

Biology topics

Year 8: Health & Drugs

Lesson number	Key learning objectives
1&2. What is a drug?	<p>Foundation → Define a drug.</p> <p>Developing → Describe how drugs are categorised</p> <p>Secure → Explain the effects of recreational drugs (including substance misuse) on behavior, health and life processes.</p> <p>Extension → Consider the different ways drugs can be categorised, and give opinions on the different categories.</p>
3. How are new drugs tested?	<p>Foundation → Identify drug trials stages and placebos</p> <p>Developing → Describe how drug trials are carried out and how placebos are used.</p> <p>Secure → Discuss the ethical issues around drug trials</p> <p>Extension → Evaluate an investigation</p>
4. Recreational drugs	<p>Foundation → Define recreational drug with examples</p> <p>Developing → Explain why legal drugs can be more harmful than illegal drugs</p> <p>Secure → Analyse why some drugs are known as gateway drugs</p> <p>Extension → Evaluate whether cannabis should be made illegal</p>
5.	Revision
6.	Test
7.	Feedback

Extension	Pupils will be able to consider the effects of recreational drugs (including substance misuse) on behaviour, health and life processes. They will be able to present this to their peers to improve their presentation skills and confidence. They will also be able to analyse why some drugs are known as gateway drugs and evaluate where cannabis should be made legal or illegal
Secure	Pupils will be able to consider the effects of recreational drugs (including substance misuse) on behaviour, health and life processes. They will be able to present this to their peers to improve presentation skills and confidence. They will also be able to analyse why some drugs are known as gateway drugs
Developing	Pupils will be able to consider the effects of recreational drugs (including substance misuse) on behaviour, health and life processes. They will be able to present this to their peers to improve presentation skills and confidence.
Foundation	Pupils will be able to consider the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.

Year 8 - Respiration

Lesson number	Key learning objectives
1. Food for energy	<p>Foundation → Describe aerobic respiration as a reaction with oxygen and glucose.</p> <p>Developing → Represent the process of aerobic respiration as a word and/or symbol equation and identify similarities with the burning of fuels.</p> <p>Secure → Describe some effects of inadequate oxygen supply.</p> <p>Extension → Explain anaerobic respiration including lactic acid formation</p>

2. Anaerobic respiration and fermentation	<p>Foundation → Recall the word equation for anaerobic respiration and some examples of when it occurs.</p> <p>Developing → Explain the similarities and differences between aerobic and anaerobic respiration and how athletes get cramp.</p> <p>Secure → Explain how the fermentation experiment could be adapted to measure the rate of fermentation.</p> <p>Extension → Evaluate an investigation</p>
3. Breathing in and out	<p>Foundation → Recall what happens when we inhale and exhale and the basic structure of the lungs</p> <p>Developing → Describe the process of breathing using some of the keywords and label a diagram of the lungs highlighting some of the features that are helpful for breathing</p> <p>Secure → Explain using all the key words how we inhale and exhale making reference to pressure and volume</p> <p>Extension → Represent the diffusion of oxygen through diagrams labelling features of the lungs that increase the rate of oxygen up take</p>
4. Improving our gas exchange	<p>Foundation → Recall how exercise improves our lungs.</p> <p>Developing → Explain how smoking damages our lungs.</p> <p>Secure → Identify how asthma impacts our lungs</p> <p>Extension → Prepare a persuasive letter to promote healthy lungs.</p>
5. Gas exchange in plants	<p>Foundation → Describe respiration also takes place in plants</p> <p>Developing → Explain how gases exchange in plants.</p> <p>Secure → Prepare a slide to analysis stomata in a leave.</p> <p>Extension → Calculate magnification, actual size and image length</p>
6.	Revision
7.	Test
8.	Feedback
Extension	<p>Pupils will be able to identify and explain the structure and functions of the human gas exchange including adaptations to functions. They will be able to explain mechanisms of breathing, using pressure model to explain the movement of gases, including simple measurements of lung volume important to their life. They will be able to use scientific knowledge to state how to look after their own exchange system from asthma and exercise to how smoking can damage their lungs. Finally they will understand and identify the structures involved in plant breathing systems with the ability to apply numeracy to calculate magnification of stomata.</p>
Secure	<p>Pupils will be able to identify the structure and functions of the human gas exchange including adaptations to functions. They will be able to use mechanisms of breathing, using pressure model to describe the movement of gases, including simple measurements of lung volume important to their life. They will be able to state in detail how to look after their own exchange system from asthma and exercise and how smoking can damage their lungs. They will understand, identify and describe the structures involved in plant breathing systems.</p>
Developing	<p>Pupils will be able to identify the structure and some functions to the human gas exchange including adaptations to functions. They will be able to understand mechanisms of breathing, using pressure model important to their life. They will be able to briefly state how to look after their own exchange system from asthma, exercise and how smoking can damage their lungs. They will understand and identify the structures involved in plant breathing systems.</p>

