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Subject –Science Summer 2 Year 5 Properties and Changes in Materials pt 2

Key vocabulary: Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material					
National Curriculum	**Week**	**NC - Coverage**	**Disciplinary Knowledge**	**Substantive Knowledge**	**Activity Outline**
The national curriculum for Science aims to ensure that all pupils: Working Scientifically Upper KS2 pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: § planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary § taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate	1	Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.	I can report and present findings from enquiries (which materials can be used to separate sand from a sugar solution) including conclusions.	I know that some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. I know that mixtures can be separated by filtering, sieving and evaporation.	Share topic vocabulary (on cards) and ask children to sort them into words most familiar and least familiar (they should much more confident with this as they are revisiting this topic). Ask children to discuss their definitions and assess their understanding. Complete their KWL grid. Complete 'Meet the scientist and BBI'. In groups, give children a a range of materials to explore: which materials can be used instead of filter paper to separate sand from a sugar solution? e.g. foil, fabric, sponge. Ensure the method is modelled to children before they test different materials. Children to choose how to present their results – focus on presenting their findings including conclusions.

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§ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs § using test results to make predictions to set up further comparative and fair tests § reporting and presenting findings from enquiries, including conclusions, causal relationships, and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations § identifying scientific evidence that has been used to support or refute ideas or arguments. Subject Content • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. • Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. • Use knowledge of solids, liquids, and gases to decide how mixtures might be	2	Give reasons, based on evidence from comparative and fair tests, for the uses of everyday materials, including metals, wood and plastic. Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.	I can take measurements using a range of equipment including a thermometer. I know how to measure the temperature by reading a thermometer correctly. I can record the temperature using the correct units in a table.	I know that materials e.g. polystyrene, plastic, ceramic and metal have different uses depending on their properties. These properties including thermal conductivity. I know that polystyrene is a good thermal insulator, but metal is a poor thermal insulator.	CT to discuss key vocabulary 'thermal insulator'. Ask children to set up an investigation to investigate 'how can different types of cups keep a drink warm?' Children to decide how often they will take measurements and record their results in a table. CT must model the correct use of a thermometer to measure the temperature including holding it correctly (not at the bulb), making sure it does not touch the walls of the container, waiting until the temperature does not decrease any further, reading the scale correctly and measuring the temperature at eye level with the surface of the liquid in the stem. Repeat readings for accuracy. **Ensure children have opportunities to practise reading a thermometer correctly before setting up their investigation.**
	3	Give reasons, based on evidence from comparative and fair tests, for the uses of everyday materials, including metals, wood and plastic. Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.	I can report and present findings from enquiries, including conclusions. I know how to plot my test results using a line graph. I can record data and present my findings from my enquiry including conclusions.	I know that materials e.g. polystyrene, plastic, ceramic and metal have different uses depending on their properties. These properties including thermal conductivity. I know that polystyrene is a good thermal insulator, but metal is a poor thermal insulator.	Children to use results collated in their investigation **in lesson 2 to present their data and draw conclusions**. Ensure children are taught how to plot a graph of temperature against time and draw a curve of best fit. Plot all the curves for each material on the same axis. Children should know to label their axes, recognise the scale they should use, plot their results according to the measurements recorded in their table of results. Children should be able to describe the pattern in the line graph and the relationship between the independent (type of material) and dependent variable (temperature of water). They should also link their results to their knowledge of thermal conductivity of materials. (See Rosemary Feasey's document for further details).

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separated, including through filtering, sieving and evaporating. • Give reasons, based on evidence from comparative and fair tests, for the uses of everyday materials, including metals, wood and plastic. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda **School Context** Common Misconceptions Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g.	4	Give reasons, based on evidence from comparative and fair tests, for the uses of everyday materials, including metals, wood and plastic. Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.	I can use scientific diagrams and labels to record my findings.	I know that everyday objects including a saucepan are made from materials e.g. plastic and metal have different uses depending on their properties. I know these properties including thermal conductivity, hardness and transparency.	Give children some everyday objects to identify why they are made from chosen materials and how they fit their purpose. Children to draw annotated diagrams of objects and consider properties including thermal and electrical conductivity e.g. thermal cup, cable socket, saucepan.
	5	Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda	I can classify changes to materials as reversible or irreversible.	I know that some changes to materials are irreversible, such as such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials, and these are not reversible.	Display terms 'reversible change' and 'irreversible change' on the board and ask children to discuss what they thought these might mean and to suggest examples of reversible and irreversible changes – CT to assess children's understanding. identifies changes of state as reversible changes. CT to focus on exploring a range of irreversible changes e.g children should know that cooking, burning, rusting are irreversible changes with the creation of new materials. Check children's understanding by also including examples of reversible changes e.g. making a salt solution is reversible as no new material has been created.
	6	Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible,	I can use scientific evidence to support or refute my ideas	I know that some changes to materials such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the	CT to demonstrate the reaction between vinegar and bicarbonate of soda. CT to ensure children understand that mixing these substances causes an irreversible change 'bubbles of carbon dioxide 'are made – the liquid mixture and carbon dioxide cannot be turned back into vinegar and bicarbonate of soda. Show children the measurements of vinegar used e.g.50ml of vinegar and 50g of bicarbonate of soda. Children to generate questions

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cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed.		including changes associated with burning and the action of acid on bicarbonate of soda		formation of new materials, and these are not reversible.	which they could investigate e.g. what would happen if they increased the amount of bicarbonate of soda. The Children to share their questions with a partner and choose one question with their partner to discuss in more detail. Children to use their scientific evidence to justify their predictions.