Science – Year 5				
Materials- properties and changes of materials ***Can the properties of materials be changed?***				
NC objectives - **areas of study**	End point of area of study	Vocabulary		
		Basic	Adventurous	Technical
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 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	Children apply prior knowledge of materials, their properties and their particle make up to support further understanding of how materials change. They are able to compare and classify materials according to their properties, carrying out tests to identify other properties of them. They can describe the solvency of solutions and different ways mixtures can be separated using the correct scientific terminology. Children understand reversible and irreversible changes and talk about how this occurs in different materials. Children explore how new materials are created through first-hand experience and research.	change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material		Thermal/electrical insulator/conductor

changes associated with burning and the action of acid on bicarbonate of soda.				

Knowledge

Substantive Knowledge

- Retrieval- work in year 5 builds on the prior knowledge of pupils from KS1 where children name objects and the materials they are made from. They begin to choose materials for a particular purpose and know how some materials can be changed and recycled. They know who John Boyd Dunlop is.
- In LKS2 they know the name of different types of rock and how they are formed, how soil and fossils are formed and the work of Mary Anning. They know the three different states of matter, solid, liquid and gas and can talk about the particles in each. They explain the process of the water cycle using the correct scientific vocabulary.
- In Y4 pupils have studied electricity which may support further learning about the electrical conductive properties of materials.

Lesson 1

Retrieval of previous vocabulary-

Solid, liquid, gas, opaque, transparent, translucent, reflective*, also include names of materials and some of their properties.*

LO To know that materials can be sorted in different ways.

- Know that materials can be sorted in a variety of ways based on their properties
- Pupils sort materials in different ways using prior knowledge to support them.

Disciplinary Knowledge

Children work as chemists and chemical engineers to explore materials and their properties. They carry out a range of investigations to explore how materials can change.

Similarities and differences

Children explore the properties of different materials through investigation. They build up a knowledge of reversible changes, evaporation, filtration, sieving, melting and dissolving. They can identify similarities and differences between the processes and explain them- knowing that melting and dissolving are different processes. Planning different enquiries, they ask and answer questions, suggesting ways to measure and collect evidence. They learn the importance of fair testing and how variables are changed in a controlled manner. Children compare materials in order to choose those suitable for specific purposes.

Use of Evidence

Through investigation, pupils explore changes that are difficult to reverse, for example burning and rusting. They explore the reaction of vinegar with bicarbonate of soda. Children answer questions such as, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting or for making blackout curtains? They make

Have an openness to the fact that some answers cannot be provided by Science. • Lesson 2 • Solution, soluble, dissolve, insoluble, change of state LO To know what a solution is. • Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution; when a solid does dissolve in a liquid it is described as being soluble in that solvent (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water) • Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated. • Lesson 3 • Dissolve, change of state • LO To know how materials dissolve and evaporate. • Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals – the slower the solvent evaporates, the larger the crystals that will be formed • Know how to dissolve a solute in a solvent and then how to evaporate the solvent to recover the solute • Lesson 4 • Reversible, non-reversible, burning, rusting • LO To know that changes can be reversible or irreversible. • Know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place • Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new	measurements using data loggers for temperature and record data in tables and graphs, through diagrams, annotated photographs and notes as appropriate. **Researching** different scientists, they find out about scientists and how they create new materials for example Spencer Silver and Ruth Benerito.

material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid).
Reflect on whether change is a good thing.

- Lesson 5
- Mixture, filter, sieve
- LO To know how mixtures can be separated.
- Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated
- Know how to separate a mixture of sand, salt and small stones by sieving (to remove the small stones), followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt.
- Lesson 6
- Retrieval Magnetic, non magnetic, repel, attract
- LO To know properties of materials can be tested.
- Know that materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic,
- Lesson 7
- Thermal conductor, thermal insulator
- LO To know materials can be thermally conductive.
- Identify properties of materials, make observations of measurements to test how materials can be thermal conductors or insulators.
- lesson 8
- Electrical conductor, electrical insulator
- LO To know materials can conduct electricity.
- Know that materials can be electrically conductive; know that the various properties of different materials make them suitable for a given function
- Lesson 9
- Application of vocabulary to describe properties that make them suitable for different purposes.
- LO To know why materials are suited to their purpose.
- Know how to explain orally and in writing the reasons why various materials are suited or unsuited to a function.

Reflect on how we rely on using different materials.

- Lesson 10
- Scientist, influence
- LO To know how scientists create new materials.
- Find out about scientists and how they create new materials for example Spencer Silver and Ruth Benerito.
- Look at a post it note, what are the benefits of this item? Ask children to explore how they think it would have been invented. Explore the work of Spencer Silver and how it was invented by him after he explored the use of adhesives.
- Research the work of Ruth Benerito and her work as a chemist. She is said to have saved the cotton industry with her discovery of a method for creating wrinkle-resistant cotton.
- Pupils identify the benefits of each of these discoveries and how scientists work in many different ways.

Appreciate what we have in our world due to the creation of materials.

- Lesson 11
- LO To know Marie Curie was a genius physicist.
- Scientist, influence

- Know that Marie Curie was a genius physicist, earning two Nobel Prizes
- She discovered two new elements (the building blocks of everything) and made discoveries that suggested that atoms - which were thought to be the smallest building blocks - could be divided into smaller building blocks still

Concepts			
Biology	**Chemistry**	**Physics**	

SKILLS				
1. Compare	2. Explore	3. Identify	4. describe	5. classify

6. Question	7. observe	8. test	9. record	10. research

ASSESSMENT

KNOW MORE, REMEMBER MORE, DO MORE...

In this unit of learning, progress has been made when a learner knows more. This 'distance travelled' from the starting point is evidenced through them remembering more and doing more: in books, low stakes quizzes, retrieval, use of mind maps, answering the big question and being able to feel more confident about this unit.