


Teacher Notes

Science Enquiry Focus:

How is changing between a solid and liquid useful for recycling?

Science Enquiry Skills:

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

Scientific Outcomes:

- Pupils make predictions about the melting and cooling processes required to recycle.
- Pupils make 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; and
- 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 flow chart to assess the pupil's ability to display information using a graphic organiser.
- Use the *ShowMe* recording or the written flow chart from the Plenary as a formative assessment of pupils' 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

- Recycling involves converting waste materials into new materials, and in doing so, reducing the impact on the environment. Glass, paper, aluminium and plastic are common recycled materials.
- 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 similar processes to plastic recycling, going through multiple changes in state.

Resources

- Two hula hoops and two 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
- *The Story of Aluminium Recycling* video <https://tinyurl.com/m94nx7e>
- Digital copies of page 69 and 70 (optional)
- Copies of page 71 for pupils

Lesson Plan

Introduction:

1. Display the following items on the floor inside a hula hoop labelled 'Yes': a milk carton, a plastic bottle, a glass jam jar, an aluminium can and paper. Display the following items inside a hula hoop labelled 'No': tissues, a light bulb, a ceramic plate/vase, a battery, a disposable nappy and a paint tin. Alternatively, if you have limited time or resources, display page 69.
2. Ask pupils 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 flow chart is and how it works to convey information. Pupils 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>. Construct a flow chart (or use page 70) to discuss and reinforce the stages where the product is a liquid or a solid. **QP** **PA**
4. In small groups, pupils conduct an investigation into how other products are recycled and how melting and cooling is used to create liquids and solids in each process. Each group researches either plastic or glass recycling by drawing a topic from a hat (ensure there is an equal number of each topic placed in the hat). Pupils use page 71 to help guide their research. **PC** **PA**
5. Pupils use A3 card to draw a flow chart based on their research. **PA** **C**

Differentiation

- Guided group work with adults asking questions, providing keywords and helping to identify the different stages will allow all pupils to complete a flow chart that can be used to write a summary of the recycling process.
- More able pupils can write a more detailed flow chart with explanations for each step.

Plenary:

6. Pupils write a script that describes the recycling process and summarises why being able to change solids into liquids is useful. Pupils use this script when reporting back to classmates or when recording an audio description that accompanies the flow chart in presentation software such as *ShowMe* or *MS PowerPoint*.

Challenge:

- Ask pupils to consider setting up an aluminium recycling centre in school. They can create posters explaining how aluminium is recycled to encourage pupils, staff and parents to recycle their aluminium cans.

