The Correspondence School Te Kura-a-Tuhi

science

pūtaiao

Plastics
Ngā kirihou

97/1

SCL319

Plastics

Ngā kirihou

How to do the work Me pēhea te whakamahi

You will
- find out about plastics
- test them
- investigate them.

You have four hours to do this work.

You need Whakaarotia ēnei

- three or four plastic bags
- a collection of plastics like bottles, cups, toothbrushes, spoons.

Assessment Aro matawai

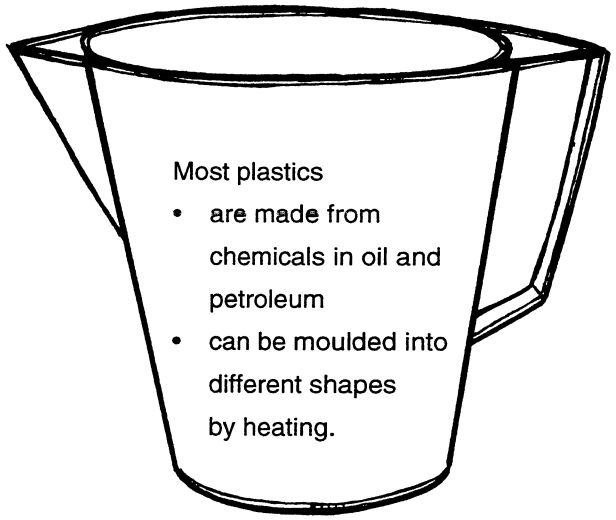
Your teacher will be looking to see how well you
- tested plastics
- designed an investigation into the properties of different plastics.

ngā rārangi kōrero
contents

1 What are plastics? ♻

He aha ngā kirihou?

Look around you to find as many plastic things as you can.
List them here.



How do you know the things you found were plastic?
What were they like?

_____

_____

What was the same about them?

_____

_____

_____

What was different?

_____

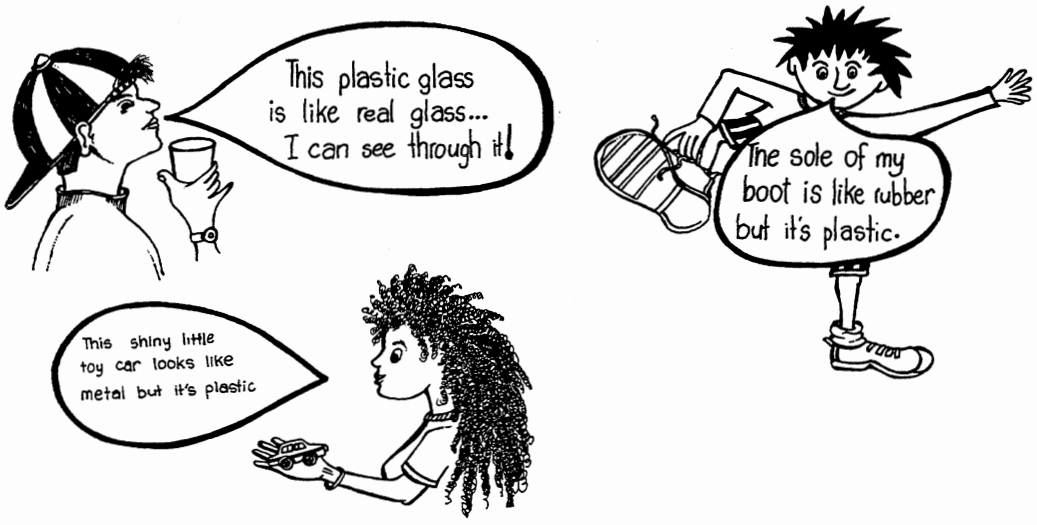
_____

_____

◗ Look at the back for ideas.

Compare plastic with another material

Plastic can act like other materials.

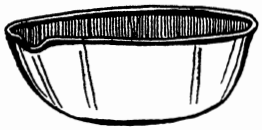


Find out about plastics by doing some tests.
You need two objects, the same size with the same use.
One is plastic, one isn't.
You could use

an old china cup

and a plastic mug

a steel bowl



and a plastic bowl.

Test their different properties by

- scratching them
- tapping and listening to them
- weighing them
- feeling them
- filling them with water
- dropping them.

Make a chart on the next page.
Fill it in as you do the tests.

Make your tests fair by doing exactly the same thing to each object.

	ceramic	Plastic
Source	rings	dull thud
Scratch	.....	.....
drop	b.....	.....