Foundation	Pupils will be able to identify the structure and some functions to the human gas exchange. They will be able to understand mechanisms of breathing important to their life. They will be able to briefly state how to look after their own exchange system. They will understand and identify some of the structures involved in plant breathing systems.
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Year 8 - Classification and Ecology

Lesson number	Key learning objectives
1. Classification	<p>Foundation → State what is meant by the term classification</p> <p>Developing → Describe the difference between invertebrates and vertebrates, flowering and non-flowering plants</p> <p>Secure → Identify invertebrates and vertebrates from their features and give examples</p> <p>Extension → Use scientific knowledge to identify an unknown organism</p>
2. Food webs	<p>Foundation → Describe how food webs are obtained from food chains</p> <p>Developing → Explain how energy flows through a food web</p> <p>Secure → Explain the importance of predators in a food web</p> <p>Extension → Analyse and evaluate changes in a food web</p>
3. Sampling a habitat	<p>Foundation → State the factors that affect the abundance/population of living organisms in a named habitat</p> <p>Developing → Describe the difference in abundance of a plant species between habitats</p> <p>Secure → Explain which/how abiotic factors might affect the population and/or distribution of a named plant species between different habitats</p> <p>Extension → Analyse and evaluate the factors affecting endangered species and recommend solutions</p>
4. Pyramids of Biomass	<p>Foundation → Describe how energy and mass is transferred along a food chain</p> <p>Developing → Construct and interpret pyramids of biomass</p> <p>Secure → Describe the difference between pyramids of numbers and biomass</p> <p>Extension → Explain how the energy and biomass is reduced at successive stages in a food chain</p>
5. Importance of insects	<p>Foundation → State the importance of bees in fruit production.</p> <p>Developing → Describe the impact of low pollination on fruit production.</p> <p>Secure → Explain why artificial pollination is used for some crops.</p> <p>Extension → Evaluate the risks of monoculture on world food security.</p>
6. Toxins in the environment	<p>Foundation → State the importance of chemicals in agriculture.</p> <p>Developing → Describe how toxins pass along the food chain.</p> <p>Secure → Explain how toxins enter and accumulate in food chains.</p> <p>Extension → Evaluate the advantages and disadvantages of using pesticides.</p>
7.	revision
8.	Test
9.	Feedback

