



Topic Title: Properties and Changes of Materials

Year Group: 5

Academic Year: 2022-23

Science Intent: To understand the properties of materials and what can cause changes in those properties

Prior Scientific Learning/Linked Topics: Year 4: Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)	Literacy Links (including texts/media used):	Maths Links: Measurement Statistics (Data collection, interpretation, and presentation)
Scientific Knowledge	Working Scientifically	
• 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.	• 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 • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Recording data and results of increasing complexity using scientific diagrams and	



No Limits
To Learning!

- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Give reasons, based on evidence from comparative and fair tests, for the particular 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.

- labels, classification keys, tables, scatter graphs, bar and line graphs
- Identifying scientific evidence that has been used to support or refute ideas or arguments
 - 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
 - Using test results to make predictions to set up further comparative and fair tests

Content:

- Introduce properties of materials and learn associated vocabulary, creating flashcard set to emphasise importance of accurate use of terminology in science. Define material: something that is used to make something or make part of something. Children to define words such as “Opaque, Brittle, Thermal, Transparent, Flexible, Insulator, Soluble, Waterproof, Conductor, Translucent, Shiny, Synthetic, Absorbent, Rigid, Natural and Hard” (see planning documents) – **researching using secondary sources**
- Sort and compare materials by various properties. Children are introduced to the ranking system that will be used. Children are provided with materials and work at various stations to analyse their properties (e.g. sink to test water absorbency and permeability, tables with magnets to test magnetism) (see planning documents). Children rank their materials on each property. – **identifying, grouping, and classifying**
- Children showed several materials ranked based on a criteria that is not revealed – after discussion reveal that the criteria is thermal insulation vs conduction. Revise meaning of thermal insulation/conduction. Children to plan investigation to determine the best thermal insulator to keep food in a lunch box fresh longer. They will use materials to insulate ice and use thermometers to check the temperature after a period of time – **comparative and fair testing, problem solving**
- Discuss dissolving and dissolving vs melting. Revise vocabulary “insoluble” and “soluble”. Children will observe which materials can dissolve in water, and what happens when water at different temperatures is used – **observation**
- Introduce four different mixtures (see planning documents) and possible methods of separating mixtures. Children to predict which method can



separate each mixture and then try it themselves. Discuss reversible changes – dissolving, mixing, and changes of state (i.e. evaporation) are all reversible changes, as can be demonstrated when the mixtures are separated. – **pattern seeking, observation**

- Revisit concept of reversible changes from previous lesson. Explain that some changes are irreversible because they are chemical changes and these changes actually create new materials. Go over simplified explanation of chemical reaction when bicarbonate of soda and vinegar are combined. Children try mixing bicarbonate of soda and vinegar and write an explanation of what they have observed using scientific terminology (“Reversible, irreversible, physical, chemical, reaction, reactant, product”) (see planning documents). Children will try methods from the previous lesson to separate the product of the reaction and will observe that they cannot undo the reaction and end up with the original ingredients. – **observation**

Key Vocabulary:

Material, Properties, Insulator, Conductor, Thermal, Soluble, Waterproof, Mixture, Melting, Dissolving, Separating, Irreversible

Stunning Start/Marvellous Middle/Fabulous Finish:

To be revealed

OAA/Trips/Visits/Visitors:

To be revealed