Draw your chart here.

◗ Your teacher will look at your work.

Mā tō kaiako ō mahi e tirotiro

Turn to the back to read **"The History of Plastics".**

Plastics have taken the place of metals and other materials.
Look closely at this picture of a kitchen in the 19th century.

List the things you spot that are made of

wood	metal	glass	iron

◗ Turn to the back for ideas.

Study the picture of a kitchen now.

List 10 plastic things that might once have been made of other materials.

◗ Turn to the back for ideas.

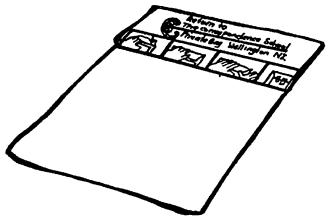
2 Test plastic bags ♻

Te whakamātau i ngā kirihou

Plastic bags are usually made for special jobs.
Your Correspondence School bag is especially made to carry lots of paper and other things in the post.

It is
- strong
- waterproof
- light
- smooth.

It lasts a long time.



Choose 2 other sorts of plastic bags.

You could choose
- a supermarket bag
- a bag from a clothing shop
- a rubbish bag
- a lunch bag.

Write the special job each bag is designed to do.

The _____ bag is designed to _____

_____

It needs to be _____

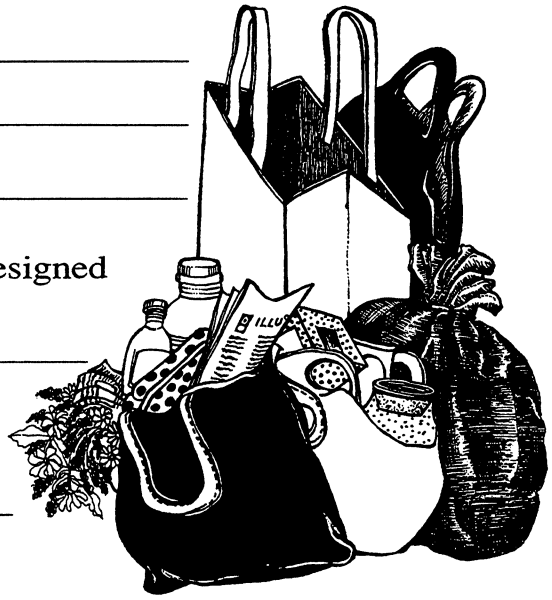
_____

The _____ bag is designed

to _____

It needs to be _____

_____

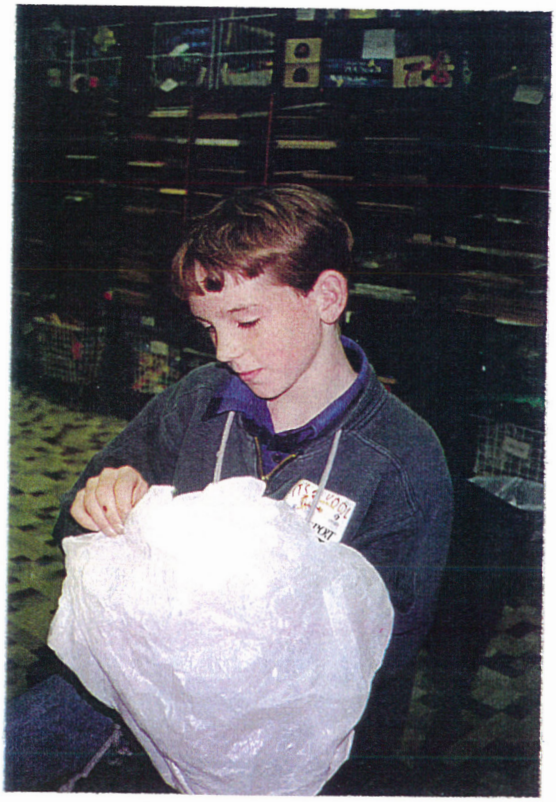


Think of some ways to test your bags to find out how well they do each of these jobs.

Two Correspondence School students, David Lourie and Michael Ward test a plastic shopping bag to see if it will carry a heavy load of groceries.

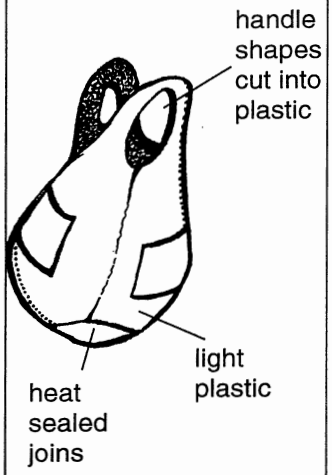
David tests plastic bags under a running tap to see how waterproof they are.

