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| **Science and Technology sample unit:**  **Let’s celebrate!** |
| Stage 3  | Duration: **10 weeks (1.5 hours per week)** |
| Term 1 | Booragul Public School |

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| **Unit context** |
| National celebrations and family and community events are familiar experiences for Stage 3 students. In the context of celebrations, students extend their understanding of changes materials undergo and how the properties of materials determine their use for specific purposes. |
| **Target outcomes**  |
| A student:**ST3-1VA** shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities**ST3-4WS** investigates by posing questions, including testable questions, making predictions and gathering data to draw evidence-based conclusions and develop explanations**ST3-5WT** plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints**ST3-12MW** identifies the observable properties of solids, liquids and gases, and that changes made to materials are reversible or irreversible**ST3-13MW** describes how the properties of materials determine their use for specific purposes**ST3-16P** describes systems used to produce or manufacture products, and the social and environmental influences on product design |
| **Unit overview** |
| This unit builds on students’ prior knowledge about changes in state in solids and liquids from Stage 2 and introduces them to air as a gas. They investigate how changes in the state of everyday materials relate to the addition and removal of heat and whether these changes are reversible or irreversible. Students integrate the processes of Working Scientifically and Working Technologically in designing a system to produce ice cream. They use their understanding of the effect of heat in changing the state of materials, to design and conduct a fair test to evaluate the effectiveness of a portable product brought from home used to keep a can or carton of drink cold during an outdoor event. Throughout the unit, each student will maintain a digital and/or hard copy portfolio. The portfolio will be used by students to record and share findings and ideas, and to monitor and reflect on their own learning, and for the teacher to provide feedback.**Teachers should be aware that students may have food and other allergies that can result in serious medical consequences. This is an important consideration in selecting the foods to be handled and potentially consumed.** |

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| *Content* | **Teaching and learning** | **Eval/Reg** |
| Working Scientifically **Students conduct investigations by:** * working individually and collaboratively in conducting a range of appropriate investigation methods, including fair tests, to answer questions or solve problems

**Students process and analyse data and information by:*** constructing and using a range of representations, including tables, graphs (column, picture, line and divided bar graphs) and labelled diagrams N-ICON-numeracy.png L-ICON-literacy.png
* drawing conclusions and providing explanations based on data and information gathered first‑hand or from secondary sources CCT-ICON-critical creative thinking.png
 | **Is it solid, is it liquid?****Teacher background***In the context of family celebrations and special events, students build on their prior knowledge of solids and liquids from Stage 2. They carry out simple investigations to compare the observable properties and behaviour of solids and liquids. In the process of classifying materials as solid or liquid, they identify that some materials cannot easily be placed into one of these groups.**Each student establishes a digital and/or hard copy portfolio to record and share their findings and ideas, to monitor and reflect on their own learning, and for the teacher to provide feedback.***Class activity**Students brainstorm about special events and the range of celebrations they have experienced.**Pair activity**Students discuss their favourite celebration or special event. In their individual portfolios, they record:* the type of celebration
* why it was held
* when and where it was held
* who attended the celebration
* the food, drink and other items that were part of the celebration.

Students conduct a first-hand investigation to identify the materials that make up a range of items and classify the materials as solid or liquid.For the investigation, the teacher sets up around the classroom numbered containers each with an item/material to be observed. The containers should include some of the items that have been suggested by the students from their favourite celebrations. Items/materials that could be provided for the investigation could include wrapping paper, paper whistles, gift boxes, sweet bags, cordial, tomato sauce, ice cream, popcorn, sweets, water, ice, fizzy drink, jelly, sherbet. To assist students in classifying the properties of the items/materials as solid or liquid, containers of different types, sizes and shapes, pouring and measuring equipment, tongs, tweezers, spoons, and paddle-pop sticks could be made available.In their individual portfolios, students construct or use a teacher-provided table to record their observations, eg Attachment A: Sample worksheet – Is it solid, is it liquid?**Group activity****Is slime solid or liquid?**The students share their previous experiences with the material known as slime. They use a teacher-selected method to safely make slime, eg <http://sciencesquad.questacon.edu.au/activities/cornflour_slime.html>. They identify potential risks and how these will be avoided. Students use the equipment and materials safely to make slime and conduct first‑hand observations to:* explore, identify and record the observed properties of slime
* compare the properties of slime with those already identified for solids and liquids
* pose an answer to the question ‘Is slime solid or liquid?’ and explain their answer.

