# Unit of Work: States of Matter

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Pedagogy

- This unit of work has been developed using the Science Primary Connections model which draws on theoretical underpinnings of a constructivist nature, Piaget (child centered approach – age appropriate learning), Vygotsky (Zone of Proximal development – experiential learning) and more recently Jerome Bruner (dialogic teaching – shared learning experiences) who all identify that successful learning best occurs when these variety of elements are combined to create the ideal environment for the learning process.
- Classroom interactions will be covered in a variety of ways, but this unit has a focus of bringing digital tools into practical application through research tasks, theory development, explanation/exploration, design and publication in a blended learning environment. This unit will encourage students to extend their thinking and communication skills through a series of challenging activities and lessons so they are able to clearly articulate the scientific theory of states of matter.
- In preparing lessons for a high majority of indigenous learners, I have incorporated elements from Tyson Yunkaporta’s 8 ways framework to assist with differentiation in the lesson deliveries.
- Work to develop a passion for Science for my students.

Rationale

- The Australian Curriculum (V8.1, 2016) Science rationale provides a way of answering interesting and important questions about the biological, physical and technological world. Science is a dynamic, collaborative and creative human endeavour arising from our desire to make sense of our world through exploring the unknown, investigating universal mysteries, making predictions and solving problems. Science knowledge is contestable and is revised, refined and extended as new evidence arises.
- The Australian Curriculum: Science provides opportunities for students to develop an understanding of important science concepts and processes, the practices used to develop scientific knowledge, of science’s contribution to our culture and society, and its applications in our lives.
- In addition to its practical applications, learning science is a valuable pursuit in its own right. Students can experience the joy of scientific discovery and nurture their natural curiosity about the world around them. In doing this, they develop critical and creative thinking skills and challenge themselves to identify questions and draw evidence-based conclusions using scientific methods.
- The ability to think and act in scientific ways helps build the broader suite of capabilities in students as confident, self-motivated and active members of our society.

The lesson sequence it is intended (to):

- Provide opportunities for students to work independently and collaboratively using ICT tools
- Ensure each lesson has clear specified objectives
- Lessons and activities follow a logical sequence
- Teacher and student engagement and communication in a priority
- Scaffolding and strategies are provided for students
- Conduct appropriate and ongoing assessment, student-self and peer.
Unit Overview

<table>
<thead>
<tr>
<th>Unit title: States of matter</th>
<th>Year Level: 5</th>
<th>Duration: 6-8 Weeks</th>
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Unit Outline:
Science is a process of discovery - through inquiry and this unit of work ‘States of Matter’ will offer students a variety of exciting and challenging activities. Learning will be inquiry-based, with students critically analysing, evaluating and interpreting a range of interactive and experiential resources to develop their knowledge and understanding. Research will incorporate ICT including web-based and other traditional sources as appropriate, 20% of assessment marks are awarded for ICT usage. Students will work collaboratively with guided group discussion and investigation to produce physical and digital artefacts which will develop student understanding of the unit materials. Students will also work in small groups to develop scientific reports based on the prescribed experiments as well as hypothesizing theoretical experiments and possible outcomes. This unit will also integrate other curriculum areas including Mathematics and Literacy to build students’ knowledge, skills and understandings to assist with the inquiry and to demonstrate their findings using written, oral and digital formats. Inquiry based activities will incorporate self and peer assessment with learning outcomes assessed using both formative and summative techniques.

Prior Knowledge
In Year 3, students use their understanding of the movement of Earth, materials and the behaviour of heat to suggest explanations for everyday observations, (ACSSU046).
By the end of Year 4, students apply the observable properties of materials to explain how objects and materials can be used, (ACSSU074).

Content Descriptions
- **Science Understanding** - Solids, liquids and gases have different observable properties and behave in different ways (ACSSU077)
  - recognising that substances exist in different states depending on the temperature
  - observing that gases have mass and take up space, demonstrated by using balloons or bubbles
  - exploring the way solids, liquids and gases change under different situations such as heating and cooling
  - recognising that not all substances can be easily classified on the basis of their observable properties

- **Science as a Human Endeavour** - Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE081)
  - testing predictions relating to the behaviour of solids, liquids and gases by conducting observational experiments

- **Science Inquiry** – Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate (ACSIS090)
  - constructing tables, graphs and other graphic organisers to show trends in data
  - identifying patterns in data and developing explanations that fit these patterns
  - identifying similarities and differences in qualitative data in order to group items or materials

- **Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts (ACSIS093)**
  - discussing how models represent scientific ideas and constructing physical models to demonstrate an aspect of scientific understanding
  - constructing multi-modal texts to communicate science ideas
  - using labelled diagrams, including cross-sectional representations, to communicate ideas