Extension	Students would be able to use scientific knowledge on classifications and observations to identify unknown organisms based on their external characteristics. They would be able to explain how pyramids of numbers and food webs represent feeding relationships in a habitat and to analyse the factors that could cause changes in a food web such as abundance of organisms, predator/prey relationships, the introduction of toxins into food chains as well as explain and evaluate the consequences of such changes in an ecosystem. They would also be able to suggest solutions to such problems. In terms of scientific enquiry, students will plan how to collect reliable data and carry out investigations without support, interpret their results by drawing graphs and writing conclusions that meet the success criteria. They will use data to support their conclusions and evaluations of these investigations.
Secure	Students would be able to classify some animals into the main taxonomic groups of animals; identify and name organisms found in a particular habitat and describe how they are adapted to the environmental conditions, explaining how the adaptations help survival. They would be able to relate the abundance and distribution of organisms to the resources available within a habitat and begin to represent this using a pyramid of numbers. They would be able to describe the difference between pyramids of numbers and biomass. Students would be able to explain why artificial pollination is used for some crop and how toxins enter and accumulate in food chains. In terms of scientific enquiry, students would be able to collect data to investigate a question about a habitat using appropriate apparatus and techniques to make measurements and observations without help; use ICT to store and present information.
Developing	Students will be able to describe some differences between vertebrates and invertebrates, flowering and non-flowering plants and name some organisms found in a habitat and describe how they are adapted to environmental conditions. They would also recognise that the abundance and distribution of organisms is different between habitats and would be able to collect data to investigate a question about a habitat using appropriate apparatus and techniques with some support. They would be able to construct and interpret pyramids of biomass and describe how toxins flow through food chains. They will draw graphs that meet a significant proportion of success criteria and write conclusions based on their data by using a framework.
Foundation	Students would be able to group animals into vertebrates and invertebrates and state the importance of classifying organisms. They would be able to describe feeding relationships between organisms in a food chain and recognise that organisms only survive in a habitat where they have all the essentials for life and reproduction. Students would also learn about the use of quadrats as a sampling technique for investigating populations and be able to sample using quadrats. They would learn that that both plants and animals are adapted to ensure the survival of the species and to describe how energy flows along a food chain from producer to consumer. Finally, they would learn about the importance of bees to fruit and how chemicals enter into the food chain to affect food production.

Year 8 – Chemistry units

Year 8: Atoms Elements and the Periodic Table

Lesson number	Key learning objectives
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1. What are atomic models?	<p>Foundation → Recognise a simple atomic model</p> <p>Developing → Understand elements contain one type of atom and name some elements</p> <p>Secure → Explain the structure of an atom and describe some elements along with their symbols</p> <p>Extension → Explain and label the structure of an atom and to locate elements using their symbol and their name.</p>
2. How are elements arranged in the periodic table?	<p>Foundation → To know that the periodic table contains groups, periods metals and non-metals</p> <p>Developing → To know why elements are arranged in groups and periods, and to know the periodic table contains metals and non-metals.</p> <p>Secure → To describe the properties of metals and non-metals using the periodic table</p> <p>Extension → To explain the difference between metals and non-metals by using their properties and the periodic table</p>
3. How do chemists represent elements and compounds?	<p>Foundation → Outline that elements contain only one kind of atom</p> <p>Developing → Describe that compounds contain more than one kind of atom joined together.</p> <p>Secure → Explain the difference between an element and a compound, and represent compounds using symbols</p> <p>Extension → Know and use the chemical formulae of different compounds and to explain in good detail how elements and compounds differ from one another.</p>
4. What are the physical and chemical properties of elements?	<p>Foundation → Define physical and chemical properties</p> <p>Developing → Describe physical and chemical properties</p> <p>Secure → Identify and describe physical and chemical property of elements using the periodic table</p> <p>Extension → Explain the physical and chemical properties of elements using the periodic table</p>
5. How can we use the periodic table to predict the reactivity of elements?	<p>Foundation → Know that the periodic table contains groups, periods metals and non-metals</p> <p>Developing → Know why elements are arranged in groups and periods to enable reactivity predictions</p> <p>Secure → Describe the reactivity of group 1 and group 7 elements</p> <p>Extension → Explain why the reactivity of group 1 increases and group 7 decreases.</p>
6.	Revision
7.	Test
8.	Feedback
Extension	Students will use a wide range of appropriate descriptive and scientific terms to explain the periodic table, elements and compounds. They will be able to apply their knowledge of the properties of metals and non-metals to everyday situations using keywords. They can apply their knowledge of chemical and physical properties to different situations used in labs and everyday situations. They can explain why the reactivity changes for different groups in the periodic table. They should be able to understand the structure of the atom and label all parts of the atom. They should confidently use chemical formulae for writing compounds.
Secure	Students will use appropriate scientific terminology to describe the difference between an element and a compound with correct examples from the periodic table. They should know why the elements are arranged in groups and periods in the periodic table. They