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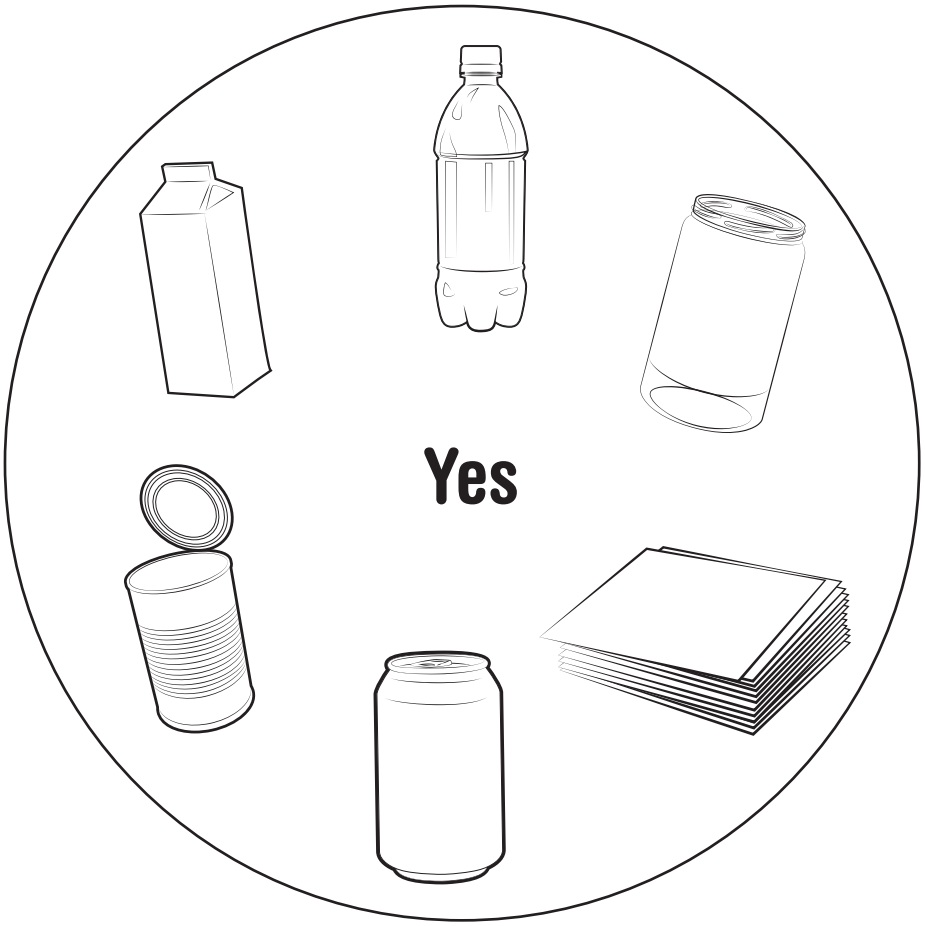
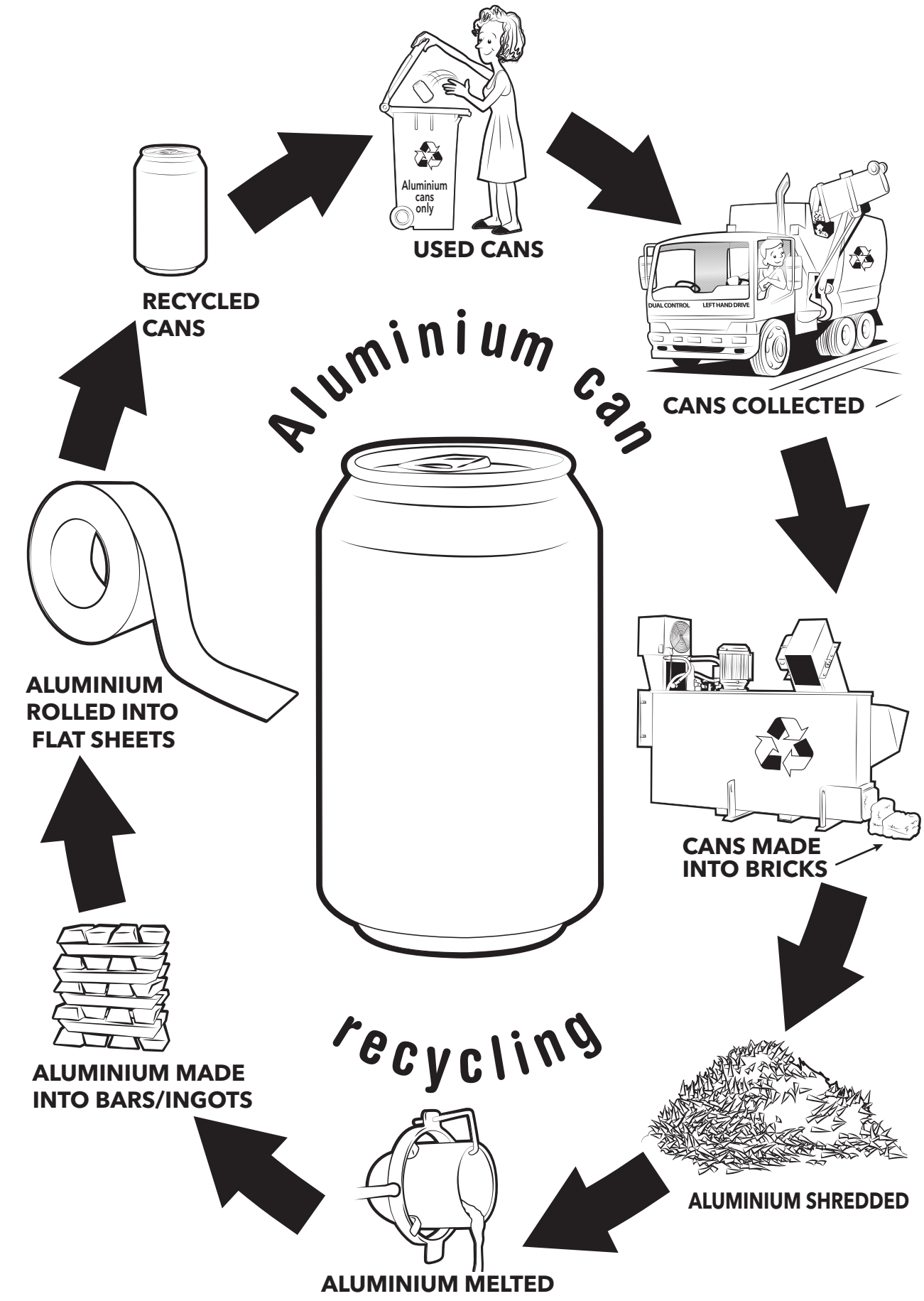
Yes/No Chart



Aluminium Recycling Flow Chart



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Recycling Research Template

Names: _____

We are researching _____.

1. Scan the QR code to watch a video about **plastic** recycling.

<https://tinyurl.com/lxn9ajt>

OR Scan the QR code to watch a video about **glass** recycling.

<https://tinyurl.com/mgtleoh>

2. Write another website you have visited that helped you gather more information about your research topic.

_____

3. In the box, create a flow chart based on your research.