**ACTIVITY: Determining the properties of plastic and glass**

**Activity idea**

In this activity, students examine a range of recycling items, identify and record the properties and then explore a range of ways of classifying the items.

By the end of this activity, students should be able to:

* make close observations using a range of senses
* record their data in a table to support making comparisons
* use a variety of ways to group items on the basis of similarities in their properties.

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# For teachers

During this activity, support students to make scientific observations and make classification decisions based on the data collected.

## Introduction/background

This activity is designed to give students experience in making close observations and to use these in making classification decisions. Students will explore different ways of classifying according to the purpose of the classification.

Scientists classify objects using a variety of criteria depending on the focus of their inquiry. As an example, one scientist might classify possums based on their fur for farming/textile purposes while another scientist might classify possums on their ability to avoid traps.

## What you need

* Copies of the student handout [Observing plastics and glass](#_heading=h.tyjcwt)
* Printed or digital copies of the [resin identification code chart](https://www.sciencelearn.org.nz/images/3242-identifying-different-types-of-plastic).
* Samples of plastic and glass items, including used or ‘rubbish’ versions of the same items –for example, an intact plastic bag and a torn one. It is useful to have a range of items of the same colour but with different texture or components – for example, ice cream containers, water bottles, packaging and milk bottles. Include both glass and plastic jars.
* Hula hoops or similar (optional).

## Teaching suggestions

This activity can be adapted for early reader-writers. Using hula hoops, students can sort their items into objects that are smooth or rough, flexible or rigid and by colour.

The teacher can record student observations in a class observation table. Sharing observations is an excellent opportunity to develop explicit and accurate language.

## What to do

1. Provide students with the items and ask then to sort them into a variety of groupings that you give (this will change according to the items that you use). For example, sort your items into groups based on:

* size
* colour
* texture.

1. Ask students to use the [student handout](#_heading=h.tyjcwt) to list each item, its purpose and its physical properties. Students work either individually or as a group to complete a chart in the student handout. Sample answers are listed below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Item** | **What do we use this for?** | **Is it soft or hard?** | **Does it hold its shape?** | **Is it bendy or rigid?** | **What does it look like?** | **What does it feel like?** |
| ice cream container | holding ice cream | hard | yes | a bit bendy | white (colour will vary) | smooth |
| plastic bag | carrying things | soft | no | very bendy (flexible) | whitish or see through | thin and slippery |
| olive oil bottle | holding oil | hard | yes | rigid | clear | smooth |
| marbles | playing games, rolling | hard | yes | rigid | stripe or colours inside, opaque | usually smooth |

1. Invite students to share their ideas on the properties that make an item useful for its purpose.
2. Invite students to sort the items into two groups – those that might be reused and those that might be recycled or discarded when they have fulfilled their original function.
3. Ask:

* How did you decide to group the items?
* Why did you make this decision?
* How can the items you’ve identified as reusable be reused?

1. Invite students to further sort the items – for example:

* glass by colour
* plastic by the resin identification codes.

1. Invite students to modify the table to include this information – there is a blank column on the table for this. Tables should be readily understandable so clear labelling and organisation is essential.
2. Invite students to investigate which resin identification codes for plastics are collected for recycling in their local area.

## What to look for

* Listen for the language students use to describe the properties of the recyclable items.
* What components are students focused on?
* Other elements that could be noted:
  + Shape.
  + Texture.
  + Smell.
  + Sound when tapped – for example, a cracked plate may not look damaged but it sounds quite different to an undamaged plate.
  + Size. Big or small is always comparative – how big or how small? This could lead into a session on measurement using appropriate tools. Alternatively, younger students could use appropriate comparative measurements – for example, bigger or smaller than a tennis ball.

## Extension ideas and next steps

* Invite students to compare a plastic bottle with a glass bottle in terms of their transparency, weight and the thickness of their walls. Ask students for their ideas on how these properties affect the bottles’ uses.
* Encourage students to further develop their ideas on the comparative advantages and disadvantages of glass over plastic:
  + Look at the uses of each. For example, glass is mostly the preferred option for windows and cooking containers. Plastic is often the preferred option for packaging. Drink bottles are made out of both glass and plastic.
  + Consider the properties of glass or plastic that make it the most suitable material for that item. For example, glass is usually clearer and easier to see through so it’s ideal for windows. It’s less likely to scratch, absorb smells or melt when heated so it’s ideal for cooking. Plastic doesn’t break easily and is lightweight so it’s ideal for packaging.
* In reusing items, knowledge of their properties is important for our health and safety. Students could investigate what containers would be safe to store:
  + petrol
  + food in the fridge
  + food to be microwaved.
* How could these be safely investigated? Research versus practical experimentation? Ensure that students **always carefully research first**. You can talk through the worst-case scenario if we didn’t do the research and why it is important to ensure the research is rigorous and valid.

# For students

## Observing plastics and glass

Use this table to record your observations.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **What do we use this for?** | **Is it soft or hard?** | **Does it hold its shape?** | **Is it bendy or rigid?** | **What does it look like?** | **What does it feel like?** |  |
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