	should be able to understand and describe the difference between physical and chemical properties and metals and non-metals using keywords. They should be able to use the periodic table to describe the reactivity of elements in group 1 and 7. They can correctly write chemical formula for some compounds.
Developing	Students can use the periodic table to identify different elements using their chemical symbol. They can distinguish between metals and non-metals and use examples. They can describe the properties of metals and non-metals with guidance they can describe an element and a compound and use examples to show this.
Foundation	Students will have a basic knowledge of the periodic table and can name some elements that exist in the periodic table using symbols. They should be able to describe what an element is and know that the periodic table consists of groups and period. They can identify some metals and non-metals. They should be able to define chemical and physical properties.

Keywords

Atom	All substances are made out of these. An atom consists of tiny particles known as protons, neutrons and electrons
Element	An element is a substance made up of only one type of atom therefore it is PURE.
Periodic table	A table organised into groups and periods to indicate the properties of elements
Electron	Tiny negatively charged particle that orbits around the nucleus of an atom
Proton	A tiny positively charged particle found in the nucleus of an atom
Brittle	A material that is delicate and easily broken.
Sonorous	A substance that makes a sound when hit.
Ductile	Materials that can be easily bent without breaking and drawn into wires.
Malleable	A material that can be bent or shaped
Compound	When two or more elements react in a chemical reaction, the atoms do not just mix together; they bond to one another to form a compound
Physical Property	Characteristics that can be observed without the substance changing into another substance for example colour.
Chemical Property	Characteristics that determine how a substance will react with other substances or changing from one substance to another for example burning
Reactivity	The capacity of an atom to undergo a chemical reaction with another atom, molecule, or compound.

Year 8: Earth and Atmosphere

Lesson number	Key learning objectives
1.The structure of the Earth	Extension → Name and describe the 4 layers in the structure of the Earth in sequence. Use evidence from the video to evaluate the current model for the earth's structure.

	<p>Secure → Name and describe the 4 layers in the structure of the Earth in sequence.</p> <p>Developing → Name the 4 layers in the structure of the Earth In sequence.</p> <p>Foundation → Name the some of the layers in the structure of the Earth.</p>
2.Rock cycle	<p>Extension→ Can apply knowledge of rock formation to new situations.</p> <p>Secure → Can describe how each is formed in detailed terms.</p> <p>Developing → Can describe how each is formed in simple terms.</p> <p>Foundation → Name the three types of rock.</p>
3.Carbon Cycle	<p>Extension → Understand and explain the interaction of the processes in the carbon cycle.</p> <p>Secure → Describe photosynthesis and respiration as a word and symbol balanced equation.</p> <p>Developing → Describe photosynthesis and respiration as a word equation.</p> <p>Foundation → Can state that photosynthesis takes CO₂ out of the atmosphere and respiration puts CO₂ into the atmosphere.</p>
4.Combustion and the effects on the atmosphere	<p>Extension→ Can discuss how combustion and respiration are similar.</p> <p>Secure → Using the equation describe the gaseous changed in the atmosphere during combustion.</p> <p>Developing → State the word equation for combustion</p> <p>Foundation → Can carry out an experiment safely can collect a valid set of results.</p>
5.Climate Change	<p>Extension → Can apply knowledge of rock formation to new situations.</p> <p>Secure → Can describe how each rock is formed in detailed terms.</p> <p>Developing → Can describe how each rock is formed in simple terms.</p> <p>Foundation → Name the three types of rock.</p>
6.	Revision
7.	test
8.	feedback
Extension	Students can name and describe the 4 layers in the structure of the Earth in sequence. Use evidence from the video to evaluate the current model for the earth's structure and how it was formed. They can apply knowledge of rock formation to new situations. They understand interaction of the processes in the carbon cycle and can discuss how combustion and respiration are similar. They confidently use scientific equations to summarise the biological and chemical processes involved in the cycle.
Secure	Students will be able to name and describe the 4 layers in the structure of the Earth in sequence. They will be able to describe how each is formed in using specialized scientific terms. They can describe photosynthesis and respiration as a balanced equation. Using equations they are able describe gaseous exchange in the atmosphere during combustion. They can describe how each rock is formed in detailed terms.
Developing	Students can name the 4 layers in the structure of the Earth in sequence. They can describe how each is formed in simple terms. Students can describe photosynthesis and respiration as a word equation, and state the word equation for combustion. They can describe how each rock is formed in simple terms.
Foundation	Students can name the some of the layers in the structure of the Earth. They can name the three types of rock. Students can state that photosynthesis takes CO ₂ out of the atmosphere and respiration puts CO ₂ into the atmosphere, and can use the word equations in the C-cycle to describe the processes involved. They can carry out an experiment safely can collect a valid set of results.

