved?

Sentence starters: I am writing to ask... Did you know that... Firstly, ... Furthermore, ...

Some people might argue... however...

I would like to suggest that...

Thank you for considering...

Date _____

Dear _____,

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins or other markings on the paper.

Yours sincerely, _____

DESIGN & TECHNOLOGY

Invent a plastic catcher

Engineers around the world are inventing ways to stop plastic reaching the sea. Now it's your turn.

Real inventions for inspiration:

A drain filter that catches litter before it washes into rivers

A washing machine filter that traps microfibres from clothes

A river barrier that guides floating plastic to the bank

LABELLED DIAGRAM OF MY INVENTION

1. What is it called, and what problem does it solve? (2 marks)

2. How does it work? (2 marks)

3. What materials would you use, and why? (2 marks)

4. What could go wrong? How would you test it? (2 marks)

ORACY

Debate: ban single-use plastic?

The motion: “All single-use plastic should be banned.” Use the evidence cards to build arguments on both sides, then hold a class debate.

MEDICAL USE

Syringes, gloves and drips are often single-use plastic because they must be completely clean.

ACCESSIBILITY

Some disabled people need bendy plastic straws to drink safely.

FOOD WASTE

Plastic packaging can keep food fresh for longer, which means less food is thrown away.

COST

Reusable swaps can cost more up front, which is harder for some families.

LITTER

Single-use items are some of the most common things found on UK beaches.

CHANGE WORKS

After England's carrier bag charge began in 2015, sales of single-use bags in major supermarkets fell by more than 95%.

For the motion

Against the motion

Before the debate I was: ☐ For ☐ Against ☐ Not sure

After the debate I was: ☐ For ☐ Against ☐ Not sure

The argument that made me think most was:

TAKE ACTION

Our plastic action plan

Detectives don't just solve cases — they make things better. Plan one plastic-cutting project for your class or school.

Our goal

Make it SMART

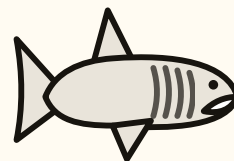
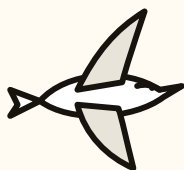
S Specific What exactly will we do?	
M Measurable How will we know it worked?	
A Achievable Can we really do it?	
R Relevant How does it cut plastic?	
T Time-bound By when?	

Who needs to help?

How will we tell people?

Progress tracker

Date	What happened



SAVE OUR SEAS CERTIFICATE

Plastic Detective

This certificate is proudly awarded to

for investigating the evidence on plastic pollution and taking
action to protect our seas.



Signed

Date



FOR TEACHERS

Answers & notes

The plastic problem (p.3)

1) More than 400 million tonnes. 2) mismanaged. 3) e.g. many plastics are mixed or dirty; some types can't be recycled; collection isn't available everywhere; new plastic is cheap. 4) The same properties that make it useful (strong, long-lasting, light) mean it persists and spreads. 5) Own answer.

Sources (p.4)

Land: A, C, D, E, G, I. Sea: B, F. Both: H. Most ocean plastic is thought to come from land-based sources.

Hidden plastic (p.5)

Yes: glitter (most), polyester fleece, crisp packet, takeaway paper cup (plastic lining). Depends: wet wipes (many still contain plastic; England bans selling them from May 2027 and the other UK nations are bringing in similar rules), tea bags (some are sealed with plastic). No: paper bag, wooden pencil (though its paint or rubber may contain some plastic — good for discussion).

Food chain (p.6)

1) The direction energy (food) passes. 2) Plankton eaten by small fish, eaten by mackerel, eaten by seals — plastic travels inside prey. 3) Animals move and eat many things; plastic enters from water too; hard to trace particles. 4) Own answer.

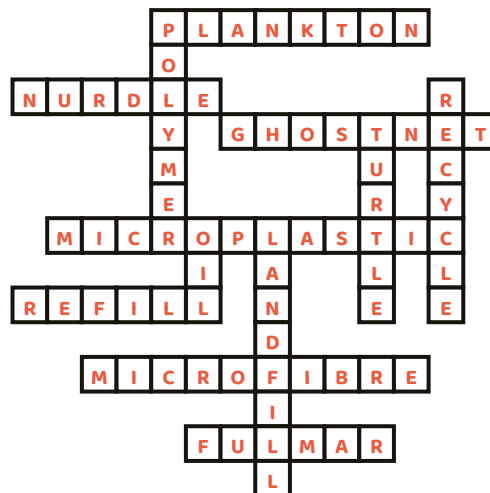
Beach survey (p.7)

1) 37.5% 2) $50/400 = 1/8$ 3) $70:20 = 7:2$ 4) $400 \div 7 = 57.1$ 5) string & rope — fishing boats lose or cut off line, nets and rope 6) Bigger items break into many smaller pieces.

Swap maths (p.9)

1) 12 days ($8 \div 0.70 = 11.4$) 2) $190 \times £0.70 = £133$, minus £8 = **£125** 3) $190 \times 30 = 5,700$ 4) $6 \times 52 = 312$ 5) e.g. cost, time, allergies, access to shops.

Crossword (p.8)



Logic puzzle (p.10)

Amara – Oban – rope; Ben – St Ives – cotton buds; Chloe – Tenby – crisp packets; Dev – Whitby – bottle caps. Without clue 2, Chloe could be at Oban, so the puzzle would not have one answer.

Notes & curriculum links

- **Science:** materials, food chains, evidence and working scientifically.
- **Geography:** human impacts, rivers and oceans.
- **Maths:** percentages, fractions, ratio, mean, money.
- **English:** reading, persuasive letters, debate.
- **PSHE / citizenship:** taking responsible action.

Encourage pupils to check sources. Facts are correct to the best of our knowledge at the time of writing; figures such as decomposition times are estimates.

About Save Our Seas

A UK campaign started in 2022 to cut single-use plastic from schools and homes before it reaches our seas. saveourseas.org.uk · info@saveourseas.org.uk