



Teacher notes

Science inquiry focus:

How is changing between solid and liquid useful for recycling?

Science Inquiry Skills focus:

- Questioning and predicting **QP**
- Planning and conducting **PC**
- Processing and analysing data and information **PA**
- Evaluating **E**
- Communicating **C**

Science as a Human Endeavour link:

- making predictions about the melting and cooling processes required to recycle
- making predictions about the reversible changes in state that plastic recycling involves

Technology/Engineering/Mathematics links:

- referring to changing states of matter in terms of adding and subtracting heat
- exploring sustainability and the importance of recycling materials which have the ability to be melted into liquid and cooled to be remade into solid objects

Assessment focus:

Use the flowchart to assess student's ability to display information using a graphic organiser.

Use the ShowMe recording or the written flowchart from the conclusion as a formative assessment of student's understanding of how knowledge of solids and liquids, and changing states using melting and cooling can apply in real-life processes such as recycling.

Background information

- You will require milk bottles and all bottle lids to be collected ahead of time so you have enough for the class. Ask students to bring them in from home, starting at the beginning of the term. Ensure you collect only plastics labelled



- Teachers may wish to familiarise themselves with the ShowMe application.
- Plastic is shredded and then melted to create plastic beads, which are then re-melted and cooled to create the required product. It goes from being a solid to a liquid to a solid, and then back to a liquid and finally a solid again.
- Glass and aluminium recycling follow a similar process to plastic recycling, going through multiple changes in state.

Resources

- 2 hula hoops and 2 pieces of card labelled 'Yes' and 'No'
- 'Yes' items: milk carton, plastic bottle, glass jam jar, aluminium can, paper
- 'No' items: tissues, light bulb, ceramic plate/vase, battery, disposable nappy, paint tin
- Aluminium recycling video <<https://tinyurl.com/m94nx7e>>
- digital copies of page 71 and 72 (optional)
- copies of page 73 for students
- 1 piece of A3 card per group



Lesson plan

Introduction:

1. Display the following items on the floor inside a hula hoop labelled 'Yes': milk carton, plastic bottle, glass jam jar, aluminium can, paper. Display the following items inside a hula hoop labelled 'No': tissues, light bulb, ceramic plate/vase, battery, disposable nappy, paint tin. Alternatively, if you have limited time or resources, display page 71.
2. Ask students to identify why the items belong in the 'Yes' or 'No' section. ('Yes' items can be recycled, while 'No' items can't.) *What is recycling? How might products be recycled? How can the knowledge of how solids and liquids change be applied to the recycling process?* **QP**

Development:

3. Discuss what a flowchart is and how it works to convey information. Ask students to suggest what aluminium recycling might involve. *What processes might be involved? Is anything melted or cooled? As a whole class watch a video about aluminium recycling at <<https://tinyurl.com/m94nx7e>> and attempt to construct a flowchart together (or use the aluminium recycling flowchart on page 72) to discuss and reinforce the stages where the product is a liquid or a solid.* **QP PA**
4. In small groups, students conduct an investigation into how other products are recycled and how melting and cooling is used to create liquids and solids in the processes. Each group researches either plastic or glass recycling by drawing a strip of paper from a hat with either glass or plastic written on it (ensure there is an equal number of each topic placed in the hat). Students use page 73 to help guide their research. **PC PA**
5. Students use A3 card to draw a flowchart based on their research. **PA C**

Differentiation:

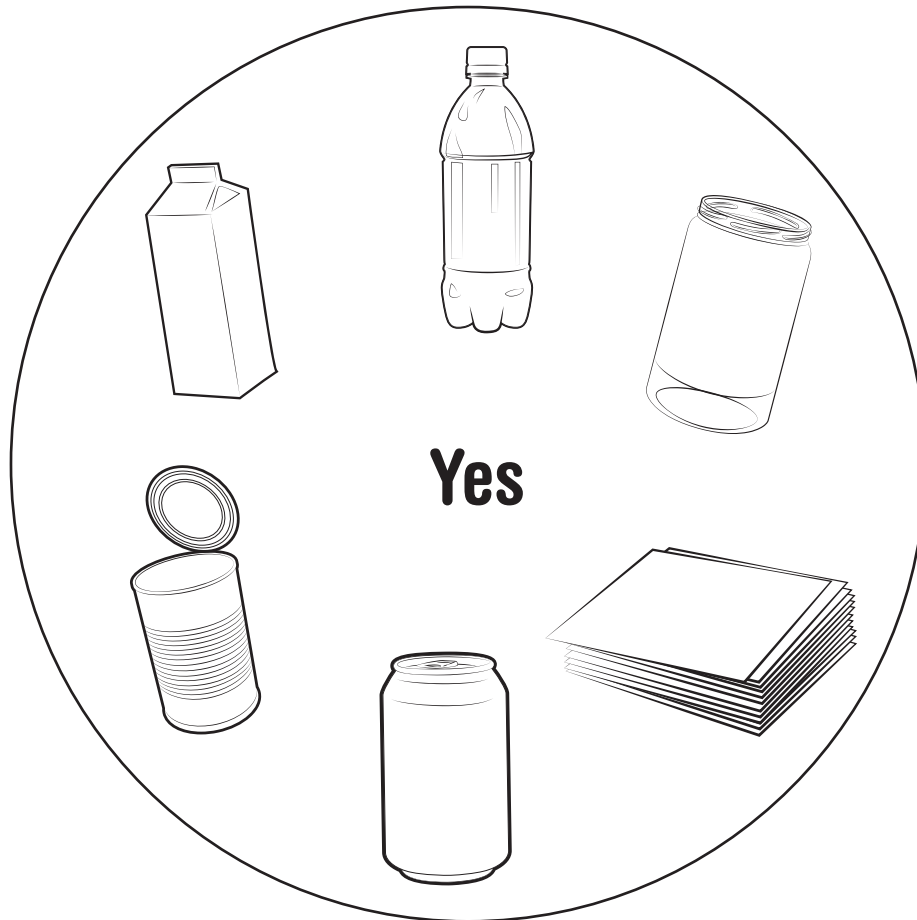
- More capable students can draw and write several sentences describing each step on their flowchart.
- Less capable students can just draw the stages and write keywords.

Reflection:

6. Using their flowchart and an iPad® application like ShowMe, students record audio that describes the recycling process and summarise why being able to change solids and liquids is useful for their recycling process. The recordings can be played back to a partner or the whole class. Alternatively, if technology is not available, students from the plastic recycling group can simply present their flowchart to a glass recycling group. **E C**



Paper carton





Aluminium recycling flowchart