- **Questioning and Predicting: With guidance, pose clarifying questions and make predictions about scientific investigations (ACSIS231)**
  - exploring the range of questions that can be asked about a problem or phenomena and with guidance, identifying those questions that could be investigated
  - applying experience from similar situations in the past to predict what might happen in a new situation
| Cross Curriculum Capabilities | Mathematics – Recognise and use patterns and relationships and interpretation of data displays  
Literacy – Creating texts through speaking, writing and creating and developing learning area vocabulary.  
Critical and creative thinking – Inquiring – identifying, exploring and organising information and ideas through organising and processing information  
Information and Communication Technology (ICT) - The particular elements of Information and Communication Technology (ICT) Capability addressed by this content description through Creating with ICT |
<table>
<thead>
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<tbody>
<tr>
<td>Achievement Standard</td>
<td>- By the end of Year 5, students classify substances according to their observable properties and behaviours.</td>
</tr>
</tbody>
</table>
| Links to future learning: | Year 6: Changes to materials can be reversible or irreversible (**ACSSU095**)  
Year 7: Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques (**ACSSU113**)  
Year 8: Properties of the different states of matter can be explained in terms of the motion and arrangement of particles (**ACSSU151**) |
| Key Inquiry Questions | - What is ‘matter’ and why is the ‘state’ significant  
- What are the processes called which signify a change in state  
- What external influence is added or removed for this process to occur  
- Identify ways that ICT can help illustrate our understanding of the principals of states of matter |
| Key Concepts | - Identify, describe and measure  
- Continuity and Change  
- Cause and Effect  
- Observation and perspectives  
- Significance |
| ICT Applications | Indicates the ICT which is integrated into the learning for each lesson  
1. IWB (Interactive Whiteboard/Smart board), Device (tablet/computer), YouTube, WMM (Windows Movie Maker)/iMovie  
2. IWB, Device, YouTube, WMM/iMovie  
3. IWB, Device, YouTube, WMM/iMovie  
4. IWB, Device, YouTube, WMM/iMovie  
5. IWB, Device, YouTube, WMM/iMovie  
6. IWB, Device, YouTube, WMM/iMovie |
| Student Diversity | A diverse range of learning needs broadens the width of education delivery to include the entire learning spectrum, from those with severe learning difficulties to those who are extraordinarily capable. Given that the nature of this lesson sequence includes a significant amount of group discussion and input, the following considerations should be made for any student, but particularly those with EAL/D, identified SEN or who are placed on individual learning programs, as suggested by the Board of Studies (BOS, 2015)  
1. Differentiation to assessment activities, for example rephrasing questions, using simplified language, fewer questions or alternative formats for tasks  
2. For students with impairments that may challenge verbal participation, a peer or assistant may offer input articulated in a variety of ways  
3. Providing greater time for a student to respond to questioning, or provide rephrased prompts with simple language  
4. As a part of everyday learning, peer -led instruction can be beneficial for all parties involved, use a student with higher research skills/confidence and specify they develop a mentor relationship with a learner of lower ability/confidence student.  
5. Encourage fast finishing groups to work collaboratively and assist any learners who they feel may benefit from their guidance. |
<table>
<thead>
<tr>
<th>Phase</th>
<th>Lesson</th>
<th>Summary</th>
<th>Inquiry Phase</th>
<th>Assessment</th>
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<tbody>
<tr>
<td>Engage</td>
<td>1. States of Matter video, discussion experiment: State of Water</td>
<td></td>
<td>Confirmation</td>
<td>Diagnostic</td>
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<tr>
<td>Explore</td>
<td>2. Discussion, Experiment, Report video and visualisation, experiment: Condensate</td>
<td></td>
<td>Structured</td>
<td>Formative</td>
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<tr>
<td></td>
<td>3. Experiment, Report experiment: dry Ice</td>
<td></td>
<td>Structured</td>
<td>Observations</td>
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<tr>
<td>Explain</td>
<td>4. Mind Map videos, discussion, concept map</td>
<td></td>
<td>Guided</td>
<td>Diagnostic</td>
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<tr>
<td>Elaborate</td>
<td>5. Solar Still visualisation, condensation experiment: solar still</td>
<td></td>
<td>Guided</td>
<td>Formative</td>
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<tr>
<td>Evaluate</td>
<td>6. Interpretive explanation ICT art project, concept mapping and reporting</td>
<td></td>
<td>Open</td>
<td>Summative</td>
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**Lesson Overview**

**Lesson 1**
- **Title:** Melting
- **Objective:** Diagnostic Assessment
- **Content:** Revision, explanation of terms, key concepts, assessments. Discuss timeline, what is expected
- **Summary:** Introduce subject and material, discussion about the upcoming Unit, uncover the content, and discuss the Unit Outline, lesson sequence and assessment requirements.
- **Cross Curriculum Link:**
  - Numeracy – Interpretation of data displays
  - Literacy – developing learning area vocabulary
  - ICT – Creating
- **Assessment:**
  1. Teacher Observations – **KWL Chart (Re-Cap Yr. 3/4 Achievement Std.)**
  2. Peer & Self-Assessment – **KWL Chart** (prompted questioning: I would like to learn more about...)
  3. Diagnostic – Experiment report video observations

**Lesson 2**
- **Title:** Gas to Liquid
- **Objective:** Formative Assessment
- **Content:** Exploration of the water cycle
- **Cross Curriculum Link:**
  - Numeracy – Interpretation of data displays
  - Literacy – developing learning area vocabulary
  - ICT – Creating
- **Assessment:**
  1. Formative – Video Observation
  2. Peer & Self-Assessment – **KWL Chart** (prompted questioning: I would like to learn more about...)

**Lesson 3**
- **Title:** Zombie Snacks
- **Objective:** To conduct Observations
- **Content:** Exploration of limitations on complex material
- **Cross Curriculum Link:**
  - Numeracy – Interpretation of data displays
  - Literacy – developing learning area vocabulary
  - ICT – Creating
- **Assessment:**
  1. Teacher Observations – **KWL Chart (Re-Cap Yr. 3/4 Achievement Std.)**
  2. Peer & Self-Assessment – **KWL Chart** (prompted questioning: I would like to learn more about...)

**Lesson 4**
- **Title:** Mind Mao
- **Objective:** Diagnostic Assessment
- **Content:** Consolidating and Explaining information we have so far, video, discussion
- **Cross Curriculum Link:**
  - Numeracy – Interpretation of data displays
  - Literacy – developing learning area vocabulary
  - ICT – Creating
- **Assessment:**
  1. Teacher Observations – **KWL Chart (Re-Cap Yr. 3/4 Achievement Std.)**
  2. Peer & Self-Assessment – **KWL Chart** (prompted questioning: I would like to learn more about...)

