SCIENCE
YEAR 5-6
Cycle A – Unit 3

Materials – changes

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RANGE

Sustainable Earth

3. a comparison of the features of some natural and man-made materials
4. the properties of materials related to their uses
5. how some materials are formed or produced

KEY VOCABULARY

solid
liquid
gas
freeze
melt
solidify
evaporation
condensation
reversible
irreversible
solution
variables
line graph
reliability
scale

Developing thinking
(Plan-Develop-Reflect integrated into activities)

LNF - Main Numeracy Strands covered*

Strand:
Developing numerical reasoning.
Elements:
Identify processes and connections.
Represent and communicate.
Review.

Strand:
Using measuring Skills.
Elements:
Length, weight/mass, capacity.
Time.
Temperature.
Area and volume, angle and position.

Strand:
Using data skills.
Elements:
Collect and record data, Present and analyse data, Interpret results.

**Refer to LNF Numeracy framework for details of specific skills within each element.*

LNF – Literacy (writing) opportunities

Element: Organising information and ideas
Writing accurately

Writing to inform and explain

Developing ICT

School to identify and provide opportunities for developing this skill within the scope of the unit.

Curriculum Cymreig

School to identify and provide opportunities for developing this skill within the scope of the unit.

Personal and social education

School to identify and provide opportunities for developing this skill within the scope of the unit.

Science – Medium Term Planning (half term)

Year Group	**5-6**	Term	**Cycle A – Unit 3**	Unit Title	**Materials – changes**

Range: ***Sustainable Earth***
3. a comparison of the features of some natural and man-made materials
4. the properties of materials related to their uses
5. how some materials are formed or produced

Cross Curricular Links:

Skills (Principal skills in bold italics)	**Suggested activities**	**Resources and web links**	**Assessment Opportunities**
PLAN ***Identify gaps in prior knowledge*** Ask relevant questions	**1. Big Question: What do you know about materials?** **Changing Materials: NGfL KS2 science** Introduce topic and elicit pupils' ideas about the nature of materials, changing state and how some everyday materials are formed or produced. Consider using: • An odd-one-out activity or online interactive activities. • Begin to create a graffiti board of pupils' questions. In particular, establish pupils' ideas about key vocabulary, including: solids, liquids, gases, melting, cooling, freezing, evaporation, condensation, reversible, irreversible. Consider a true/false activity to elicit specific areas of uncertainty. Begin to create a KWL grid.	http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e24-changing-materials/index.html Concept Cartoons	Use preferred diagnostic strategy/tool