Look carefully at
sides
handles
bottom
seams.



Michael checks the bottom seam of a supermarket bag.

David and Michael charted their findings like this.

Type of bag	What the bag needs to do	How I tested this	What happened?
Supermarket bag 	The bag needs to be strong enough to carry a load of groceries. Have handles which don't break or slip and are comfortable to hold. Stop things leaking/spilling.	I filled a bag with things from the pantry and walked round the house. Put water in the bag.	Takes a heavy load easily. Doesn't leak if held upright. Handles cut hands if load is really heavy. Doesn't leak if held upright.
Clothing shop bag 	Keep clothes clean on short trips. Carry light clothing only. Be waterproof. Advertise the shop I bought from.	Carried a pair of jeans round the house. Walked under the sprinkler to see how water-proof it would be in the rain.	Jeans stayed clean and dry and in shape. Waterproof as long as I hold handle together. I can use the bag again so the shop name will be seen by more people.

Record your results for each bag on this chart.

Type of bag (draw and label it)	What my bag needs to do	How I tested this	What happened?

Your conclusion

Decide whether each bag is suitable for its job.
Give reasons.

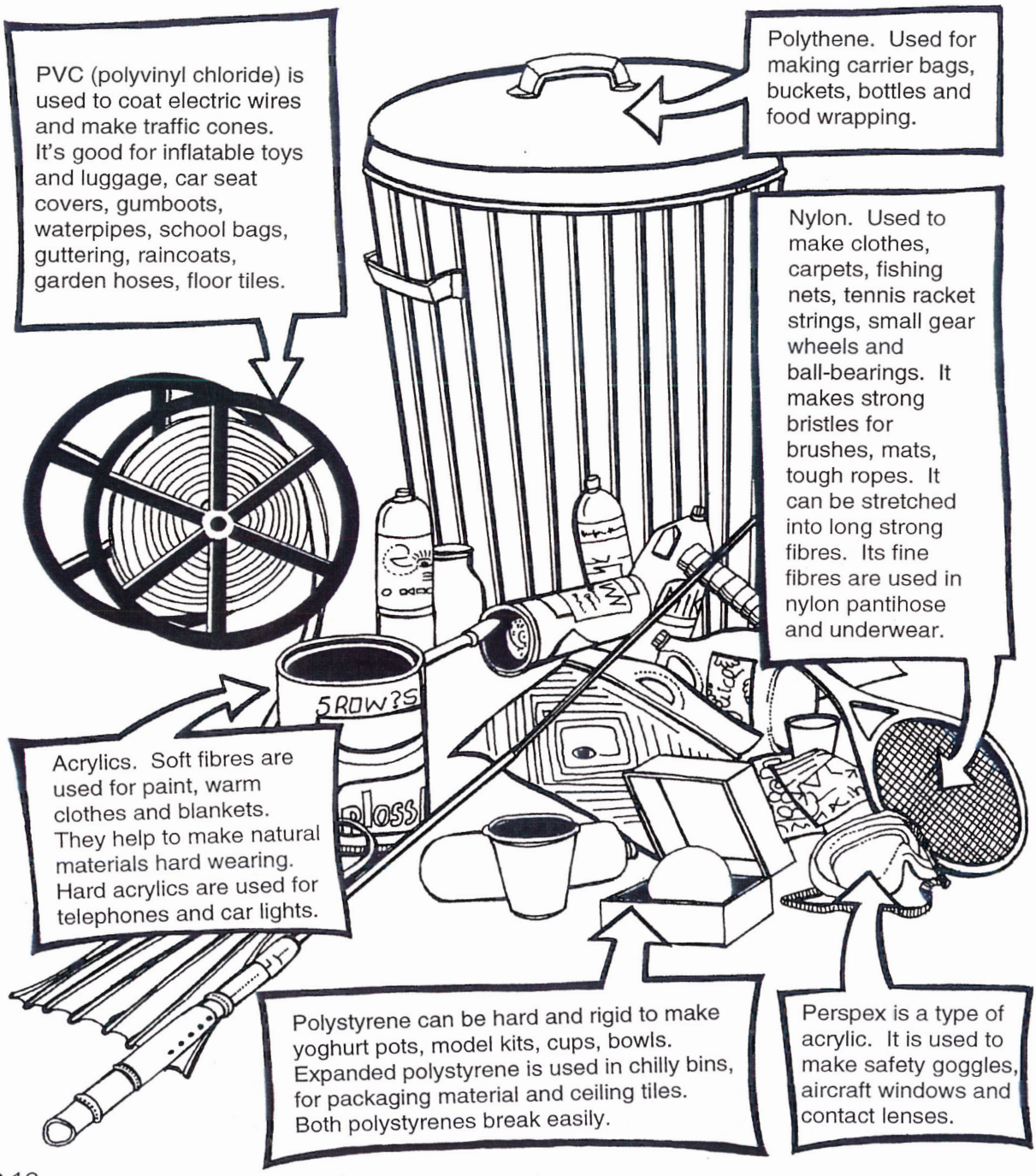
My conclusion

▶ Your teacher will look at this.

3 Classify plastics

Me whakarōpū ngā kirihou

There are many different kinds of plastics.
Look at this picture of some with their proper names.

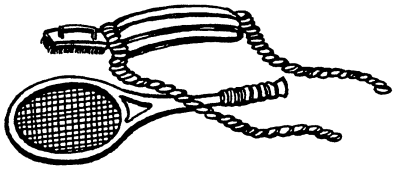
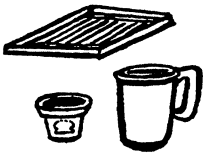


Your plastics investigation

Choose four of the plastics in the picture.
You could choose PVC, acrylic, polystyrene, polythene, Nylon or perspex.

Investigate to find out what is the same about each.