**Lesson 5**
- **Title:** Survivor Man
- **Objective:** Formative Assessment
**Lesson 6**

**Title:** Look at the State of it!

**Objective:** Summative Assessment

**Content:** Students create a digital artefact which demonstrates their knowledge of the unit materials, conclusion.

**Cross Curriculum Link:**
- **Numeracy** – Interpretation of data displays
- **Literacy** – developing learning area vocabulary
- **ICT** – Creating

**Assessment:**
1. Teacher Observations – KWL Chart (Re-Cap Yr. 3/4 Achievement Std.)
2. Peer & Self-Assessment – KWL Chart (prompted questioning: I would like to learn more about...

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**Lesson Plans**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Topic: States of Matter</th>
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<tr>
<td><strong>Title:</strong> Introduction</td>
<td><strong>Serial:</strong> 1/6</td>
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<tr>
<td><strong>Session:</strong> After lunch</td>
<td><strong>Class Size:</strong> 29</td>
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<td><strong>Timing:</strong> 90 minutes</td>
<td><strong>Grade:</strong> 5</td>
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**Behavior Management:**
1. Rewards – group points for tally mark, encouragement and positive action
2. Modified tasking for focus/literacy challenge. Reward success
3. Distract and re-focus: Brain Gym activity and return to task. Reward when focused
4. Relocate student, possibly review actions at recess/lunch. Reward if successful

**Curriculum Objective:**
- ACSSU077 - Solids, liquids and gases have different observable properties and behave in different ways
- ACSIS090 - Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate

**Cohort Diversity:** 24 Indigenous (5 Individual Learning Program [ILP] – all have devices), 3 Non-Indigenous are high achieving, and 2 additional non-Indigenous who have poor attendance but perform at an average level.

**Learning Intention:** Students be able to recall the states of matter and identify the processes for the changes.

**Success Criteria:**
1. Students recall facts, information and other relevant data to illustrate an understanding of the states of matter.
2. Students construct and present this information in a scientific report format
3. Students pose questions and dictate any particular interests which may be investigated during the unit.

**Resources:**
1. Printed copy of yr 3. Achievement standard
2. IWB and ‘blank page’ for KWL chart (variety of software)
3. Theme work books/E-device/Computer (desk equipment – pencils, erasers, pens etc.)
4. Experiment – see Appendix – Lesson 1

**Assessment:**
1. Participation – Observations of student involvement
2. Participation – Direct Questioning
3. Diagnostic – Assessment of report (see rubric)
4. See Lesson Appendix

**Rubric:**

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<th>Criteria</th>
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<tr>
<td>Recall Facts</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Identify States</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Present Data</td>
<td>5</td>
<td>3</td>
<td>1</td>
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**Time** | **Program**
---|---
13:05 | **Introduce subject and material, discussion** About the upcoming Unit, uncover the content, and discuss the Unit Outline, content, lesson sequence and assessment requirements. The class will be familiar with the language “show me what you are learning”
13:15 | **WARM UP:** In your theme books, you have 10 minutes to create a small mind map, include date, a heading, sketches, pictures, words, dates, in-facts or comments and any
Appendix: Lesson 1 – Experiment Guide

<table>
<thead>
<tr>
<th>Name: States of Matter</th>
<th>Investigating: Changes in Water</th>
<th>Work space: Inside/Outside</th>
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</table>
| **Materials:**  
Qty. Ice bricks, [cubes, crushed, powdered]  
Magnifying glasses  
Pot and stove  
Thermometers  
Food colouring  
Various containers | **Safety brief:**  
1. We are doing activities in class that have risks, if we follow the safety procedures, we will not get hurt.  
2. Anyone not following the safety guidelines may hurt themselves or a mate, this is not acceptable.  
3. This is the only warning, if you choose not to behave, then you shall miss out on the experiment  
4. This activity involves adding ‘heat energy’ to objects including fire (flame), focused light energy, a stove top and will require supervision. Group leaders and TA will be assigned ‘sites’ to supervise. | **Task:**  
Demonstrate your understanding of the states of matter by:  
1. Describe the attributes of the object, is it solid/liquid etc.  
2. What are you planning to do to change that? What will you use and why?  
3. What happened, was that the plan and why do you think it did?  
4. Make a video of your work and findings, no less than 2 minutes, no more than 4 minutes answering the key questions above.  
5. Can the process be reversed? |

**Task Differentiation:** ILP’s are to submit work via saved file and display on IWB, H.Ach group will assume a role of mentorship for any remaining time after completion, SEN to complete task on Tablet/IWB or may produce an artefact which will demonstrate key information (with Aid assistance).

2. **Structured discussion** about what the group is familiar with from the year 3 achievement standard. During this discussion, a student will scribe the key information down into the KWL chart under K(now). This should be completed on the IWB (Smart Board)

3. The second part of the discussion is about what we might W(ant) to learn about the states of matter. Students who may have posed questions or require greater detail/clarity may take this first of many opportunities to demonstrate the types of knowledge they want to complete the unit with.


5. Experiment – Ice investigations: Create each of the states of matter, photograph and document your activities for your report. You have 10 minutes to write the experiment up and have it approved and 20 minutes to complete the experiment. You may work in small groups and will need to demonstrate for the class how you achieved each state.

**Class Feedback:** Who: worked well? Was rewarded? What did they do differently to someone who did not get a reward? Who is confident of the year 3 learning and is ready to move forward with yr. 5? Anyone stuck or not understanding?


1. Have a play with the app to demonstrate the way temperature influences water.  
2. Record a short video and email it to me to demonstrate your understanding of the states of matter based on your interaction with this app.

b) Follow this link: Print out the worksheet – fill in the blanks, ensure your name is on it and hand the completed sheet in. Record a short video and email it to me to demonstrate what you know about ice melting to make water. What happens if you keep making the water hot?

c) Additional videos: States of matter: [https://www.youtube.com/watch?v=wlY8F-UoTE](https://www.youtube.com/watch?v=wlY8F-UoTE) ... [https://www.youtube.com/watch?v=bMbmQzV-Ezs](https://www.youtube.com/watch?v=bMbmQzV-Ezs) ...