PLAN ***Identify key variables*** ***Outline plan/method*** **DEVELOP** Use equipment and apparatus correctly and safely **REFLECT** Describe how they have learned	**2. Big Question: Heating water - where does all the water go?** **Changing Materials: NGfL KS2 science**. Discuss video clips and examples of changing state from Task 4. Explain concept of evaporation and everyday examples. Can pupils list more examples? **Introduce the skill – Identifying key variables and plan method** Use Concept Cartoons to trigger discussion – what factors will control how quickly water evaporates from a saucer/bowl? • How will pupils explore and answer this question? Groups discuss and outline a plan/method. • What factor will they change? (e.g. size of bowl, temp in room) • What will they measure? • How will they record their findings? • What equipment will pupils require? **Practise the skill – Identifying key variables and plan method** • Pupils to undertake the fair test enquiry • Tabulate their findings • Some pupils may elect to use the datalogger to measure temperature • Discuss findings? What do pupils notice? • What are the conclusions they can draw from their work? • Does water always need to be warm for it to evaporate? **To write to inform** **Text type: science write-up/report**	http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e24-changing-materials/index.html http://www.bbc.co.uk/education/subjects/z2pfb9q Concept Cartoon template	***Can pupils recognise variables with support? (Level 4)*** ***Can pupils recognise all key variables? (Level 5)*** ***Can pupils use scientific knowledge and skills to plan? (Level 4)*** Can pupils draw conclusions and form considered opinions? (Level 4)
PLAN Plan the process/method to be used Control hazards and risks **DEVELOP** ***Make careful observations*** ***Explain using prior knowledge*** **REFLECT** Link learning to similar situations within and outside school.	**3. Big Question: Why does water often appear on cold surfaces?** **Changing Materials: NGfL KS2 science**. Discuss video clips and examples of changing state from Task 4. Explain concept of condensation using everyday examples. Can pupils list more examples around the home? **Introduce the skill – Make careful observations and explain findings** • Place cling film over a bowl of warm water and place ice cubes on top side of the cling. • Observe water droplets condensing on the underside of the cling film. • Consider using a datalogger. • Are there any patterns apparent? Do more droplets occur nearer the ice cubes? **Practise the skill – Make careful observations and explain findings** • Ask pupils to observe and record their observations. • How will they record observations? Writing, drawing, video, photos? • Discuss findings and produce an annotated diagram/photo to explain the concept of condensation. • Consider producing cartoon strip (using computer software, e.g. Comic Life) to communicate work. **To write to inform/explain** **Text type: annotated diagrams and/or non-chronological report**	Ice cubes Cling film Bowls http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e24-changing-materials/index.html http://www.bbc.co.uk/education/subjects/z2pfb9q	***Can pupils make qualitative observations and use standard equipment to measure using SI units? (Level 4)*** ***Can pupils select the measuring instruments that allow them to make accurate measurements? (Level 5)*** Can pupils identify patterns and trends? (Level 4)

PLAN Outline the plan/method **DEVELOP** ***Make careful observations using digital equipment*** ***Check observations by repeating them*** **REFLECT** Suggest how the method could have been improved	**4. Big Question: Cooling drinks - is one ice cube more effective than several small ones?** Discuss key question and elicit pupils' ideas and/or predictions. Can they use science concepts to justify their ideas? **Introduce the skill – Check observations by repeating them for reliability** • Review the datalogger and allow all pupils to familiarize themselves with recording temp. • Challenge pupils to devise a test to answer the ice cube question (do smaller/more ice cubes keep a liquid cooler for longer?) • Discuss variables associated with this fair test enquiry. **Practise the skill – Check observations by repeating them for reliability** • Pupils to select a testable question. Outline plan/method and carry out. • Option 1: vary the number of ice cubes and record time taken to warm to a given temperature (bar chart). • Option 2: monitor the temperature change over time for given numbers of ice cubes (line graph). • Record observations – tabulate and consider 3 repeat readings for reliability. • Discuss average – mean, mode and median.	Interactive planning templates Ice cubes Bowls Thermometers Datalogger http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e24-changing-materials/index.html http://www.bbc.co.uk/education/subjects/z2pfb9q	***Can pupils select the measuring instruments that allow them to make accurate measurements? (Level 5)*** ***Do pupils consider reliability? (Level 5)***
COMMUNICATION ***Communicate using tables, bar and line graphs*** **REFLECT** Suggest how the method could have been improved	**5. Big Question: Cooling drinks - is one ice cube more effective than several small ones? …cont.** **Practise the skill – Using bar charts and line graphs** • Review knowledge of graph types – explain nature of categoric and continuous data. (Words plotted against numbers produce a bar chart; numbers plotted against numbers produce a line graph.) • Create bar chart or line graph (depending on chosen variables). • More able pupils: construct their own bar chart, selecting axes and scales. • What patterns can pupils describe from their findings? ***Confirm pupils' understanding of key concepts of solids/liquids/gases and evaporation/condensation.***	Interactive planning templates http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e24-changing-materials/index.html http://www.bbc.co.uk/education/subjects/z2pfb9q	***Can pupils select the appropriate type of graph to use? (Level 5)*** ***Can pupils use line graphs to describe the relationship between two continuous variables? (Level 5)***