Year 8: Energetics, chemical reactions and compounds

Lesson number	Key learning objectives
1. Moving atoms around	<p>Foundation → Recall that mass is conserved in changes of state and chemical reactions</p> <p>Developing → Describe how atoms are rearranged in a chemical reaction</p> <p>Secure → Calculate masses of products and reactants when given information</p> <p>Extension → Explain why mass seems to be lost in chemical reactions that give off a gas, using ideas about gas state and conservation of mass</p>
2. How do scientists represent chemical reactions?	<p>Foundation → Name simple compounds</p> <p>Developing → Work out the number of elements and atoms in different compounds</p> <p>Secure → Name compounds and explain experiments using word and some symbol equations</p> <p>Extension → Explain experiments using balanced symbol equations</p>
3. What is the reactivity series?	<p>Foundation → Recall that different metals have different reactivity</p> <p>Developing → Use experiments to put some metals in order of their reactivity</p> <p>Secure → Describe how more reactive metals can be used to displace less reactive metals</p> <p>Extension → Explain why some metals are more reactive than others, using the arrangement of the periodic table</p>
4. How can we obtain metals from their ores?	<p>Foundation → Recognise which metals can be extracted using carbon</p> <p>Developing → Use the reactivity series to explain why different metals are extracted using different processes</p> <p>Secure → Write word equations for reduction and oxidation</p> <p>Extension → Write balanced symbol equations for a range of reactions that occur in an iron blast furnace</p>
5. Energy changes – changes of state	<p>Foundation → Recognise that substances exist in different states of matter</p> <p>Developing → Describe the key terms relating to substances when they change from one state to another</p> <p>Secure → Describe patterns in a table/graph and write a valid conclusion using evidence</p> <p>Extension → Explain how substances change from one state to another using the key idea of energy</p>
6. Endo and exothermic reactions	<p>Foundation → Recognize that some reactions give out heat (exothermic) while others take heat in (endothermic)</p> <p>Developing → Describe the differences between exo- and endothermic reactions and give examples</p> <p>Secure → Explain what happens in an exo- / endothermic reaction</p> <p>Extension → Deduce if a reaction is exo- or endothermic from quantitative data</p>
7. Ceramics and polymers	<p>Foundation → Identify products made of ceramic, composites and polymers</p> <p>Developing → Suggest uses for ceramic, composites and polymers based on their properties</p> <p>Secure → Distinguish between the properties of ceramics, composites and polymers</p> <p>Extension → Recognise and draw the structure of monomers and polymers</p>
8.	Test
9.	Feedback