**Evaluation: Prompts**

1. What worked well in this lesson?  
2. What part needs attention/fine tuning prior to re-delivery?  
3. What would you recommend to a colleague in a similar situation?

**Reflection: Prompts**

1. Were you prepared? What did you not need? What did you miss?  
2. Did the students enjoy the lesson? Were they excited about the excursion?  
3. Did you enjoy teaching the lesson? What could (practically) make it more enjoyable?

**Comments/Observations:**
Comments:
- This experiment provides an opportunity for the class to Explore the states of matter to re-cap some of the experiential learning from previous years.
- The safety aspect may provide an opportunity for community engagement by providing an opening for student supervision by family members or senior grades, [preparation as required].

Subject: Science  
Topic: States of Matter

Title: Gas to liquid  
Serial: 2/6  
Date:  / /16

Session: After lunch  
Class Size: 29

Timing: 90 minutes  
Grade: 5

Cohort Diversity: 24 Indigenous (5 Individual Learning Program [ILP] – all have devices), 3 Non-Indigenous are high achieving, and 2 additional non-Indigenous who have poor attendance but perform at an average level.

Behavior Management:
1. Rewards – group points for tally mark, encouragement and positive action
2. Modified tasking for focus/literacy challenge. Reward success
3. Distract and re-focus: Brain Gym activity and return to task. Reward when focused
4. Relocate student, possibly review actions at recess/lunch. Reward if successful

Curriculum Objective:
ACSSU077 - exploring the way solids, liquids and gases change under different situations such as heating and cooling
ACSIM090 - Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate

Learning Intention: Students be able to recall the states of matter and identify the processes for the changes.

Resources: 1. IWB and video links
2. IWB and 'blank page' for KWL chart (variety of software)
3. Theme work books/E-device/Computer (desk equipment – pencils, erasers, pens etc.)
4. Experiment – see Appendix – Lesson 2

Success Criteria:
1. Students recall facts, information and other relevant data to illustrate an understanding of the states of matter.
2. Students construct and present this information in a scientific report format
3. Students pose questions and dictate any particular interests which may be investigated during the unit.

Assessment:
1. Participation – Observations of student involvement
2. Participation – Direct Questioning
3. Diagnostic – Assessment of report (see rubric)
4. See Lesson Appendix

Time Program
13:05 1. WARM UP: Video – Dry Ice

Task Differentiation: H.Ach group & ILP’s may submit comments to class chat and display on IWB,

13:15
2. Structured discussion based on our experiment in the last lesson, has anything evolved or our understanding of the concept developed on the KWL chart, students to scribe on the IWB (Smart Board). Did anything in the video show us something we did not know to put in the Learnt section.

13:40
3. How do you think we can capture gas and make it change state to return it to liquid form.

13:45

5. Experiment – Vapour Investigations: Create a way for air to change state back into water droplets. Photograph and document your activities for your report. You have 10 minutes to write the experiment up and have it approved and 20 minutes to complete the experiment. You may work in small groups and will need
Differentiate

a) Follow this link:  http://phet.colorado.edu/en/simulation/states-of-matter
1. Have a play with the app to demonstrate the way temperature influences water.  2. Record a short video and email it to me to demonstrate your understanding of the states of matter based on your interaction with this app.

b) Follow this link:  Print out the worksheet – fill in the blanks, ensure your name is on it and hand the completed sheet in.  Record a short video and email it to me to demonstrate what you know about gas returning to a liquid state.  What happens if you keep cooling the liquid?

c) Additional videos:  States of matter: https://www.youtube.com/watch?v=wclY8Fu0TE  ... https://www.youtube.com/watch?v=bMbmQzV-Ezs ...

Evaluation: Prompts
1. What worked well in this lesson?
2. What part needs attention/fine tuning prior to re-delivery?
3. What would you recommend to a colleague in a similar situation?

Reflection: Prompts
1. Were you prepared?  What did you not need?  What did you miss?
2. Did the students enjoy the lesson?
3. Did you enjoy teaching the lesson?  What could (practically) make it more enjoyable?

Comments/Observations:

Appendix: Lesson 2 – Experiment Guide

<table>
<thead>
<tr>
<th>Name: Gas to Liquid</th>
<th>Investigating: Creating condensation</th>
<th>Work space: Inside/Outside</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qty. Ice bricks, [cubes, crushed, powdered]</td>
<td>Safety brief: 1. We are doing activities in class that have risks, if we follow the safety procedures, we will not get hurt. 2. Anyone not following the safety guidelines may hurt themselves or a mate, this is not acceptable. 3. This is the only warning, if you choose not to behave, then you shall miss out on the experiment 4. This activity involves adding 'heat energy' to objects including fire (flame), focused light energy, a stove top and will require supervision. Group leaders and TA will be assigned ‘sites’ to supervise.</td>
<td>Task:  Demonstrate your understanding of the states of matter by recording: 1. Describe the attributes of the object, is it solid/liquid etc. 2. What are you planning to do to change that? What will you use and why? 3. What happened, was that the plan and why do you think it did/did not work? 4. Make a video of your work and findings, no less than 2 minutes, no more than 4 minutes answering the key questions above. 5. Can the process be reversed? 6. What was the most effective method for changing the state of matter that you tested?</td>
</tr>
<tr>
<td>Magnifying glasses</td>
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<td>Pot and stove</td>
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<tr>
<td>Thermometers</td>
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<tr>
<td>Various containers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qty. Salt, sugar, bi-carb soda, detergent, sand, hay, compost, grass clippings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kettle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microwave</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- I am looking for students to theorise what will create condensation (the change of state from gas to liquid).  Of the resources in the school, what can we set up to test theories; will salt water produce more condensation than fresh?  Will adding an insulating material like hay or newspaper help or hinder?  Can we get condensation by
adding colour? What effect does the size of the container have? What if we push more air with a fan over the materials?

