

# Change Detectives – Stage 3

Material World Strand

Term	1	2	3	4	Weeks	1	2	3	4	5	6	7	8	9	10	11
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Outcome	Lesson Sequence – Overview	Resources	Word Wall
<p>ST3-6MW-S explains the effect of heat on the properties and behaviour of materials</p> <ul style="list-style-type: none"> <li>identify evidence of changes that occur</li> <li>describe their existing ideas of what causes change</li> <li>explain why they think changes can or cannot be reversed.</li> </ul> <p>ST3-1WS-S plans and uses materials, tools and equipment to develop solutions for a need or opportunity</p> <ul style="list-style-type: none"> <li>contribute to discussions about changes to common materials</li> <li>identify the purpose and features of a science journal</li> <li>make predictions and record observations in the class science journal</li> <li>understand the purpose and features of a</li> </ul>	<p><b>Lesson 1</b></p> <p><u>Mess scene investigation – Lesson focus p11</u></p> <ul style="list-style-type: none"> <li>To capture students' interest and find out what they think they know about changes that occur to materials in their everyday lives.</li> <li>To elicit students' questions about why certain changes occur and whether or not they are easily reversible.</li> </ul> <p><u>Students:</u></p> <ul style="list-style-type: none"> <li><i>observe and record information about some common changes to materials</i></li> <li><i>share and discuss observations.</i></li> </ul>	<p>For the class</p> <ul style="list-style-type: none"> <li>class science journal</li> <li>word wall</li> <li>'Mess scene' (see 'Preparation')</li> <li><i>optional:</i> digital camera</li> </ul> <p>For each team</p> <ul style="list-style-type: none"> <li>role wristbands or badges for Director, Manager and Speaker</li> <li>each team member's science journal</li> </ul>	<p><i>acidic</i></p> <p><i>accuracy</i></p> <p><i>alkaline</i></p> <p><i>appearance</i></p> <p><i>boil</i></p> <p><i>burning</i></p> <p><i>change</i></p> <p><i>characteristics</i></p> <p><i>chemical</i></p> <p><i>composition</i></p> <p><i>condensation</i></p> <p><i>dissolving</i></p> <p><i>essence</i></p> <p><i>evaporation</i></p> <p><i>fair test</i></p>

summary and a report.			freeze gas investigation irreversible
<p>ST3-6MW-S explains the effect of heat on the properties and behaviour of materials</p> <ul style="list-style-type: none"> <li>plan an investigation, with teacher support</li> <li>make predictions about what factors will make an ice cube melt fastest and a liquid evaporate fastest</li> <li>observe, record and interpret the results of their investigation</li> <li>describe the effect of temperature on phase change</li> <li>explain that the same substance can change state and be a liquid, a solid, or a gas</li> <li>explain why they can smell evaporated liquids.</li> </ul> <p>ST3-1WS-S</p>	<p><b>Lesson 2</b> <u>Purely physical – Lesson focus p</u></p> <ul style="list-style-type: none"> <li>To provide students with hands-on, shared experiences of melting and evaporation, and a model used to represent them.</li> </ul> <p><b>Session 1</b> Mostly melting <u>Students:</u></p> <ul style="list-style-type: none"> <li><i>test whether melted or frozen objects can be returned to their original state</i></li> <li><i>observe and record the factors that make an ice cube melt the fastest.</i></li> </ul> <p><b>Session 2</b> Playing particles <u>Students:</u></p> <ul style="list-style-type: none"> <li><i>represent what happens when a solid melts.</i></li> </ul> <p><b>Session 3</b> Evocative evaporation <u>Students:</u></p> <ul style="list-style-type: none"> <li><i>discuss why they can smell evaporated liquids</i></li> <li><i>observe and record the factors that make a liquid evaporate the fastest</i></li> <li><i>describe what happens when a liquid evaporates.</i></li> </ul>	<p><b>Session 1</b> For the class</p> <ul style="list-style-type: none"> <li>class science journal</li> <li>word wall</li> <li>1 enlarged copy of 'PROE record: Purely physical' (Resource sheet 1)</li> <li>1 non-melted chocolate button</li> <li>1 glass of milk</li> </ul> <p>For each team</p> <ul style="list-style-type: none"> <li>role wristbands or badges for Director, Manager and Speaker</li> <li>each team member's science journal</li> <li>1 copy of 'PROE record: Purely physical' (Resource sheet 1) per each team member</li> <li>1 frozen milk cube in a container (see 'Preparation')</li> <li>1 melted chocolate button (see 'Preparation')</li> <li>3 ice cubes in separate containers</li> </ul>	journal liquid measure melting molecules observation oxygen particles physical reaction reversible safety salt science

plans and uses materials, tools and equipment to develop solutions for a need or opportunity