PLAN Search for relevant information Ask relevant questions **DEVELOP** ***Make careful observations using digital equipment*** ***Explain using prior knowledge*** **REFLECT** Decide whether the method was successful	**6. Big Question: Reversible or irreversible changes?** **Changing Materials: NGfL KS2 science**. Task 1 & 2 - discuss video clips and examples of what happens when a range of materials is mixed with water to produce a mixture, e.g. salt, flour, sugar, sand etc. (Changes of state and mixing materials are examples of physical changes.) **Introduce the skill – Making careful observations and explaining** • Share further examples and video clips of materials burning and cooking. • Are new materials formed when paper burns or toast is cooked? How do we know? • What happens to the original material when it is heated/cooked? • Discuss reversible/irreversible (physical and chemical) changes. • Discuss safety implications of observing objects burning in class (teacher demo – see ASE 'Be Safe' guide). **Practise the skill – Making careful observations and explaining** • Present pupils with a series of materials/objects and ask them to describe what happens when they are heated. Sort the changes into reversible/irreversible changes. • Consider ideas and activities from OAM unit 10 – What's Cooking? • Can pupils explain their observations using scientific ideas?	Variety of books, websites etc http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e24-changing-materials/index.html OAM unit 10	***Can pupils make qualitative observations and use standard equipment to measure using SI units? (Level 4)*** ***Can pupils select the measuring instruments that allow them to make accurate measurements? (Level 5)*** ***Can pupils explain using science ideas? (Level 4)***
PLAN ***Select success criteria*** ***Consider hazards and risks*** **DEVELOP** ***Use equipment correctly and safely*** **REFLECT** Describe how they have learned	**7. Big Question: What reversible and irreversible changes occur in the kitchen?** Introduce the question: What examples of reversible and irreversible changes in the kitchen can pupils list? Are there any changes of state in the kitchen? **Changing Materials: NGfL KS2 science**. Task 2 - discuss food and recipe ideas. **Introduce the skill – Set success criteria and consider risks/hazards** • Challenge pupils to identify a number of recipes that involve irreversible changes. • Select a recipe and plan method. • Identify success criteria for a method and practical work. • Consider health and safety and practicality of chosen recipe. **Practise the skill – Set success criteria and consider risks/hazards** • Remind pupils of their success criteria. • Pupils to prepare chosen recipe. • Review success criteria. **To write to instruct** **Text type: recipe/non-chronological report**	Chosen ingredients	***Can pupils select success criteria? (Level 4)*** ***Can pupils select and justify success criteria? (Level 5)*** ***Can pupils follow the planned method and use standard equipment? (Level 4)***
DEVELOP ***Use some prior knowledge to explain*** **REFLECT** Begin to evaluate outcome against success criteria	**8. Big Question: What have you learned about changing materials?** **Introduce the skill – Use prior knowledge to explain** • Show pupils new concept cartoon linked to materials topic and/or use template to create their own cartoon. Discuss. • How have pupils' ideas moved on? • Pupils create their own science randomizer game. • Review the work on materials - list new ideas and knowledge. • Consider a concept map linking ideas on solids, liquids, gases, reversible/irreversible changes, dissolving, freezing, melting etc.		***Can pupils explain using some scientific ideas? (Level 4)*** ***Can pupils explain using simple models? (Level 5)***

REFLECT ***Describe how they have learned, and identify the ways that worked the best.*** Link the learning to similar situations, within and outside school.	Revisit initial diagnostic assessment. Can pupils demonstrate understanding at end of topic and discuss new skills learned and/or practised? **To write to inform and explain** **Text type: annotated diagrams and/or captions (Concept Cartoon)**	Use preferred AfL strategy	***Can pupils describe how they have learned and identify the ways that worked the best? (Level 4)*** ***Can pupils identify the thinking/learning strategy they used? (Level 5)***
Evaluation			