**Class activity**The students compare their recorded observations and classification of the items/materials as solid or liquid. They identify why they found some items/materials (eg slime) difficult to classify as either a solid or a liquid. Each student records in their portfolio, any relevant additional information from the discussion.Through teacher-guided questioning, students discuss and use their findings to identify and record the distinguishing properties of solids (eg keep their volume and shape) and liquids (eg keep their volume but take the shape of the container). They use digital technologies to construct a table to summarise the properties of solids and liquids. Following their investigation of gases, the students could add the properties of gases to this table. |  |
| Working Scientifically **Students conduct investigations by:** * using suitable equipment and materials, checking observations and measurements by repeating them where appropriate

**Students process and analyse data and information by:*** drawing conclusions and providing explanations based on data and information gathered first‑hand or from secondary sources CCT-ICON-critical creative thinking.png

Students communicate by:constructing and using a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data including using digital technologies as appropriate (ACSIS090, ACSIS107)    | **Conducting first-hand investigations to identify observable properties of air****Teacher background***Through these activities, students are introduced to gases as a third state (form) in which materials can occur. Using air as an example of a material in a gaseous state, students carry out simple investigations to identify some of the observable properties and behaviour of gases. Prior to carrying out investigations to find answers to questions about the properties of air, students should review their understanding of mass and volume from Stage 2 Mathematics. By measuring the mass of a sample of air, students recognise that while they may not be able to see the air, there is a material inside the football/basketball, not just empty space. In Stage 4, students learn that air is made up of a mixture of gases.***Class activity**To introduce the concept of materials occurring in a third state as gases, the teacher invites students to explore the occurrence of gases in their surroundings by: * engaging in simple first-hand activities such as those provided in Attachment B: What is a gas?
* identifying and recording other everyday places where we find gases, eg in helium balloons, natural gas in cook tops, ovens and gas bottles for BBQs, the smell of perfume or aftershave, exhaust from cars, and air inside footballs/basketballs and the tyres of bikes and cars.

**Group activities**Students conduct first-hand investigations to identify some properties of air.**Collecting and testing a sample of air**Students work in groups to suggest possible ways of collecting a sample of air, eg gently sweeping an open plastic bag through the air and tying it to contain the air. They discuss their proposed method for collecting a sample of air with another group and, if necessary, change or modify the design.Students use the method to collect a sample of air and observe whether air:* can be seen
* can be felt
* changes or keeps its shape.

Through teacher-guided questioning, students identify that air is invisible and cannot be observed directly using their eyes and that they will need to use other ways to find out about the properties and behaviour of air.**Does air have mass?**Students use an electronic kitchen balance to measure the difference in mass of a deflated and inflated football/basketball or observe identical football/basketball bladders, one inflated and one deflated, at either end of the suspended lever of a pan balance. Students check results by repeating the measurements and summarise their results in a table. They use observations and measurements to answer the questions posed.**Does air take up space?**Students use a teacher-provided procedure to conduct an investigation to find an answer to the question Does air take up space?, eg Attachment C: Conducting first-hand investigations to identify whether air takes up space. In their individual portfolios students, reflect on and record their findings about the properties of gases, including:* how the air collection was carried out
* their observations and results for each of the tests
* what they conclude from their results about the properties of air
* whether air could be grouped with solids or liquids.

**Class activity**Each group shares their results with the class. With teacher guidance, the students:* select and use an appropriate method to collate and compare the class results
* describe the properties of air that they have observed
* watch a video to observe the behaviour of a coloured gas, eg [www.youtube.com/watch?v=ow3mIB2CH1A](http://www.youtube.com/watch?v=ow3mIB2CH1A)
* use their findings about the properties of air to draw conclusions about the properties of gases
* record their conclusion in an extra column in the table they constructed to summarise the properties of solids and liquids.

 **Assessment for learning activity** * Students could use a simple key to classify a range of items as solids, liquids or gases, eg Attachment D: Individual assessment for learning activity.
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