- understand the purpose and features of a table
- use oral, written and visual language to record and discuss investigation results
- engage in a discussion to compare ideas, and use evidence from an investigation to explain that temperature has an effect on phase change
- role-play their understanding of the effect of temperature on phase change by using representational models of particles.



- 1 timing device (eg, a stopwatch or a watch with a second hand)
- equipment to investigate melting an ice cube (eg, towel, aluminium foil, glass of hot water)

#### Session 2

##### For the class

- class science journal
- word wall
- 1 melted ice pole in a clear wrapper
- 1 frozen ice pole in a clear wrapper

##### For each team

- science journal
- tray of marbles or small beads for each team
- *optional*: length of rope

#### Session 3

##### For the class

- class science journal
- word wall
- a small bottle of perfume, vinegar or essence
- 1 sheet of plastic (eg, an overhead transparency)
- 1 glass of water
- 1 straw
- heating equipment, such as: electric hot plate, hairdryer

*shape*

*size*

*smell*

*sodium bicarbonate*

*solid*

*soluble*


*solution*

*state*

*substance*

*texture*

		<p><b>For each team</b></p> <ul style="list-style-type: none"> <li>• role wristbands or badges for Director, Manager and Speaker</li> <li>• each team member's science journal</li> <li>• 10 ml water</li> <li>• a clock</li> </ul>	
<p><b>ST3-6MW-S explains the effect of heat on the properties and behaviour of materials</b></p> <ul style="list-style-type: none"> <li>• make predictions about the results from an investigation of the effect of the quantity of water on the amount of salt dissolved</li> <li>• plan and conduct an investigation follow directions to investigate a chemical reaction that produces the gas carbon dioxide</li> <li>• observe, record and interpret the results of their investigations</li> <li>• identify the features that made their investigation a fair test</li> <li>• explain that chemical change only occurs when all the</li> </ul>	<p><b>Lesson 3 Slippery solutions – Lesson focus p28</b></p> <ul style="list-style-type: none"> <li>• To provide students with hands-on, shared experiences of dissolving and a chemical reaction in water.</li> </ul> <p><b>Session 1 Delightful dissolving</b></p> <p><u>Students:</u></p> <ul style="list-style-type: none"> <li>• <i>observe salt dissolving in water</i></li> <li>• <i>devise and conduct tests to retrieve the salt in its original form.</i></li> </ul> <p><b>Session 2 Gas bags</b></p> <p><u>Students:</u></p> <ul style="list-style-type: none"> <li>• <i>observe and record what happens when a sodium bicarbonate solution mixes with a tartaric acid solution.</i></li> </ul>	<p><b>Session 1 For the class</b></p> <ul style="list-style-type: none"> <li>• class science journal</li> <li>• word wall</li> <li>• 1 enlarged copy of 'Salt dissolving table' (Resource sheet 2)</li> <li>• 1 x 300 ml measuring jug</li> </ul> <p><b>For each team</b></p> <ul style="list-style-type: none"> <li>• role wristbands or badges for Director, Manager and Speaker</li> <li>• each team member's science journal</li> <li>• 1 copy of 'Salt dissolving table' (Resource sheet 2)</li> <li>• 1 x 100 ml transparent container</li> <li>• 1 x 200 ml transparent container</li> <li>• 300 ml of water</li> <li>• 3 tablespoons of salt</li> <li>• 1 x ½ teaspoon measuring spoon</li> </ul>	

