KESTEVEN AND SLEAFORD HIGH SCHOOL

Science Scheme of Learning

Year 7 – Term 3/Units 3

Intent – Rationale

Students learn about organisms and their habitats. They consider food chains and food webs along with competition and cooperation between organisms. They also learn about how humans effect the environment.

Students learn about everyday acids and alkalis. They learn how to use indicators, the pH scale, make dilutions and work safely with acids and alkalis. They also consider neutralisation.

Students learn about current and potential difference. They construct circuits in series and parallel to identify the rules for electrical circuits. They also consider resistance and calculations of potential difference.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
KS2 NC Y3 Plants **KS2 NC Y4 Living things and their habitats, Animals, including humans, Electricity.** **KS2 NC Y5 Properties and changes of materials, Forces, Living things and their habitats.** **KS2 NC Y6 Electricity** **B7.1 Cells and tissues, B7.2 Reproduction.** **C7.1 Particles, C7.2 Atoms and elements** **P7.1 Energy transfers, P7.2 Forces and effects**	• Topic B7.4 Variation and classification, B7.5 Photosynthesis, B8.10 Inheritance and evolution. Topic C7.5 Simple chemical reactions, C7.6 Compounds, C8.9 Reactions of acids, C8.10 Describing reactions. Topic P7.4 Energy resources, P7.5 Magnets and electromagnets, P7.6 Motion, P8.10 Application of forces, P8.11 Heat transfer. • GCSE Units B14 Variation and evolution, B15 Genetics and Evolution, B16 Adaptations, Interdependence and Competition, B17 Organising an ecosystem and B18 Biodiversity and ecosystems. • GCSE Topic 4 Chemical Changes, Topic 10 Using Resources • GCSE Physics Units P3 Electricity resources, P4 Electric circuits, P5 Electricity in the home
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	• B7.3 L1 GB4adgi
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 *Diversity of life*; Robert Sneddon-571.6 *Eco Systems and Environment*; A Fullick-577 *Food Chains and Webs*; Anita Ganeri-5 *Climate, the Environment and People*; Gary Cambers-910 *The Environment*; Michael Allaby-363.7 *Chemicals in Action;* Chris Oxlade-546.24 *Acids Bases and Salts*; Brian Knapp-546.24 *Shocking Electricity*; Nick Arnold -530	• Mean • Potential difference equation and calculations.

Electronics; DK Eye Witness-621	

Science Scheme of Learning

Year 7 – Term 3/Units 3

Intent – Concepts

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

Know

- State what a habitat is. Identify variables that can be measured or controlled. Describe how food chains and webs show feeding relationships in a habitat. Explain how modern farming techniques can negatively affect the environment.
- Name some acidic and alkaline substances. Describe the pH scale. Recognise some important hazard symbols. State the general word equation for neutralisation.
- Describe the symbols for common electrical components. Construct parallel circuits and measure the current. Explain how resistance alters electrical current. State the equation for calculating potential difference.

Apply

- Create a suitable data table with room for repeats and correct use of headings and units. Show feeding relationships in pyramids of number.
- Test the pH of some household substances. Describe some safety precautions to follow when using acids and alkalis. Describe some examples of useful neutralisation reactions.
- Use a model to demonstrate energy transfer. Identify rules for current flow in parallel circuits. Investigate the relationship between length of wire and its resistance. Use the potential difference equation to calculate values.

Extend

- Describe adaptations of organisms to live in particular habitats. Collect data systematically considering precision and accuracy. Describe how food chains and webs show the flow of energy through a habitat. Describe bioaccumulation.
  - Describe how litmus can be used to identify if a solution is acidic or alkaline. Explain how the pH scale can be used to measure how acidic or alkaline a substance is. Describe how to dilute an acid or alkali. Plan an investigation into how effective indigestion tablets are.
  - Explain what electric current and potential difference are. Explain how current and potential difference differ in series and parallel circuits. Explain how potential difference alters electrical current. Explain how resistance, potential difference and current are related to each other.

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

adaptations	An animal that hunts and feed on other animals.
Bioaccumulation	When a toxin (poison) passes up a food chain and becomes concentrated in the top predator because it cannot be excreted or broken down. This can have serious consequences on the health of the top predator.
camouflage	An animal that eats (consumes) plants or other animals.

What opportunities are available for assessing the progress of students?

