Australian Curriculum

YEAR 5

AGES 10–11

RIC PUBLICATIONS

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SCIENCE: A STEM APPROACH

AC

Biological sciences

Chemical sciences

Earth and space sciences

Physical sciences

SCIENCE TECHNOLOGY ENGINEERING MATHEMATICS

SAMPLE - NOT FOR SALE

RIC-6175 7.6/1260

Teacher notes

Science inquiry focus:

Can solids flow from one container to another like liquids?

Science Inquiry Skills:

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

Science as a Human Endeavour:

- Students predict and observe the properties and behaviours of common kitchen solids.
- Students discuss how knowledge of the properties and behaviours of solids in different forms is beneficial to household cooking.

Technology/Engineering/Mathematics links:

- manipulating materials with appropriate tools, equipment and techniques when preparing food
- working safely, responsibly and cooperatively to ensure safe work areas
- using an online dictionary to define words

Assessment focus:

- View pages 50 and 51 to monitor student science inquiry skills, including predicting, planning and conducting, processing and analysing data and evaluating.
- View the Communicating science ideas section on page 51 to assess student knowledge of the properties of solids and how some solids can appear to exhibit different properties.

Background information

- Solids have a fixed shape and volume. They can be any size or shape and do not have to be hard or completely solid, such as a teddy bear or a beach ball. Solids can be cut into finer pieces but each piece is still a solid in itself. Solids cannot be compressed and cannot flow from one container to another.
- Some common misconceptions about solids are that they must have no air inside them to be a solid object, and that they can flow.
- Unlike liquids and gases, solids cannot flow. This is because the particles in a solid are in a fixed position. When a physical change such as cutting is applied to a solid, the bonds between particles are broken. This allows each piece of the solid to pour from one container to another. However, the pieces do not flow in a steady and continuous stream. For more information on states of matter flowing, go to <http://tinyurl.com/guaernv>.

Resources

- Completed copies of page 45 from Lesson 1
- Science journal for each student
- Internet access—online dictionary
- Copy of pages 50 and 51 for each student
- A bottle of water and a whole biscuit
- Three whole, plain biscuits in a ziplock bag for each student
- A plastic knife for each student
- Two different-sized cups/ containers for each student

SAMPLE - NOT FOR SALE

978-1-925431-98-8

Teacher notes

Introduction:

1. As a class, examine a bottle of water and a whole biscuit and identify the state of matter of each, comparing their properties.

Development:

2. Using page 50, students predict if solids can flow from one container to another and take the shape of the container in which they are placed. **QP**
3. Students find the meaning of the words *pour* and *flow* using an online dictionary and record each meaning in their science journal. **PC** **PA**
4. Using page 50, students plan an experiment to investigate the question, *Can a solid flow from one container to another and take the shape of the container in which it's placed?* Provide each student three plain biscuits in a small ziplock bag, two containers of varying shape and size and a plastic knife. Students decide three physical changes (including cutting to various sizes, crumbling or re-shaping) they will apply to the biscuits and record them on page 50. Without using anything other than the two containers, the biscuits in a bag, the knife and their body, students make one physical change at a time to conduct their experiment, recording their results in the table. *Note: Students apply one physical change to each biscuit. If the change is cutting, students cut one of the biscuits into various sizes to test, before using the second biscuit for a new change.* Using page 51, students communicate their conclusion based on the results and their scientific understanding, and suggest improvements to their experiment. **PC** **PA** **E**

   Differentiation
   - Less capable students can work in pairs to answer the Communicating science ideas questions on page 51.
   - More capable students can compare the mass of one cup of granulated sugar and one cup of sugar cubes. They should explain why granulated sugar gives a more accurate measurement. *Note: this can also be done using whole and crushed biscuits.*

Reflection:

5. In pairs, students use the think-pair-share cooperative learning strategy to share their answers to the first question on page 51. Once both partners have answered, students discuss the similarities and differences between each answer and clarify any information they think is incorrect. Randomly select one or two pairs to share their answer for that question with the class. Repeat this activity for the other questions. **C**
6. Discuss how knowledge of solids that behave like liquids is beneficial to household cooking, including accurately measuring ingredients (e.g. one cup of flour), ingredients and adding seasoning or spices to recipes. **C**

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Pouring solids – 1

Question:
Can solids flow from one container to another and take the shape of the container in which they are placed?

Prediction:

_____

_____

_____

_____

Experiment:
Collect three plain biscuits in a ziplock bag, two containers of varying shape and size and a plastic knife. Use these materials to answer the investigation question.

Physical changes:
Choose three physical changes that can be made to the biscuit. Remember: a physical change is a change in the state, size or shape of the object.

Physical change	What effect will this physical change have on the biscuit

Results:

Test number	What physical change did you apply?	Did the solid flow from one container to another?	Did the solid take the shape of the container in which it was placed?
1			
2			
3			
4			
5			
6			

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Pouring solids – 2

Conclusion based on the results of the experiment:

Possible improvements to the experiment:

Communicating science ideas:

1. Why are flour, salt and sugar classed as solids if they can be poured and can take the shape of the container in which they are placed?

2. Which other solids can behave like liquids?

3. When a powdered solid and a liquid are poured onto a flat surface, the pieces of the solid stack on top of each other, while the liquid spreads out across the surface. Explain why this happens.

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