Extension	Extension level students should be able to explain the properties of different materials, including elements, ceramics and polymers. They should be able to use this explanation to compare different materials and link their properties to their uses. They should also be able to explain the results of different experiments involving metals by
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	<p>considering their reactivity and positions in the periodic table. They should be able to apply this knowledge to industrial processes, including the extraction of metals from their ores.</p> <p>Extension level students will begin to write simple, balanced chemical equations. They can also identify elements within a compound and what makes an element pure. They are able to identify reactants and products in a word and symbol equations and recognise the signs of chemical reactions. Will be able to carry out experiments using a written method without support. They will be able to plan investigations, interpret their results through the use of a graph or other visual representation and draw conclusions.</p>
Secure	<p>Secure level students should be able to describe the properties of different materials, including elements, ceramics and polymers. They should be able to use this to compare different materials and link their properties to their uses. They should also be able to explain the results of different experiments involving metals by considering their reactivity. They should also be able to describe how carbon is used to extract metals and compare metals that can be extracted using carbon with those that cannot.</p> <p>Secure level students will write chemical word equations. They can also identify elements within a compound and what makes an element pure. They are able to identify reactants and products in a word equation and recognise most of the signs of chemical reactions.</p> <p>Secure level students will be able to carry out experiments using a written method with little support. They will be able to plan investigations when given a structure and come up with independent, simple conclusions from their results by using graphs or tables.</p>
Developing	<p>Developing level students should be able to briefly describe the properties of different materials, including elements, ceramics and polymers. They should be able to use this to describe why materials are used for different purposes. They should also be able to link their results from experiments to the reactivity of given metals. They should also be able to state that some metals can be extracted using carbon and more reactive ones cannot. Will write simple word equations when given compound names. They can also identify elements within a compound. They are able to identify reactants and products in a word equation and recognise some of the signs of chemical reactions.</p> <p>Developing level students will be able to carry out experiments using a written method with little support. They will be able to come up with simple conclusions from their results linking independent and dependent variables</p>
Foundation	<p>Foundation level students should be able to describe some properties of different materials, including elements, ceramics and polymers. They should be able to use this to describe why materials are used for different purposes. They should also be able to state that some metals can be extracted using carbon and more reactive ones cannot.</p> <p>Foundation level students will put compound or element names in the right place for a word equation with support. They can also identify elements within a compound. They are able to recognize a few signs of chemical reactions.</p> <p>Foundation level students will be able to carry out experiments using a written method with support. They will be able to describe observations</p>

Keywords	Meaning
Atom	The smallest part of a chemical element that can exist
Boiling Point	The temperature at which a chemical boils
Chemical	Occurs when two or more substances are chemically joined to form new substances.

reaction	This is usually irreversible
Chromatography	this the collective term for a set of laboratory techniques for the separation of mixtures.
Compound	A substance made from two or more different types of atoms which are chemically bonded together
Conservation	The action of conserving something
Dissolving	Become or cause to become incorporated into a liquid so as to form a solution.
Distillation	The action of purifying a liquid by a process of heating and cooling.
Element	A substance made up of only one type of atom
Evaporation	The process of a liquid changing into a gas
Filtration	The action or process of filtering something
Freezing Point	The temperature at which a chemical freezes
Insoluble	A substance which is incapable of being dissolved
Irreversible	Not able to be undone or altered
Melting Point	The temperature at which a chemical melts
Mixture	A combination of two or more substances which are not chemically bonded together.
Precipitate	Cause (a substance) to be deposited in solid form from a solution
Properties	Characteristics or attributes that something has
Physical reaction	Occurs when a substance changes state. It is reversible
Reaction	A chemical process in which substances act mutually on each other and are changed into different substances, or one substance changes into other substances.
Reversible	Capable of being reversed so that the previous state is restored
Soluble	Able to be dissolved, especially in water
Solubility	Property of a solid, liquid, or gaseous chemical substance called solute to dissolve in a solid, liquid, or gaseous solvent to form a solution of the solute in the solvent
Solute	The minor component in a solution, dissolved in the solvent
Solution	A liquid mixture in which the minor component (the solute) is uniformly distributed within the major component (the solvent).
Solvent	The liquid in which a solute is dissolved to form a solution
Symbol equation	Uses symbols in place of words in a chemical reaction
Word equation	Describes the reactants and products involved in a chemical reaction