Select at least three things in each type, to test.
Do one test on each thing.
You might choose

Types of plastic
Polythene • bucket • rubbish tin • bowl 
Nylon • swing rope • nail brush • tennis racquet strings 
Polystyrene (hard) • meat tray • yoghurt pot • throwaway cup 
PVC • gumboots • raincoat • school bag 

Test each item the same way.
You could find out which group of plastics is best for

- keeping things dry
- keeping things cool or warm.

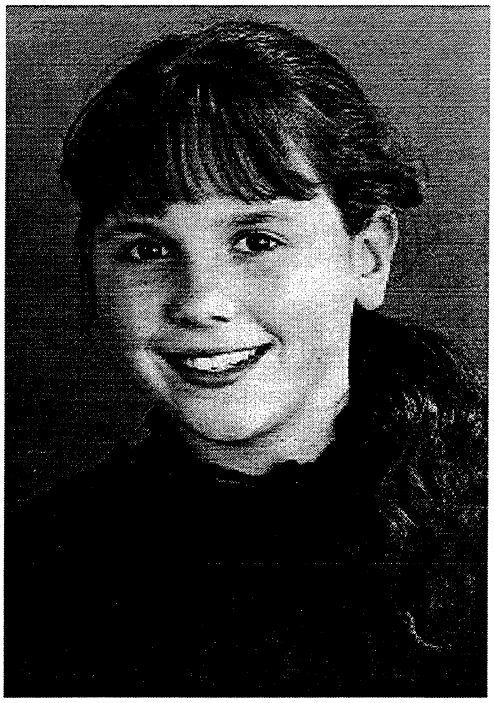
Which group of plastics

- breaks most easily
- bends most easily
- burns most easily.

(You will need permission to burn plastic. Kia tupato!)

Danielle White decided to see how easily hard polystyrene breaks.

I pulled each thing with both hands.
The cup cracked.
The yoghurt pot cracked.
The tray snapped in half.



When she tested polythene the same way she had quite different results.

The bowl bent but didn't break.
The cups didn't even bend.
The rubbish bucket couldn't be pulled apart.

Danielle made a chart to show her findings.

Plastics	Do they break?		
Hard polystyrene	cup	yoghurt pot	tray
Polythene	bowl	cup	rubbish bucket

Here's what Danielle found out.
She wrote this conclusion.

Attach the chart to this page.

> The plastics I tested were hard polystyrene, polythene, perspex and nylon. The only plastic I could break by pulling was hard polystyrene. The others were too strong. They would stay the same for longer.

List the plastics and the three objects in each group you decided to test.

Types of plastic

I chose these objects to test.

Plastic			
_____	•	•	•
_____	•	•	•
_____	•	•	•

What test did you do?

I wanted to find out _____

_____

I tested the plastics by _____

_____

Make your own chart on spare paper about the tests you did and what happened to each plastic.