<p>necessary substances are present.</p> <p><b>ST3-1WS-S plans and uses materials, tools and equipment to develop solutions for a need or opportunity</b></p> <ul style="list-style-type: none"> <li>• identify the features and purpose of a procedural text</li> <li>• follow a procedural text to complete an investigation</li> <li>• use oral, written and visual language to describe, record and discuss investigation results</li> <li>• engage in discussion to compare ideas and relate evidence from an investigation to explanations about dissolving and reacting and to prior predictions</li> <li>• demonstrate understanding of dissolving and reacting using science journal entries.</li> </ul>		<p><b>Session 2</b> <b>For the class</b></p> <ul style="list-style-type: none"> <li>• class science journal</li> <li>• word wall</li> <li>• 1 enlarged copy of 'Fizzing investigation' (Resource sheet 3)</li> <li>• <i>optional</i>: digital camera to record students' findings</li> </ul> <p><b>For each team</b></p> <ul style="list-style-type: none"> <li>• role wristbands or badges for Director, Manager and Speaker</li> <li>• each team member's science journal</li> <li>• 1 copy of 'Fizzing investigation' (Resource sheet 3)</li> <li>• 6 teaspoons of sodium bicarbonate</li> <li>• 6 teaspoons of tartaric acid</li> <li>• 3 cups of non-acidic water (see 'Preparation')</li> <li>• 1 cup measure</li> <li>• 1 teaspoon</li> <li>• 4 transparent bottles of the same size (350–400 ml approximately)</li> <li>• 4 balloons</li> <li>• 1 labelling pen</li> <li>• 1 funnel</li> <li>• adhesive tape</li> <li>• 4 pieces of paper towel</li> </ul>	
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**ST3-6MW-S**  
explains the effect of heat on the properties and behaviour of materials

- observe and discuss the features of a candle
- make predictions about which features of candles allow them to burn
- with teacher support, plan an investigation of how a burning candle is affected by the amount of air available
- identify how to conduct the investigation safely
- observe, record and interpret the results of their investigation
- describe the conditions that are necessary for a candle to burn.

**ST3-1WS-S**  
plans and uses materials, tools and equipment to develop solutions for a need or opportunity

- use oral, written and visual language to report observations of candles
- identify the purpose and features of a graph

## Lesson 4

### Candle capers – Lesson focus p39

- To provide students with hands-on, shared experiences of burning candles.

#### Students:

- *observe candles and their separate parts*
- *investigate how candles need air (oxygen) to keep burning.*



#### For the class

- class science journal
- word wall
- 3 identical candles (see 'Preparation')
- matches
- lump of wax on a metal skewer
- length of wick
- 1 foil tray
- 1 tea-light candle
- 1 glass jar (eg, 250 ml)

#### For each team

- role wristbands or badges for Director, Manager and Speaker
- each team member's science journal
- 4 tea-light candles
- 4 glass jars of different sizes (see 'Preparation')
- matches
- 1 timing device (eg, a stopwatch or a watch with a second hand)

<ul style="list-style-type: none"> <li>engage in discussion to compare ideas and develop understanding about conditions that are necessary for a candle to burn</li> <li>demonstrate understanding of candles and burning through science journal entries.</li> </ul>			
<p>ST3-6MW-S explains the effect of heat on the properties and behaviour of materials</p> <p>ST3-7MW-T explains how the properties of materials determines their use for a range of purposes</p> <ul style="list-style-type: none"> <li>recognise a need for scientific classification</li> <li>create categories to group different changes</li> <li>explain the difference between physical and chemical change</li> <li>describe reactions as physical or chemical change,</li> </ul>	<p><b>Lesson 5</b>  <u>Classifying changes – Lesson focus p46</u></p> <ul style="list-style-type: none"> <li>To support students to represent and explain their understanding and observations of physical and chemical changes.</li> <li>To introduce current scientific views about physical and chemical changes.</li> </ul> <p><u>Students:</u></p> <ul style="list-style-type: none"> <li><i>discuss descriptions of physical and chemical change</i></li> <li><i>classify changes as physical or chemical changes.</i></li> </ul>	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>class science journal</li> <li>word wall</li> <li>1 enlarged copy of 'Changes card sort' (Resource sheet 4)</li> </ul> <p><b>For each team</b></p> <ul style="list-style-type: none"> <li>role wristbands or badges for Director, Manager and Speaker</li> <li>each team member's science journal</li> <li>1 copy of 'Changes card sort' (Resource sheet 4)</li> <li>A3 sheet of paper or butcher's paper</li> </ul>	

and give reasons for their choice.

**ST3-1WS-S**  
plans and uses materials, tools and equipment to develop solutions for a need or opportunity

- demonstrate understanding of the difficulties of classification systems through discussions
- engage in discussion to compare ideas about how to classify changes and provide relevant arguments to support their conclusions
- use scientific vocabulary appropriately in their writing and talking
- create a Venn diagram to present information.