Year 8: Working Scientifically - Chemistry

Lesson number	Key learning objectives
1. How does a scientist plan an investigation?	<p>Foundation → Identify the different changes that can occur during an experiment.</p> <p>Developing → Identify the different factors that can be measured during an experiment.</p> <p>Secure → Use the appropriate keys to pose a question that can be investigated.</p> <p>Extension → Suggest different ways in which the experiment can be carried out as well as making appropriate predictions.</p>
2. How are you going to plan your investigation?	<p>Foundation → Draw a results table and include the independent and dependent variables correctly.</p> <p>Developing → Draw a graph to represent their results clearly.</p> <p>Secure – Identify which variable will go on each axes.</p> <p>Extension → Make and write a scientific prediction and explain why they have given</p>

	that particular prediction. They will also be able to identify errors and positives from given methods.
3. What factors affect how quickly sugar dissolves?	<p>Foundation → Draw a results table and include the independent and dependent variables correctly.</p> <p>Developing → Write a prediction for the experiment they will be performing.</p> <p>Secure → Write a prediction for the experiment they will be performing with given reasons why.</p> <p>Extension → Make a scientific prediction and explain why they have given that particular prediction. They will also be able to identify errors and positives from given methods.</p>
4. What factors affect how quickly tissue paper absorbs water?	<p>Foundation → Draw a graph with labeled axes and plot points with very little help.</p> <p>Developing → Write simple conclusion for their results to show a trend.</p> <p>Secure → Write a scientific conclusion with reasons as well as linking their results back to their prediction.</p> <p>Extension → Evaluate two sets of data competently and include data to support their claims.</p>
5. What factors affect how quickly tissue paper absorbs water?	<p>Foundation → Write a conclusion to a set of random data they will receive.</p> <p>Developing → Carry out an experiment to test their prediction</p> <p>Secure → Draw a graph to represent results from and write a simple conclusion</p> <p>Extension → Write a scientific conclusion and quoting at least two sets of data to support their explanations.</p>
6. What factors affect how quickly sugar dissolves?	<p>Foundation → Write a conclusion to a set of random data they will receive.</p> <p>Developing → Carry out an experiment to test their prediction</p> <p>Secure → Draw a graph to represent their results and write a simple conclusion</p> <p>Extension → Confidently write a scientific conclusion including two sets of data to support their explanations.</p>
7. How does the size of the beaker affect how quickly a candle extinguishes?	<p>Foundation → Identify the dependent and independent variable</p> <p>Developing → Decide on relevant units to correspond with table headings</p> <p>Secure → Construct an appropriate results table</p> <p>Extension → Critique a completed results using subject specific language</p>
8. Mock assessment – How Science Works	<p>Foundation → Identify different pieces of equipment.</p> <p>Developing → Identify variables needed for the experiment.</p> <p>Secure → Choose and draw and suitable graph and write a simple conclusion.</p> <p>Extension → Confidently write a scientific conclusion including a set of data.</p>
9.	Test
10.	Feedback

Extension	Pupils will be able to suggest different ways in which the experiment can be carried out as well as making appropriate predictions. They can make a scientific prediction and explain why they have given or chosen that particular prediction. They will also be able to identify errors and positives from given methods. Pupils will be able to evaluate two sets of data competently and include data to support their claims. Pupils will be able to confidently write a scientific conclusion and quoting at least two sets of data to support their explanations. Evaluate given results and data using subject specific language.
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Secure	Pupils will be able to use appropriate keys words to pose questions that can be investigated, identify which variable will go on each axes of a graph and be able to write a prediction with reasons for the experiment they will be performing . The will be able to construct an appropriate results table. Pupils will be able to write a scientific conclusion with reasons as well as linking their results back to their prediction. Draw a graph to represent their results and write a simple but scientific conclusion.
Developing	Pupils will be able to identify the different factors that can be measured during an experiment. They will be able to draw a graph to represent their results clearly. Pupils will be able to write a prediction for the experiment they will be performing and be able to write simple conclusion for their results to show a trend. Pupils will be able to carry out an experiment to test their prediction and decide on relevant units to correspond with table headings. Pupils will be able to identify variables needed for the experiment.
Foundation	Pupils will be able to identify the different changes that can occur during an experiment and be able to draw a results table to include the independent and dependent variables correctly. Pupils will be able to draw a graph with labeled axes and plot points with very little help and write conclusions to any set of random data they will receive. Identify the dependent and independent variable and identify different pieces of equipment.