Write your conclusion too.

◗ Your teacher will check your chart.

4 Plastic pollution ♻

Kirihou tūkinotanga

Plastic is everywhere
You see it in places where it's been dumped.
Now it's rubbish. And it's rubbish that lasts a long time.

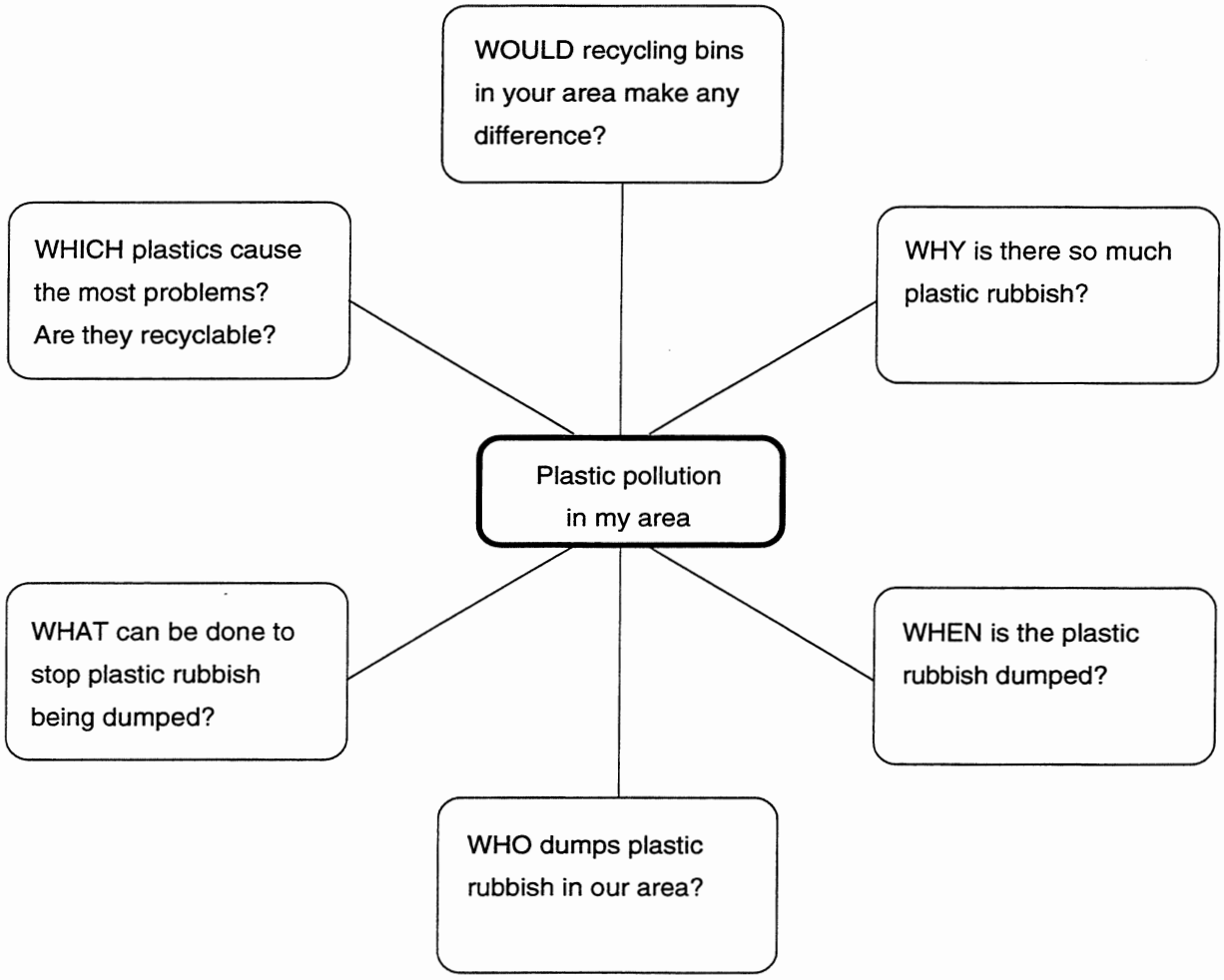
Look at roadsides, sportsgrounds, bus stops, railway stations, beaches.
List plastic rubbish dumped in areas near you.

_____ _____

_____ _____

_____ _____

How might you answer these questions?



Think of a solution to the problem of plastic pollution.
Ask other people for their ideas.

