KESTEVEN AND SLEAFORD HIGH SCHOOL

Science Scheme of Learning

Year 7 – Term 5/Units 5

Intent – Rationale

. Students consider the importance of plants and explore the process of photosynthesis. They relate the structure of the leaf to photosynthesis and learn about the essential minerals for plants.

Students learn about simple chemical reactions by observing chemical and physical changes. They consider the difference between atoms and molecules and how atoms are combined in substances and products. Students learn how to test for a variety of gases to indicate a chemical reaction has taken place and write chemical equations.

Students learn about magnets and electromagnets. They consider which substances are magnetic and ideas about attraction and repulsion. They learn about magnetic fields and how to trace them. Students explore electromagnets; how to make them and how they are used.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
KS2 NC Y6 Electricity **KS2 NC Y5 Properties and changes of materials** **KS2 NC Y3 Plants and Forces and Magnets** **Topic B7.1 Cells** **Topic B7.3 Environment and adaptation** **Topic C7.1 Particles** **Topic C7.2 Atoms and Elements** **Topic P7.1 Energy Transfers** **Topic P7.3 Electricity**	• Topic C7.6 Compounds, C8.7 Periodic table and C8.10 Describing reactions. Topic P8.7 Domestic and Static electricity. • GCSE Units B1 Cell structure and transport, B4 organising plants and animals, B5 Communicable diseases, B8 Photosynthesis, B16 Adaptation, Interdependence and Competition, B17 Organisation of an ecosystem and B18 Biodiversity and ecosystems. • GCSE Topic 1 Atomic Structure and the Periodic Table, Topic 2 Bonding, Topic 3 Quantitative Chemistry,Topic 4 Chemical Changes, Topic 8 Chemical Analysis • GCSE Physics P15 Electromagnetism
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
• Base the content here on what you already know but there will be time in future to liaise further as part of our collaborative work	• Use the coded help guides to complete this section
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
FROM THE LIBRARY *Plant Physiology*; Irene Ridge-581 *Incredible Plants*; Barbara Taylor-581 *Cells and Systems*; Anita Ganeri-574.8 *Plants and Fungi: Multi Celled Life*; Robert Sneddon-571.6 *Chemicals in Action: Atoms* Chris Oxlade-541 *We Are All Made of Molecules*; Susin Neilsen. FIC-N *Gasses Liquids and Solids;* Brian Knapp-546 *The Elements:* Dan Green-546 *Electricity and Magnetism*; Chris Oxlade-537	• Drawing graphs

Science Scheme of Learning

Year 7 – Term 5/Units 5

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- Name the process by which plants make their own food. State the word equation for photosynthesis. Describe the structure of a leaf. Describe the best conditions for plant growth.
- State some examples of physical changes and chemical reactions. Describe that in a chemical reaction, bonds are broken and made between atoms. Describe different ways to collect a gas produced by a reaction. Write word equations to describe chemical reactions. Plan an investigation on how the type of acid affects the temperature change during a reaction.
- Recall the 4 main magnetic materials. Describe two ways to plot/see magnetic fields: iron filings and plotting compasses. Describe how you build an electromagnet. Explain how electromagnets are used in electric motors. Draw a graph.

Apply

- State the products and reactants in photosynthesis. Describe the uses of glucose from photosynthesis. Describe the adaptations of leaves for photosynthesis. Describe the effect insufficient mineral salts and fertilizers have on plants.
- Recognise the changes which occur when a chemical reaction takes place. State the equation for combustion as an example of a chemical reaction. Carry out tests for hydrogen, oxygen and carbon dioxide. Balance symbol equations to show that mass is conserved in a reaction. Consider precision of equipment in plan.
- Describe magnetic interactions using: attract, repel, force, attraction, repulsion, North (seeking) pole, South (seeking) pole etc. Be able to draw the shape of the magnetic field around: A bar magnet, a north and south pole, Two north or two south poles. Describe how to make an electromagnet stronger. Build an electric motor. Predict the effect more turns will have on an electromagnet.