- This experiment provides an opportunity for the class to Explore the states of matter through hands-on visualisation.
- The safety aspect may provide an opportunity for community engagement by providing an opening for student supervision by family members or senior grades, [preparation as required].

<table>
<thead>
<tr>
<th>Subject: Science</th>
<th>Topic: States of Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title: Zombie Snacks</td>
<td>Serial: 3/6 Date: / /16</td>
</tr>
<tr>
<td>Session: After lunch</td>
<td>Class Size: 29</td>
</tr>
<tr>
<td>Timing: 90 minutes</td>
<td>Grade: 5</td>
</tr>
</tbody>
</table>

**Cohort Diversity:** 24 Indigenous (5 Individual Learning Program [ILP] – all have devices), 3 Non-Indigenous are high achieving, and 2 additional non-Indigenous who have poor attendance but perform at an average level.

**Behavior Management:**
1. Rewards – group points for tally mark, encouragement and positive action
2. Modified tasking for focus/literacy challenge. Reward success
3. Distract and re-focus: Brain Gym activity and return to task. Reward when focused
4. Relocate student, possibly review actions at recess/lunch. Reward if successful

**Curriculum Objective:**
ACSSU077 - exploring the way solids, liquids and gases change under different situations such as heating and cooling
- recognising that not all substances can be easily classified on the basis of their observable properties
ACSSI090 - identifying similarities and differences in qualitative data in order to group items or materials

**Learning Intention:** Students be able to recall the states of matter and identify the processes for the changes.

**Resources:**
1. IWB and video links
2. IWB and ‘blank page’ for KWL chart (variety of software)
3. Theme work books/E-device/Computer (desk equipment – pencils, erasers, pens etc.)
4. Experiment – see Appendix – Lesson 3 Experiment Guide

**Success Criteria:**
1. Students recall facts, information and other relevant data to illustrate an understanding of the states of matter.
2. Students construct and present this information in a scientific report format
3. Students pose questions and dictate any particular interests which may be investigated during the unit.

**Assessment:**
1. Participation – Observations of student involvement
2. Participation – Direct Questioning
3. Diagnostic – Assessment of report (see rubric)
3. See Lesson Appendix

**Rubric:**

<table>
<thead>
<tr>
<th>Time</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:15</td>
<td>2. <strong>Structured discussion</strong> based on our experiment in the last lesson, has anything evolved or our understanding of the concept developed on the KWL chart, students to scribe on the IWB (Smart Board). Did anything in the video show us something we did not know, to put in the <strong>L</strong>(earnt) section.</td>
</tr>
<tr>
<td>13:40</td>
<td>3. <strong>How much do we have to heat something to turn it into a liquid?</strong> At what point does a solid ‘become’ a liquid?</td>
</tr>
<tr>
<td>13:45</td>
<td>4. <strong>Demonstration</strong> (15 minutes) – Hard boil 4 eggs, put it onto some toast, take one out after 2 minutes (uncooked), take one out after 5 minutes to have ‘soft and runny’. Leave the others in for another 1 minute and 4 minutes. Can you burn an eggs this way? Can we now cool the egg to make it back into a liquid?</td>
</tr>
<tr>
<td></td>
<td>5. <strong>Experiment – Zombie Snacks:</strong> Melt some of the items available for the experiment and try to figure out a way to return them to the original state, can they...</td>
</tr>
</tbody>
</table>
come back from the dead? Photograph and document your activities for your report. You have 15 minutes to write the experiment up and have it approved and 40 minutes to complete the experiment. You may work in small groups and will need to demonstrate for the class how you achieved each state.

**6. Conclusion:** We have developed our ideas on the processes which affect the change in state of materials. **Class Feedback:** Who: worked well? Was rewarded? What did they do differently to someone who did not get a reward? Anyone stuck or not understanding?

**Differentiate**

1. Have a play with the app to demonstrate the way temperature influences water. 2. Record a short video and email it to me to demonstrate your understanding of the states of matter based on your interaction with this app.

b) Follow this link: Print out the worksheet – fill in the blanks, ensure your name is on it and hand the completed sheet in. Record a short video and email it to me to demonstrate what you know about gas returning to a liquid state. What happens if you keep cooling the liquid?

c) Additional videos: Volcano [https://www.youtube.com/watch?v=oMxIlXW56cQ](https://www.youtube.com/watch?v=oMxIlXW56cQ) ... Tavurvur [https://www.youtube.com/watch?v=ha2ornJh7dc](https://www.youtube.com/watch?v=ha2ornJh7dc) ... the water cycle [https://www.youtube.com/watch?v=wv_9urMlm64](https://www.youtube.com/watch?v=wv_9urMlm64)

**Evaluation:** **Prompts**
1. What worked well in this lesson?
2. What part needs attention/fine tuning prior to re-delivery?
3. What would you recommend to a colleague in a similar situation?

**Reflection:** **Prompts**
1. Were you prepared? What did you not need? What did you miss?
2. Did the students enjoy the lesson?
3. Did you enjoy teaching the lesson? What could (practically) make it more enjoyable?