**ST3-6MW-S**  
explains the effect of heat on the properties and behaviour of materials

- formulate a question and make predictions about what factors affect the speed of a chemical reaction
- plan and conduct fair tests of different factors to see if they affect the speed of a chemical reaction
- use equipment and materials safely
- make and record observations
- construct and identify patterns in a graph
- provide evidence to support their conclusions and suggest improvements to their investigation methods.

**ST3-1WS-S**  
plans and uses materials, tools and equipment to develop solutions for a need or opportunity

- represent results to decide what factors affect the speed of a chemical reaction
- summarise their findings about what

## Lesson 6

### Fizz whizz – Lesson focus p52

- To support students to plan and conduct an investigation of the factors that affect the rate of reactions.

#### Students:

- *formulate a question for investigation*
- *plan and set up an investigation to determine factors that affect the rate of reactions*
- *observe, record and share results.*

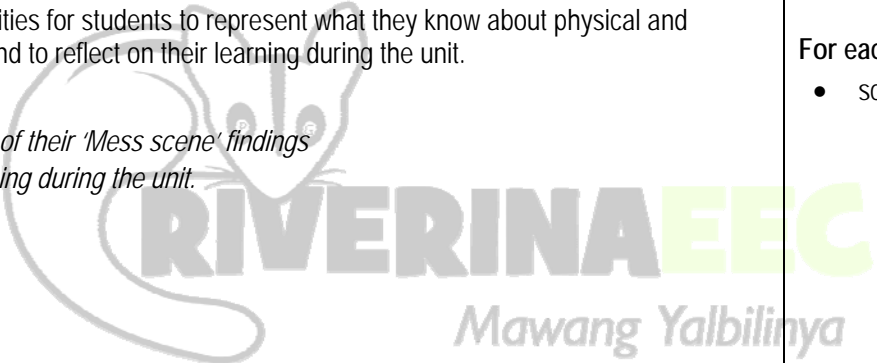


#### For the class

- class science journal
- word wall
- 1 enlarged copy of 'Tablet investigation planner' (Resource sheet 5)
- 1 fizzy tablet
- 1 glass of water
- 1 jug
- 1 timing device (eg, a stopwatch or a watch with a second hand)

#### For each team

- role wristbands or badges for Director, Manager and Speaker
- each team member's science journal
- 1 copy of 'Tablet investigation planner' (Resource sheet 5), A4 or A3 sized, for each student
- 3 fizzy tablets
- 3 plastic cups
- ½ cup measure
- spoon
- 1 timing device (eg, a stopwatch or a watch with a second hand)
- hot water (see 'Preparation')
- room temperature water
- ice-cold water

<p>factors affect the speed of a chemical reaction</p> <ul style="list-style-type: none"> <li>engage in discussion to compare ideas and provide relevant arguments to support their conclusions.</li> </ul>			
<p><b>ST3-6MW-S explains the effect of heat on the properties and behaviour of materials</b> describe different changes and why they have occurred</p> <ul style="list-style-type: none"> <li>identify changes as physical or chemical changes</li> <li>identify changes as reversible and irreversible</li> <li>describe investigations and support conclusions with evidence.</li> </ul> <p><b>ST3-1WS-S plans and uses materials, tools and equipment to develop solutions for a need or opportunity</b></p> <ul style="list-style-type: none"> <li>prepare an analytical report of their investigations which demonstrates understanding of physical and chemical changes</li> <li>summarise their findings concisely</li> <li>use language to clarify their</li> </ul>	<p><b>Lesson 7</b> <b>Intrepid reporters – Lesson focus p60</b></p> <ul style="list-style-type: none"> <li>To provide opportunities for students to represent what they know about physical and chemical changes and to reflect on their learning during the unit.</li> </ul> <p><b>Students:</b></p> <ul style="list-style-type: none"> <li><i>create a final report of their 'Mess scene' findings</i></li> <li><i>reflect on their learning during the unit.</i></li> </ul> 	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>class science journal</li> <li>word wall</li> </ul> <p><b>For each student</b></p> <ul style="list-style-type: none"> <li>science journal</li> </ul>	

<p>understanding and reflect on their experiences</p> <ul style="list-style-type: none"><li>• use language and visual representation to communicate their ideas in a report.</li></ul>			
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