◗ Turn to the back for some ideas.

Write or **draw** and **label** one way you've thought of to deal with the problem of plastic pollution.

◗ Your teacher will look at this.

Possible answers
He whakautu pea

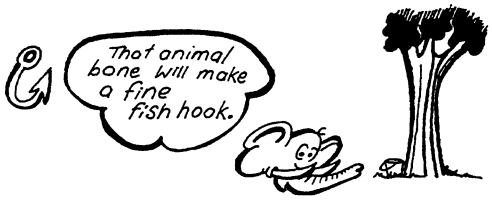
whārangi

3 What are plastics?

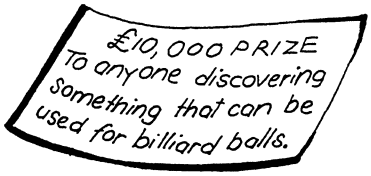
You could have listed your green plastic bag, ballpoint pen, scissor handles, tape recorder, glue pot, lampshades, chairs, toys, cassettes, buckets, brushes.
Plastic can be soft, like nylon pantihose.
It can be hard like your telephone.
It can be coloured like combs, toys and buckets.
It can be bendy like your ruler or clingwrap.
It can be stiff like your ballpoint pen or a plastic chair.
You can see through some plastics like measuring jugs, plastic glasses.

5 The history of plastics

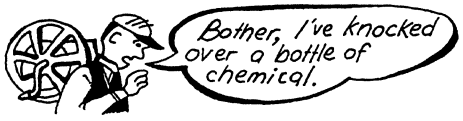
In the beginning people used natural materials.



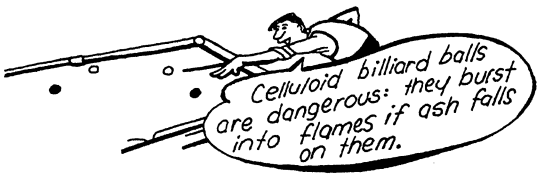
1863 Ivory became scarce.



In England in 1862 Alexander Parkes developed the first plastic.



In America in 1869 John W Hyatt made celluloid which was the first manufactured plastic.



Celluloid was used for all sorts of things, but it was dangerous!

In 1909 Dr Leo Bakeland made Bakelite a safer plastic than celluloid.
Bakelite is used in many things.

When World War 2 began in 1939 rubber plantations were no longer able to supply rubber. Plastics were manufactured.

Further kinds of plastics were developed.

Today: There are lots of different kinds of plastics, used in all sorts of things.

6 Things made from wood could be table, chair, bench, cupboards, spoons, toys.
Things made from metal could be cutlery, toys, parts of light fittings, handles.
Things made from glass could be light fittings, bowls, glasses.
Things made from steel could be the oven, taps, cutlery.

7 Plastic things that might once have been made of other materials could be lightshade, apron, handles, beater, scales, dishes, bowls, chilly bin, pen, bucket, toys, bags, clock, watch, jugs.

Plastic pollution

17 The good thing about plastic is that it's

- strong
- flexible
- light

and lasts a long time.

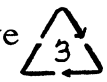
The problem with plastic is that it doesn't wear out. So if you dump it, it stays where it's dumped.

Things that rot and can be broken down by living bacteria are biogradable. Plastic is not biodegradable. It doesn't break down and become part of the earth. Still, some plastics can be used again. They can be recycled.

You can tell which plastics can be recycled.

There is a sign on most of them.
It looks like this.

Each kind of plastic has a number but 1, 2, 3 and 4 are the ones usually recycled. You will probably see  on clear drink bottles.

You will see  on ice cream containers, milk bottles and supermarket bags.
PVC things like dishwashing bottles have 

Bread and drycleaning bags have 

There are recycling bins at rubbish tips. If you live in the city your plastic can be collected for recycling.

Recycling

The good news is that scientists are inventing new plastics which will break down and disappear.

Acknowledgements

Every effort has been made to acknowledge and contact copyright holders. The Correspondence School apologises for any omissions and welcomes more accurate information and contact.

Photo: Holding a glass up to light, by Judith Hunter, Wellington, NZ: The Correspondence School.
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Photo: David Lourie and Michael Ward, by Judith Hunter.
Used by permission

SCL319 Checkpoint
Taupeka matawai

My work	☺	😐	☹	Teacher's comment
I decided which plastic things might once have been made of other materials.				
I investigated different plastics.				
I decided how to solve the problem of plastic pollution.				

Supervisor and student comments