Extend

- Explain how plants use the products of photosynthesis. Explain how scientists proved that light, carbon dioxide and chlorophyll are needed for photosynthesis. Explain how scientists proved that photosynthesis produces oxygen. Explain the impact on plant growth of insufficient minerals salts.
- Identify reactants and products in a chemical equation. Explain that mass is conserved because no atoms are made or destroyed in a reaction. Describe how to identify some gases that can be produced in the laboratory. Write symbol equations to describe chemical reactions. Justify the choice of equipment and explain why the equipment chosen is more precise.
- Explain how magnets are made by stroking with another magnet. Explain the difference between temporary and permanent magnets. Explain how it is different from a bar magnet and how it can be used. Explain how an electromagnet is used in a bell and electric motor. Extrapolate from a graph.

What subject specific language will be used and developed in this topic?

Biomass	The mass of living material in an organism or ecosystem.
Chlorophyll	A complex molecule that is green in colour. It is responsible for absorbing energy from sunlight for photosynthesis in plants and some bacteria.
Chloroplast	An organelle in a plant cell that contains chlorophyll and is where photosynthesis takes place.

What opportunities are available for assessing the progress of students?

- Assessment of graph plotting opportunities: B7.5 L3, P7.5 L5
- Interpreting graphs: B7.5 L4
- Question check: C7.5 L1, C7.5L2, C7.5 L3, C7.5 L4, P7.5 L2
- Assessment of planning: C7.5 L5

Fertiliser	A substance that is added by farmers and gardeners to soil or to crops in order to increase the growth of plants and thus the yield of crops.
Guard cell	A specialised cell that is normally found on the underside of a leaf.
Hydroponics	When plants are grown without soil but with their roots in water that contains essential dissolved mineral compounds.
Mineral salt	A chemical compound that contains an essential element for plant growth. The three main essential elements needed by plants (aside from carbon, oxygen and hydrogen) are nitrogen, phosphorus and potassium.
Palisade layer	The main photosynthetic layer in the upper part of a leaf. The palisade cells have a very large number of chloroplasts.
Photosynthesis	The biochemical process that plants and certain other organisms use to convert carbon dioxide and water into useful carbohydrates using energy from sunlight.
Respiration	The chemical reactions that allow living things to release energy from compounds such as glucose.
Stoma (stomata)	A hole. When describing the structure of a leaf, a stoma is a small hole, usually on the underside of the leaf, that opens to allow gases to enter and leave the leaf.
Upper epidermis	The top layer of cells in a leaf. The epidermis protects the leaf.
Variegated leaves	Leaves that have areas of different coloration in them.

Atom	The smallest particle of an element. An atom contains a central nucleus (which holds protons and neutrons) and this is surrounded by electrons orbiting in shells (or energy levels). All atoms are electrically neutral because they have the same number of protons and electrons. Atoms can be split apart into protons, neutrons and electrons but they cannot then be considered a particular element.
Chemical reaction	A change in which one or more new chemical substances are made. In a chemical reaction there are one or more reactants at the beginning. At the end there are one or more products formed
Compound	A pure substance made from more than one element in which the atoms combine in a fixed ratio. For example, the two elements hydrogen and oxygen can react together to produce the compound water.
Effervescence	Bubbles coming out of a solution, as can be seen when the lid is undone on a bottle of fizzy drink
Element	A pure substance made from only one type of atom. There are approximately 100 elements and they are listed in the Periodic Table.
Fuel	Any substance that can be burnt to release chemical energy as heat. Fuels react with oxygen in combustion reactions.
Incomplete combustion	When a fuel burns without enough oxygen to completely oxidise the carbon present in the fuel. This happens when the fuel is burnt in a poor supply of oxygen (or air). The products of incomplete combustion of a hydrocarbon fuel (something that contains only carbon and hydrogen) are water along with some carbon monoxide or carbon (soot). Carbon monoxide is a poisonous gas and soot is dirty. Incomplete combustion also releases less energy than complete combustion

Molecule	A cluster of atoms that are joined by covalent bonds. Molecules can therefore only be made from non-metal atoms.
Products	The chemicals that are made in a chemical reaction.
Reactants	The starting chemicals in a chemical reaction.