**Comments/Observations:**

**Appendix: Lesson 3 – Experiment Guide**

<table>
<thead>
<tr>
<th>Name: Zombie Snacks</th>
<th>Investigating: Creating condensation</th>
<th>Work space: Inside/Outside</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> Qty. Ice bricks, [cubes, crushed, powdered] Magnifying glasses Pot and stove Thermometers Various containers Qty. Salt, sugar, bi-carb soda, detergent, sand, hay, Kettle Microwave Fan Chocolate block, lemonade/drink marshmallows, cheese, eggs, potato chips, bread, glass, etc.</td>
<td><strong>Safety brief:</strong> 1. We are doing activities in class that have risks, if we follow the safety procedures, we will not get hurt. 2. Anyone not following the safety guidelines may hurt themselves or a mate, this is not acceptable. 3. This is the only warning, if you choose not to behave, then you shall miss out on the experiment 4. This activity involves adding ‘heat energy’ to objects including fire (flame), focused light energy, a stove top and will require supervision. Group leaders and TA will be assigned ‘sites’ to supervise.</td>
<td><strong>Task:</strong> Demonstrate your understanding of the states of matter by recording: 1. Describe the attributes of the object, is it solid/liquid etc. 2. What are you planning to do to change that? What will you use and why? 3. What happened, was that the plan and why do you think it did/did not work? 4. Make a video of your work and findings, no less than 2 minutes, no more than 4 minutes answering the key questions above. 5. Can the process be reversed? 6. What was the most effective method for changing the state of matter that you tested?</td>
</tr>
</tbody>
</table>
Comments:
- I am looking for students to theorise what materials can have their state of matter changed and reversed with little to no permanent damage. Can cheese melt (even boil) and then return to the solid condition? Can the other materials, chocolate, eggs, bread? Can a liquid like lemonade be boiled to a gas and returned to lemonade through condensation? Why/Why not? What is the difference between lemonade and water? What about other liquids, would they be possible? Can bread be turned into a liquid and then gas and return through a process of condensation to liquid and back to solid? Why/why not? Theorise if it is possible, why you think this and can you add anything to the material to make it possible, (salt, sugar, colouring, insulation, detergent – tell me what you think and why)?
- This experiment provides an opportunity for the class to Explore the states of matter through hands-on visualisation.
- The safety aspect may provide an opportunity for community engagement by providing an opening for student supervision by family members or senior grades, [preparation as required].

<table>
<thead>
<tr>
<th>Subject: Science</th>
<th>Topic: States of Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title: Mind Map</td>
<td>Serial: 4/6 Date: 1/16</td>
</tr>
<tr>
<td>Session: After lunch</td>
<td>Class Size: 29</td>
</tr>
<tr>
<td>Timing: 90 minutes</td>
<td>Grade: 5</td>
</tr>
</tbody>
</table>

Cohort Diversity: 24 Indigenous (5 Individual Learning Program [ILP] – all have devices), 3 Non-Indigenous are high achieving, and 2 additional non-Indigenous who have poor attendance but perform at an average level.

Learning Intention: Students be able to recall the states of matter and identify the processes for the changes.

Success Criteria:
1. Students recall facts, information and other relevant data to illustrate an understanding of the states of matter.
2. Students construct and present this information in a scientific report format
3. Students pose questions and dictate any particular interests which may be investigated during the unit.

Behavior Management:
1. Rewards – group points for tally mark, encouragement and positive action
2. Modified tasking for focus/literacy challenge. Reward success
3. Distract and re-focus: Brain Gym activity and return to task. Reward when focused
4. Relocate student, possibly review actions at recess/lunch. Reward if successful

Curriculum Objective:
ACSSU077 - exploring the way solids, liquids and gases change under different situations such as heating and cooling
- recognising that not all substances can be easily classified on the basis of their observable properties
ACSSID090 - identifying similarities and differences in qualitative data in order to group items or materials

Resources:
1. IWB and video links
2. IWB and ‘blank page’ for KWL chart (variety of software)
3. Theme work books/E-device/Computer (desk equipment – pencils, erasers, pens etc.)

Assessment:
1. Participation – Observations of student involvement
2. Participation – Direct Questioning
3. Diagnostic – Assessment of report (see rubric)

Time Program
13:05 1. WARM UP: Video – Solid…liquids [link]
2. Structured discussion based on our experiment in the last lesson, has anything evolved or our understanding of the concept developed on the KWL chart,
**Subject:** Science  
**Topic:** States of Matter

### Behavior Management:
1. **Rewards** – group points for tally mark, encouragement and positive action
2. **Modified tasking** for focus/literacy challenge. Reward success
3. **Distract and re-focus:** Brain Gym activity and return to task. Reward when focused
4. **Relocate student,** possibly review actions at recess/lunch. Reward if successful

### Evaluation: Prompts
1. What worked well in this lesson?
2. What part needs attention/fine tuning prior to re-delivery?
3. What would you recommend to a colleague in a similar situation?

### Reflection: Prompts
1. Were you prepared? What did you not need? What did you miss?
2. Did the students enjoy the lesson?
3. Did you enjoy teaching the lesson? What could (practically) make it more enjoyable?

### Comments/Observations:

---

### Subject/Observations:

| **Title:** Survivor Man | **Serial:** 5/6 | **Date:** / /16 |
| **Session:** After lunch | **Class Size:** 29 |
| **Timing:** 90 minutes | **Grade:** 5 |

### Cohort Diversity:
24 Indigenous (5 Individual Learning Program [ILP] – all have devices), 3 Non-Indigenous are high achieving, and 2 additional non-Indigenous who have poor attendance but perform at an average level.

### Curriculum Objective:
- **ACSSU077** - exploring the way solids, liquids and gases change under different situations such as heating and cooling  
- recognising that not all substances can be easily classified on the basis of their observable properties  
- **ACSHO081** - testing predictions relating to the behaviour of solids, liquids and gases by conducting observational experiments

---

![Image](https://www.example.com/image.png)
Learning Intention: Students be able to recall the states of matter and identify the processes for the changes.

Resources: 1. IWB and video links
2. IWB and ‘blank page’ for KWL chart (variety of software)
3. Theme work books/E-device/Computer (desk equipment – pencils, erasers, pens etc.)
4. Experiment – see Appendix – Lesson 5 Experiment Guide

Success Criteria:
1. Students recall facts, information and other relevant data to illustrate an understanding of the states of matter.
2. Students construct and present this information in a scientific report format
3. Students pose questions and dictate any particular interests which may be investigated during the unit.