- Show you can challenge B7.3 L1, B7.3 L4, C7.3 L3, P7.3 L1, P7.3 L4
- **Planning** an investigation B7.3 L2, C7.3 L4
- **Evaluation of data** P7.3 L3

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carnivore	Organisms in the same food chain all depend on each other.
Chlorophyll	An animal that feeds on plants.
consumer	Features that help a living thing to blend in with its surroundings.
environment	The surroundings in a habitat.
food chain	A diagram that shows how the organisms in a habitat feed on each other.
food web	The place where a living thing lives.
habitat	An animal goes into a deep sleep to survive difficult conditions in the winter.
herbivore	An animal that feeds on both plants and animals.
hibernation	Animals that are hunted and eaten by predators.
interdependence	A plant that produces its own food by photosynthesis.
omnivore	An animal that feeds on other animals.
pesticide	A chemical that is applied to crops to kill pests. Pesticides can be very effective in helping to prevent crop damage by insects and other invertebrates. However, they can sometimes have a negative impact on harmless organisms.
predator	Two or more food chains link together to form a food web, which shows the feeding relationships between the organisms.
prey	A green substance that is needed for plants to trap light energy and make their own food.
producer	Having features that help a living thing to survive in a particular place.

Word	Definition
Acid	A substance that has a pH of less than 7 and is capable of giving away hydrogen ions (H^+) in a chemical reaction. Acids make salts when they react.
Alkali	A solution that has a pH of more than 7. All alkalis contain hydroxide ions (OH^-) and this is usually because the chemical that has dissolved in the water is a metal hydroxide. Sometimes, however, the hydroxide ions come from water molecules because the substance dissolved in the water has been able to split up the water molecules. Alkalis are bases that have dissolved in water.
Concentrated	A solution is concentrated when it has a large amount of solute dissolved into a given volume of solvent. We could also say that the solution has a high concentration. This will mean that within the solution, the solute particles are closer together than in a dilute solution, where there are many more solvent molecules and fewer solute molecules. Concentration is measured in mol/dm^3, so a bottle of hydrochloric acid that is 5 mol/dm^3 is more concentrated than a solution of 1 mol/dm^3.
Control variables	Factors in an investigation that must be kept the same in order for the investigation to be a fair test. If they are not controlled, you will not be able to conclude that the factor you chose to change (the independent variable) was what caused the change you measured (the dependent variable).
Corrosive	The variable in an investigation that you choose to measure. On a graph of your results, this is always plotted on the *y*-axis.
Dilute	A solution that contains a lot of solvent (usually water) and not very much of the solute. Dilute is the opposite of concentrated. Since concentration is measured in mol/dm^3, a dilute solution would have a low value. For example, 0.1 mol/dm^3 is very dilute compared with 5 mol/dm^3.
Independent variable	The variable (factor) that you choose to change in an investigation. It can also be thought of as the 'input variable'. On a graph of your results, the independent variable is always plotted on the *x*-axis.
Indicator	A chemical substance that changes colour in an acid or an alkali.
Irritant	A hazard word that tells you that a substance might cause soreness or itching when it comes into contact with the skin. An irritant may sometimes become corrosive at higher concentrations.
Neutralisation reaction	A type of chemical reaction in which an acid is reacted with a base in such a way that there is no acid left. A salt is produced in a neutralisation reaction. A typical neutralisation reaction involves an acid and an alkali reacting to form a salt and water.
pH scale	A measure of the acidity of a solution. The pH scale measures the concentration of hydrogen ions (H^+) in a solution. The more hydrogen ions there are, the more acidic the solution, and the lower the pH. The pH values of most substances that you are likely to come across fall into a scale from 1 to 14, but in fact pH can be lower than 1 and higher than 14. You will almost certainly have used acid with a pH of 0 in the lab at school.

Universal indicator	A mixture of several different dyes that changes colour in solutions of different pH values. Universal indicator is able to distinguish between different pH values, rather than simply identify whether something is acidic, neutral or alkaline.
Variable	A factor in an investigation that was measured. The independent variable is the factor that was changed, but it will have been measured to ensure that it was at specific known values. The dependent variable is the factor that was measured as the outcome of changing the independent variable. The two variables are represented on a graph: independent on the *x*-axis and dependent on the *y*-axis.