Word	Definition
Core	The core of an electromagnet is usually made from iron, and it makes the electromagnet much stronger.
Domain	The microscopic crystalline structure of a magnetic material. If the domains are magnetised in the same direction, the material will be magnetised. If they are magnetised in different directions, the material will not be magnetised.
Electromagnet	A device made of a coil of wire, which can be magnetised by making a current flow through the wire. The strength of an electromagnet can be increased by increasing the current flowing through the coil, adding more coils or adding a soft iron core inside the coil. Electromagnets are often more powerful than permanent magnets and they have the advantage that they can be switched off.
Field lines	Imaginary lines that can be visualised with iron filings or small compasses that show the direction of a magnetic field surrounding a magnet or electromagnet. The closer the lines are to each other, the stronger the field in that area.
Hard Magnetic Material	A substance that can be used to make a magnet that stays magnetic over a period of time
Induced Magnetism	Magnetising an object by placing it in the magnetic field of another magnet.
Magnet	An object that produces a magnetic field and thus is capable of attracting or repelling other magnets.
Magnetic material	A substance that can be magnetised. The most common magnetic materials are the elements iron, nickel and cobalt, plus the alloy steel. Alloys of rare earth elements such as neodymium can be used to make very powerful magnets.
Magnetism	A non-contact force between two magnets (which can either attract or repel), or between a magnet and a magnetic material (which can only attract each other).
Poles	The two regions of a magnet in which the magnetic force is strongest, labelled north and south (short for 'north-seeking pole' and 'south-

	seeking pole'). If a bar magnet is allowed to spin freely, the north-seeking pole of a magnet will point towards the north pole of the Earth.
Soft magnetic material	A material such as iron that can be used to make a temporary magnet. The magnet does not keep its magnetism.

KESTEVEN AND SLEAFORD HIGH SCHOOL

Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
B7.5 L1 It's all about the chemistry	Can I name the process by which plants make their own food?	Can I explain how plants use the products of photosynthesis?	
B7.5 L2 Factors needed for plant growth	Can I state the word equation for photosynthesis?	Can I explain how scientists proved that light, carbon dioxide and chlorophyll are needed for photosynthesis?	
B7.5 L3 Leaf Structure	Can I describe the structure of a leaf?	Can I explain how scientists proved that photosynthesis produces oxygen?	
B7.5 L4 Mineral salts and fertilisers	Can I describe the best conditions for plant growth?	Can I explain the impact on plant growth of insufficient minerals salts?	
C7.5 L1 Chemical and physical changes	Can I state some examples of physical changes and chemical reactions?	Can I identify reactants and products in a chemical equation?	
C7.5 L2 Atoms and Molecules in reactions	Can I describe that in a chemical reaction, bonds are broken and made between atoms?	Can I explain that mass is conserved because no atoms are made or destroyed in a reaction?	
C7.5 L3 Testing gases	Can I describe different ways to collect a gas produced by a reaction?	Can I describe how to identify some gases that can be produced in the laboratory?	
C7.5 L4 Writing chemical equations	Can I write word equations to describe chemical reactions?	Can I write symbol equations to describe chemical reactions?	
C7.5 L5 Investigating	Can I plan an investigation on how the type of acid affects the	Can I justify the choice of equipment and	

temperature change	temperature change during a reaction?	explain why the equipment chosen is more precise?	
P7.5 L1 Magnetic materials	Can I recall the 4 main magnetic materials?	Can I explain how magnets are made by stroking with another magnet?	
P7.5 L2 Magnetic Fields	Can I describe two ways to plot/see magnetic fields: iron filings and plotting compasses?	Can I explain the difference between temporary and permanent magnets?	
P7.5 L3 Electromagnets	Can I describe how to build an electromagnet?	Can I explain how an electromagnet is different from a bar magnet and how it can be used?	
P7.5 L4 Electric Motors	Can I explain how electromagnets are used in electric motors?	Can I explain how an electromagnet is used in a bell and electric motor?	
P7.5 L5 Magnets and electromagnets assessment	Can I draw a graph?	Can I predict a result and extrapolate from a graph?	
Topic 5 test	Summative assessment		