Assessment:
1. Participation – Observations of student involvement
2. Participation – Direct Questioning
3. Diagnostic – Assessment of report (see rubric)

Time | Program
--- | ---
2. Structured discussion based on our experiment in the last lesson, has anything evolved or our understanding of the concept developed on the KWL chart, students to scribe on the IWB (Smart Board). Did anything in the video show us something we did not know, to put in the L(earnt) section.
3. Instead of cooling an object, can we reverse the process by heating it to condense gaseous vapour to liquid ?
13:15 | 4. Demonstration Solar Still demonstration – surviving in the wilderness. Have hole dug in sand, place bowl with leaves, grass and bush surrounding bowl. Cover the hole, bowl and material with clear plastic and seal the sides with sand. Place a small rock to create a lowest point over the bowl for the condensation to drip.
13:40 | 5. Experiment – Using chilled surfaces and eye droppers, can we rapidly ‘freeze’ various liquids?
14:20 | 6. Conclusion: We have developed our ideas on the processes which affect the change in state of materials and are working to be able to define the states with greater accuracy and with greater reasoning.
13:30 | What worked well in this lesson?
1. What part needs attention/fine tuning prior to re-delivery?
2. What would you recommend to a colleague in a similar situation?
3. Did you enjoy teaching the lesson? What could (practically) make it more enjoyable?

1. Have a play with the app to demonstrate the way temperature influences water. 2. Record a short video and email it to me to demonstrate your understanding of the states of matter based on your interaction with this app.

b) Follow this link: Print out the worksheet – fill in the blanks, ensure your name is on it and hand the completed sheet in. Record a short video and email it to me to demonstrate what you know about gas returning to a liquid state. What happens if you keep cooling the liquid?
c) Additional videos: Volcano [https://www.youtube.com/watch?v=oMxIlXW56cQ](https://www.youtube.com/watch?v=oMxIlXW56cQ) Tavurvur [https://www.youtube.com/watch?v=ha2ornJh7dc](https://www.youtube.com/watch?v=ha2ornJh7dc) the water cycle [https://www.youtube.com/watch?v=wv_9urMlm64](https://www.youtube.com/watch?v=wv_9urMlm64)

Evaluation: Prompts
1. What worked well in this lesson?
2. What part needs attention/fine tuning prior to re-delivery?
3. What would you recommend to a colleague in a similar situation?

Reflection: Prompts
1. Were you prepared? What did you not need? What did you miss?
2. Did the students enjoy the lesson?
3. Did you enjoy teaching the lesson? What could (practically) make it more enjoyable?
# Appendix: Lesson 5 – Experiment Guide

<table>
<thead>
<tr>
<th>Name:</th>
<th>Chill Out</th>
<th>Investigating:</th>
<th>Creating condensation</th>
<th>Work space:</th>
<th>Inside/Outside</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qty. Ice bricks, [cubes, crushed, powdered]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold water, lemonade, detergent, coffee, tea, oil, Dettol, lavender/eucalyptus oils</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Thermometers</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Various containers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safety brief:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. We are doing activities in class that have risks, if we follow the safety procedures, we will not get hurt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Anyone not following the safety guidelines may hurt themselves or a mate, this is not acceptable.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. This is the only warning, if you choose not to behave, then you shall miss out on the experiment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. This activity involves adding ‘heat energy’ to objects including fire (flame), focused light energy, a stove top and will require supervision. Group leaders and TA will be assigned ‘sites’ to supervise.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Task:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrate your understanding of the states of matter by recording:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Describe the attributes of the object, is it solid/liquid etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. What are you planning to do to change that? What will you use and why?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. What happened, was that the plan and why do you think it did/did not work?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Make a video of your work and findings, no less than 2 minutes, no more than 4 minutes answering the key questions above.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. Can the process be reversed?</td>
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<td></td>
<td></td>
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<tr>
<td>6. What was the most effective method for changing the state of matter that you tested?</td>
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</tr>
</tbody>
</table>

**Comments:**
- I am looking for students to theorise and experiment if water and other solutions will freeze rapidly. There are several factors involved, volume, liquid properties, surface/container the material contacts and it’s temperature. Students should be guided towards posing theories like lemonade will freeze if it touches cold glass. Melted cheese/chocolate will turn into a solid at what temperature, and is this constant? Does salt water behave the same way as fresh? Flat vs. Fizzy. Plastic vs. Glass etc.
- This experiment provides an opportunity for the class to Explore the states of matter through hands-on visualisation.
- The safety aspect may provide an opportunity for community engagement by providing an opening for student supervision by family members or mentoring from senior grades, [preparation as required].

<table>
<thead>
<tr>
<th>Subject:</th>
<th>Science</th>
<th>Topic: States of Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>Culmination</td>
<td>Serial: 6/6</td>
</tr>
<tr>
<td>Session:</td>
<td>After lunch</td>
<td>Class Size: 29</td>
</tr>
<tr>
<td>Timing:</td>
<td>90 minutes</td>
<td>Grade: 5</td>
</tr>
</tbody>
</table>

**Behavior Management:**
1. Rewards – group points for tally mark, encouragement and positive action
2. Modified tasking for focus/literacy challenge. Reward success
3. Distract and re-focus: Brain Gym activity and return to task. Reward when focused
4. Relocate student, possibly review actions at recess/lunch. Reward if successful

**Curriculum Objective:**
- ACSSU077 - exploring the way solids, liquids and gases change under different situations such as heating and cooling
- recognising that not all substances can be easily classified on the basis of their observable properties
- ACSHE081 - testing predictions relating to the behaviour of solids, liquids and gases by conducting
**Learning Intention:** Students be able to recall the states of matter and identify the processes for the changes.

**Resources:**
1. IWB and video links
2. IWB and 'blank page' for KWL chart (variety of software)
3. Theme work books/E-device/Computer (desk equipment – pencils, erasers, pens etc.)