Word	Definition
Ammeter	An instrument used in electronics to measure the current flowing in part of a circuit. Current is measured in amperes, or 'amps' for short. The abbreviation for amperes is A. An ammeter must be connected in series because it measures the **flow** of charge **through** part of the circuit.
Ampere (A)	The unit of current. The word ampere is often abbreviated to 'amp', or A. This unit was named after a French physicist.
Battery	More than one cell joined together in series. This means that the potential differences of the individual cells are added together to produce a higher voltage. Examples of batteries that can be bought easily in the UK include AA (1.5 volts), AAA (1.5 volts but a smaller physical size than AA) and PP3 (9 volts).
Cell	An electrical component that provides an electromotive force (potential difference, or voltage) to push electrical current around a circuit. Cells can be linked in series to form a battery. A cell can be made from two metals that have different reactivities (such as copper and zinc) connected to the terminals of a voltmeter and then placed into an electrolyte such as dilute hydrochloric acid (or a lemon!).
Circuit components	The various parts of a circuit that are joined together, normally using wires or rigid circuit connectors. Examples of circuit components include cells, lamps, bulbs, resistors, capacitors and switches.
Conduction	The transfer of thermal energy or electricity through a substance. Electrical conduction takes place in metals and graphite because delocalised electrons are free to move in a given direction when a voltage is applied. In a solution that contains ions (charged particles), conduction takes place because the ions are free to move.
Conductor	A material that allows electric current to pass through it – it has low electrical resistance.
Electric current (I)	The rate of flow of electric charge. The unit of current is the ampere, or amp (A) for short. One amp is one coulomb of charge flowing every second.
Insulator	A material that does not conduct electricity. Insulators are always non-metals and have very high resistance. They are important in protecting us from electricity. For example, PVC plastic is used as a sheath to insulate the copper conductor in domestic wiring.
Ohm (Ω)	The unit of resistance. The ohm is abbreviated using the symbol Ω.
Parallel circuit	A circuit with two or more different routes for the current to take. The sum of the currents in all of these loops equals the power supply current. If lamps are connected in parallel in a circuit, they will appear brighter but the battery will run out of energy sooner.
Resistance	How strongly a component opposes the flow of a current through it. Resistance is measured in ohms, Ω. It is calculated by dividing the potential difference across the component by the current flowing through it.
Series circuit	A circuit with only one route for the current to take. The same current flows through every component in a series circuit. Bulbs connected in series will appear dimmer than bulbs connected in parallel.

Volt	The unit of potential difference (p.d.). The volt is abbreviated using the symbol V.
Voltage	Another name for potential difference (p.d.). Voltage is measured in volts, V. For example, the mains supply in the UK is 230 V.
Voltmeter	An instrument used to measure voltage. Voltmeters must be connected in parallel to the component with the voltage you wish to measure. We measure voltage *across* a component, not *through* it.

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Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
B7.3 L1 **Organisms and their habitats**	Can I state what a habitat is?	Can I describe adaptations of organisms to live in particular habitats?	
B7.3 L2 **Feeding adaptations**	Can I identify variables that can be measured or controlled?	Can I collect data systematically considering precision and accuracy?	
B7.3 L3 **Food chains and webs**	Can I describe how food chains and webs show feeding relationships in a habitat?	Can I describe how food chains and webs the flow of energy through a habitat?	
B7.3 L4 **Human effects on the environment**	Can I explain how modern farming techniques can negatively affect the environment?	Can I describe bioaccumulation?	
C7.3 L1 **Everyday acids and alkalis**	Can I name some acidic and alkaline substances?	Can I describe how litmus can be used to identify if a solution is acidic or alkaline?	
C7.3 L2 **Indicators and pH**	Can I describe the pH scale?	Can I explain how the pH scale can be used to measure how acidic or alkaline a substance is?	
C7.3 L3 **Dilution and safety**	Can I recognise some important hazard symbols?	Can I describe how to dilute an acid or alkali?	
C7.3 L4 **Neutralisation**	Can I state the general word equation for neutralisation?	Can I plan an investigation into how effective indigestion tablets are?	
P7.3 L1 **Electric current and potential difference**	Can I describe the symbols for common electrical components?	Can I explain what electric current and potential difference are?	

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P7.3 L2 **Series and parallel circuits**	Can I construct parallel circuits and measure the current?	Can I explain how current and potential difference differ in series and parallel circuits?	
P7.3 L3 **Resistance**	Can I explain how resistance alters electrical current?	Can I explain how potential difference alters electrical current?	
P7.3 L4 **Resistance calculations**	Can I state the equation for calculating potential difference?	Can I explain how resistance, potential difference and current are related to each other?	
Topic 3 test	Summative assessment		