SCIENCE YEAR 5

Southdale C of E Junior school
Shining like stars in the universe

PROPERTIES OF MATERIALS

Year 5 (INTENT)

National Curriculum Aims

Pupils should be taught to:

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

Vocabulary	absorbent attract burn change state dissolve elastic	electrical-conductivity electrical-insulating evaporating flammable flexible	filtering gas hard insoluble irreversible liquid	magnetic melting mix mixture non-magnetic non-reflective	opaque particle permeable reflective residue reversible rigid	rough sieving smooth soft solid solubility	soluble solute solution strong thermal-conductivity	thermal-insulating translucent transparent waterproof weak
Significant Individuals	Arthur Fry	Spencer Silver	Jeffery Karp					

Properties and changes of materials	

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PROPERTIES OF MATERIALS

PROGRESSION OF LEARNING (IMPLEMENTATION)

Learning Objective	Overview of Teaching
WALT: compare and group together everyday materials on the basis of their properties.	The children will start by activating their prior knowledge by identifying different materials e.g. wood, plastic, metal. To further this they must then describe any properties the material has (transparent, opaque, magnetic, hard, soft). This means they will apply their prior knowledge from years 3 and 4. The children will then be introduced to new concepts (permeable, flammable, thermal conductor/insulator). Using materials the children are familiar with, they will group them into different properties, giving evidence of why they have chosen the group. This will then be followed by an investigation on testing five different properties (hard/soft, permeable/waterproof, flexible/rigid, magnetic/non-magnetic, transparent, opaque and translucent).
WS: I can use my different senses to make observes and record my findings in a table. 	
SE: I can use my own subject knowledge to be able to identify properties of materials. 	
WALT: identify thermal insulators as materials that can keep an object hot or cold.	Thermal conductors and insulators will be introduced (using their knowledge of how electrical conductors and insulators work). The 'Brilliant Bottle Company' want the children to create a new bottle which will keep hot liquids hot and cold liquids cold. The children will be posed the question 'Which material would make the best thermal insulator?' In their groups, the children must devise their own experiment (based on a range of resources given). They will be recording their experiment from start to finish using each of the working scientifically skills.
WS: I can conduct an experiment using each scientific skill. 	
SE: I can decide which variables are appropriate for my investigation and observe the effects over time. 	

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PROPERTIES OF MATERIALS

PROGRESSION OF LEARNING (IMPLEMENTATION)

Learning Objective	Overview of Teaching
WALT: investigate materials that dissolve.	The first part of the lesson, the children must distinguish between soluble and insoluble and in the second part of the lesson, involves them looking at what affects the rate something dissolves. First, the children will observe a sugar cube dissolving. They will be given three statements and they must discuss them as group. They will decide which statement they agree with and why they believe the others to be false. During their first task, they must decide which materials are soluble and insoluble. Eight different materials will be given for the children to decide yes or no and record their findings in a table. The second part of the lesson, will involve them setting up their own enquiry to test which variable influences sugar to dissolve at a different rate. The children must select their own variables and decide their independent, dependent and controlled variable. They will use the post-it planning sheets to plan their investigation and then decide on the method and equipment to carry out their enquiry.
WS: I can ask a scientific question and answer it by planning an investigation. 	
SE: I can decide which variables are appropriate for my investigation and observe the effects over time. 	
WALT: use our knowledge of solids, liquids and gases to decide how mixtures might be separated.	The children will look at four different separating processes (evaporation, filtration, magnetic attraction, sieving). They must read the different processes and predict which one would work for each solid and liquid. A carousel of the processes will be set up for the children to work their way around them so they are able to see the process in action. They will draw diagrams, label the equipment and describe the process.
WS: I can use scientific language and illustrations to discuss, communicate and justify scientific ideas. 	
SE: I can make observations over time to see if materials can be separated. 	

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PROPERTIES OF MATERIALS

PROGRESSION OF LEARNING (IMPLEMENTATION)

Learning Objective	Overview of Teaching
WALT: investigate materials that dissolve.	Using the concept of frying an egg, they will be introduced to an irreversible change with an understanding of what is the reactant (yolk), the chemical change (heat) and the product (a fried egg). Pictures of materials, going through a process, will be given to the children. They will be discussed as a class and some modelled. Independently, they will organise the irreversible and reversible changes into a table and then they will select 4 different changes and explain which scientific process is happening and why. In small groups the children will complete the irreversible baking soda and vinegar balloon experiment. They will observe the reaction and decide the reactant, chemical change and product.
WALT: understand the difference between reversible and irreversible changes. 	
SE: I can group reversible and irreversible changes and justify my ideas. 	
WALT: give reasons based on evidence from comparative tests for the particular uses of everyday materials.	The children will be presented with a picture of glue and they must apply all their learning to identify it's properties. They will then be introduced to Arthur Fry and Spencer Silver and their findings. The children will be trying to make their own glue using the following materials (sugar, salt, baking powder, cornflour, water). After the investigation, the children must decide what their glue is best suited for. Jeffery Karp will be introduced at this point, as he is a scientist thinking about the future.
WS: I can record my results in a table. 	
SE: I can learn about famous scientists and what major discoveries they have made. 	

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CORE KNOWLEDGE AND SKILLS (IMPACT)

Pupils will know:

- A material is what an object is made from e.g. plastic, metal, wood.
- A property describes a materials features e.g. flammable, transparent.
- Examples of different properties: non-magnetic/magnetic, hard/soft, flammable/non-flammable, permeable/waterproof/absorbent, transparent/opaque/translucent, flexible/rigid, conductor/insulator,
- Thermal means temperature/heat.
- Thermal conductors allow heat to pass through. Thermal insulators do not allow heat to pass through.
- Heat always wants to travel to cooler areas.
- Dissolving is when a solid and a liquid merge together. If it dissolves it is soluble and if it doesn't insoluble.
- Different factors affect the rate something dissolves e.g. stirring, heat and volume.
- When a solid dissolves a solution is formed.
- When a solid doesn't dissolve a suspension occurs.
- There are different processes to separate a solution e.g. evaporation, magnetic attraction, evaporation, sieving.
- There are reversible and irreversible changes.
- An irreversible change is caused by a chemical reaction meaning it can't be returned to its original state.

Pupils will be able to:

- Make observations of different materials.
- Record their findings in a table.
- Conduct an experiment from start to finish (with support).
- Ask questions about different soluble materials and set up an experiment selecting their own variables.
- Draw diagrams of different serperation processes and label their equipment.
- Justify which processes are reversible and irreversible.