**Success Criteria:**
1. Students recall facts, information and other relevant data to illustrate an understanding of the states of matter.
2. Students construct and present this information in a scientific report format
3. Students pose questions and dictate any particular interests which may be investigated during the unit.

**Assessment:**
1. Participation – Observations of student involvement
2. Participation – Direct Questioning
3. Summative – See Assessment Guide

<table>
<thead>
<tr>
<th>Time</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:15</td>
<td>2. Structured discussion based on our experiment in the last lesson, has anything evolved or our understanding of the concept developed on the KWL chart, students to scribe on the IWB (Smart Board). Did anything in the video show us something we did not know, to put in the L(earnt) section.</td>
</tr>
<tr>
<td>13:40</td>
<td>3. ASSESSMENT TASK: You are to reflect upon your learning over the past 5 lessons and combine the knowledge of ‘states of matter’ into a demonstration of your learning. Let me know what you have learnt. You are to create a demonstration which is no less than 2 minutes and no more than 5 minutes in length, it can be a video, song, interpretive dance or physical demonstration.</td>
</tr>
<tr>
<td>14:20</td>
<td>4. Conclusion: Closely examine the KWL chart, what was the most fun? In the Learnt section, were there any things that we thought we already KNEW? Link to future learning, year 6/7/8 chemistry relies upon understanding of the behavior of molecules and the state they are in. <strong>Class Feedback:</strong> Who: worked well? Was rewarded? What did they do differently to someone who did not get a reward? Anyone stuck or not understanding? Any questions</td>
</tr>
<tr>
<td>14:30</td>
<td>5. Evaluation: For your learning over the past 5 lessons, and complete the KWL chart, what was the most fun? What did you learn that you already KNEW? Link to future learning. <strong>Class Feedback:</strong> Who: worked well? Was rewarded? What did they do differently to someone who did not get a reward? Anyone stuck or not understanding? Any questions</td>
</tr>
</tbody>
</table>

**Differentiate**


1. Have a play with the app to demonstrate the way temperature influences water. 2. Record a short video and email it to me to demonstrate your understanding of the states of matter based on your interaction with this app.

**b)** Follow this link: Print out the worksheet – fill in the blanks, ensure your name is on it and hand the completed sheet in. Record a short video and email it to me to demonstrate what you know about gas returning to a liquid state. What happens if you keep cooling the liquid?

**c)** Additional videos: Volcano [https://www.youtube.com/watch?v=oMxIlXW56cQ](https://www.youtube.com/watch?v=oMxIlXW56cQ) : Tavurvur [https://www.youtube.com/watch?v=ha2ornJh7dc](https://www.youtube.com/watch?v=ha2ornJh7dc) ... the water cycle [https://www.youtube.com/watch?v=wv_9urMlm64](https://www.youtube.com/watch?v=wv_9urMlm64)

**Evaluation: Prompts**
1. What worked well in this lesson?
2. What part needs attention/fine tuning prior to re-delivery?
3. What would you recommend to a colleague in a similar situation?

**Reflection: Prompts**
1. Were you prepared? What did you not need? What did you miss?
2. Did the students enjoy the lesson?
3. Did you enjoy teaching the lesson? What could (practically) make it more enjoyable?

**Comments/Observations:**
### Assessment

<table>
<thead>
<tr>
<th>Type of assessment</th>
<th>What will be assessed</th>
<th>Method</th>
<th>% Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>Overall participation in class discussions and activities throughout the course of the unit.</td>
<td>Observations</td>
<td>20%</td>
</tr>
<tr>
<td>ICT</td>
<td>Student’s ability to use ICT effectively to complete and submit tasks.</td>
<td>Observations</td>
<td>20%</td>
</tr>
<tr>
<td>Experiment</td>
<td>Ability to work together as a class and in small groups to complete experiments.</td>
<td>Observations, Questioning</td>
<td>10%</td>
</tr>
<tr>
<td>Report</td>
<td>The clarity of the report findings based on the technique employed in the practical experimentation.</td>
<td>Rubric</td>
<td>25%</td>
</tr>
<tr>
<td>Article</td>
<td>Student’s ability to work individually or in a group to organise and evenly distribute tasks amongst each other. Research is put into own words. Evidence of sentences/paragraphs used to structure article. Spelling punctuation will be checked for errors. Article identifies states of matter, processes of change and simple articulate explanation. Article demonstrates a good understanding of the topic.</td>
<td>Rubric</td>
<td>25%</td>
</tr>
</tbody>
</table>

Students understanding of the topic will be assessed by using a variety of formative and summative assessment strategies throughout the course of this unit.

**Formative assessment**

Formative assessment will be used as an ongoing diagnostic evaluation to gauge a student’s progress by recording observations and questioning a student understanding, **Summative assessment**

Summative assessments for this unit will be an article explaining in the student’s own terms what are the states of matter, what are the differences and processes between each of the ‘states’ in an articulate and well-presented manner.

### Formative Assessment By Observations - Key

<table>
<thead>
<tr>
<th>Group</th>
<th>Grading Tally Rubric</th>
<th>Identified Observation Comments</th>
<th>Summative Assessment Rubric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Learning Program (ILP) / General Population (G.Pop)</td>
<td>1-D, 5-C, 8+B, 12+A</td>
<td><strong>Comments:</strong> 1. On-Task, focused, 2. Productive 3. Direct, factual &amp; accurate 4. Reasoning/Question <strong>Tally:</strong></td>
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<tr>
<td>High Achievement (H.Ach)</td>
<td>2-D, 7-C, 9+B, 13+A</td>
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<td>25% - Accuracy</td>
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<tr>
<td>Special Education Needs (SEN)</td>
<td>1-D, 3-C, 5+B, 9+A</td>
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<tr>
<td><strong>Summative Assessment Rubric [Expanded]</strong></td>
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<td><strong>25% - Artefact</strong></td>
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