



## The Canons CE Primary School



### Year 5 – Properties and Changes of Materials

| Prior Learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | In Year 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Future Learning |
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| <p>In Year 2 children will be taught to:</p> <ul style="list-style-type: none"><li>identify and compare the uses of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</li><li>find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (<i>Uses of everyday materials</i>)</li></ul> <p>In Year 3 children will be taught to:</p> <ul style="list-style-type: none"><li>compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (<i>Forces and magnets</i>)</li></ul> <p>In Year 4 children will be taught to:</p> <ul style="list-style-type: none"><li>use the terms evaporation and condensation when describing the water cycle</li><li>observe how materials change state when heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</li><li>group materials by whether they are a solid, liquid or gas compare and describe solids, gases and liquids. (<i>States of matter</i>)</li></ul> | <p>In Year 5 children will be taught to:</p> <ul style="list-style-type: none"><li>explain that certain changes are irreversible and new materials can be formed e.g. burning</li><li>demonstrate that dissolving, mixing and changing are reversible processes</li><li>use evidence from my tests to decide how to use everyday materials effectively</li><li>use my knowledge of solids, liquids and gases to decide how mixtures might be separated</li><li>describe how to recover a substance from a solution</li><li>recognise that some materials will dissolve in liquid to form a solution</li><li>compare and group everyday materials on the basis of their properties e.g. hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets.</li></ul> |                 |
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|                                                                                                                                                                                                                                                                                                                                                                   | thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Famous Scientists                                                                                                                                                                                                                                                                                                                                                 | Common Misconceptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Possible Evidence to be Secure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"><li>Jamie Garcia (BP website) – invention of a new plastic</li><li>Sir Humphrey Davy – separating gases</li><li>Spencer Silver – invented post-it notes</li><li>Ruth Benerito – wrinkle free cotton</li><li>Antoine Lavoisier (1743 – 1794)</li><li>Dmitri Mendeleyev (1834 – 1907)</li><li>John Dalton (1766 – 1844)</li></ul> | <p>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. 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.</p> <p>Some children may think:</p> <ul style="list-style-type: none"><li>thermal insulators keep cold in or out</li><li>thermal insulators warm things up</li><li>solids dissolved in liquids have vanished and so you cannot get them back</li><li>lit candles only melt, which is a reversible change.</li></ul> | <p>Children can:</p> <ul style="list-style-type: none"><li>use understanding of properties to explain everyday uses of materials, for example, how bricks, wood, glass and metals are used in buildings</li><li>explain what dissolving means, giving examples</li><li>name equipment used for filtering and sieving</li><li>use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving</li><li>describe some simple reversible and non-reversible changes to materials, giving examples.</li></ul> |



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### Working Scientifically

#### National Curriculum Statutory Requirements

1. Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
2. Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.
3. Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
4. Use test results to make predictions to set up further comparative and fair tests.
5. Report and present findings from enquiries, including conclusions, casual relationships and explanations of result, in oral and written forms such as displays and other presentations.
6. Identifying scientific evidence that has been used to support or refute ideas or arguments.

Highlighted = main focus during this topic

### Teaching Ideas – Different Types of Scientific Enquiry

| Comparative and Fair Testing                                                                                                                                             | Identifying and Classifying                                                 | Observation Over Time                                                                                                                                                    | Pattern Seeking                                    | Research                                                    |
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| Which type of sugar dissolves the fastest?<br>Which shoe is the most slippery?<br>How does the temperature of tea affect how long it takes for a sugar cube to dissolve? | Can you group these materials based on whether they are transparent or not? | How does a container of salt water change overtime?<br>How does a sugar cube change as it is put in a glass of water?<br>How does a nail in salt water change over time? | Do all stretchy materials stretch in the same way? | What are microplastics and why are they harming the planet? |

#### Teaching Ideas – How Pupils Could Work Scientifically

#### Teaching Ideas – Possible Evidence to be Secure

(Bracketed Number = National Curriculum Statutory Requirement Link)

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| <ul style="list-style-type: none"> <li>Investigate the properties of different materials in order to recommend the materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat. (1)</li> <li>Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate. (1)</li> <li>Investigate rates of dissolving by carrying out comparative and fair test. (2, 4)</li> <li>Separate mixtures by sieving, filtering and evaporating, choosing the most suitable method and equipment for each mixture. (1)</li> <li>Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning. (1)</li> <li>Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced? (1)</li> <li>Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton). (6)</li> </ul> | <p>Children can:</p> <ul style="list-style-type: none"> <li>create a chart or table grouping/comparing everyday materials by different properties (3)</li> <li>use test evidence gathered about different properties to suggest an appropriate material for a particular purpose (4)</li> <li>group solids based on their observations when mixing them with water (3)</li> <li>give reasons for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water (2)</li> <li>explain the results from their investigations. (5)</li> </ul> |
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