Year 8 - Physics units

Year 8: Energy and electromagnetism

Lesson number	Key learning objectives
1.Where did the energy go?	Foundation → State what is meant by thermal conduction Developing → Describe the results from the thermal conduction experiment Secure → Explain the results from the thermal conduction experiment Extension → Use explanation of thermal conduction to answer application questions on the experiment
2. Energy and power	Foundation → Describe the difference between energy and power Developing → State the equation that relates energy and power Secure → Calculate the power of an appliance Extension → Rearrange an equation using power
3. Speeding up	Foundation → State the formula to work out the speed of an object Developing → Use distance and time to work out the speed of an object Secure → Interpret a distance time graphs Extension → Manipulate the formula to work out distance or time
4.	Checking for progress lesson. Pathways will be the same as previous three lessons
5. Static electricity	Foundation → State what static electricity is and simply how objects become charged Developing → Describe how objects can become charged in terms of electron transfer Secure → Use key words and examples to describe how an object can become charged Extension → Explain the effect of opposite charges
6. Magnetism	Foundation → State what magnetism is in terms of poles, attraction and repulsion

	<p>Developing → State what magnetic fields are and plotting fields</p> <p>Secure → Describe the Earth's magnetic field and how we use it to navigate</p> <p>Extension → Explain how we can make electromagnets and generate electricity with magnets</p>
7.	Test
8.	Feedback

Extension	<p>Extension students should be able to apply their knowledge of conduction to answering application questions on thermal decomposition and explain why some substances can conduct heat better than others. They will be able to use and rearrange the power equation to work out either energy or time. Explain the effect of opposite electrical charges in terms of negative and positively charged objects, the movement of electrons, using diagrams to make their understanding clear and apply their knowledge to explain how electromagnets work in terms of electromagnetic induction of a current. They can apply their knowledge to explain how electricity is generated using magnets and coils of wire.</p>
Secure	<p>Secure students should be able to interpret results from an investigation on thermal conduction and interpretation will include a comparison between own results and their peer's results. They can use energy and time to find out the power rating of an appliance. Use electron transfer and diagrams to show the movement of electrons and charge.</p> <p>They can describe the shape of Earth's magnetic field and how it is used to navigate by using compasses.</p>
Developing	<p>Developing students should be able to carry out a simple experiment on thermal conduction and briefly describe the trend/pattern shown by the results and list equipment, write a simple method and risk assessment for this investigation.</p> <p>They can recall the equation for power and substitute numbers into a given formula</p> <p>Able to describe how an object becomes charged by referring to the movement of electrons from one object to another to become charged and describe what magnetic fields are and use line diagrams and plotting compasses to show the magnetic field around a magnet or electromagnet.</p>
Foundation	<p>Foundation students should be able to state what is meant by thermal conduction, carry out a simple experiment on thermal decomposition and a very briefly describe the practical.</p> <p>They can define power and describe the difference between energy and power including the units. State what static electricity is and how objects can become statically charged, state what magnetism is by using the word poles and state what they can do by using the words attraction and repulsion</p>

Keywords for learning in the order to be learnt:

Power	Power is a measure of how quickly energy is transferred. The unit of power is the watt (W).
Conduction	The process by which heat is directly transmitted through the material of a substance when there is a difference of temperature
Speed	The rate at which someone or something moves or operates or is able to move or operate:
Attract	Two objects pulling towards each other
Repel	Push away
Magnet	An object that can attract magnetic materials

Magnetism	A non-contact force
North pole	One end of a magnet. This end points north if the magnet can move
South pole	Opposite end of the north pole
Compass	A magnetised piece of metal that can swing around – it points north.
Magnetic field	The space around a magnet where it can affect magnetic materials or other magnets
Electromagnet	A coil of wire with electricity flowing in it. An electromagnet has a magnetic field like a bar magnet

Year 8: Waves

Lesson number	Key learning objectives
1. What are waves?	<p>Foundation → Describe a wave and know some examples</p> <p>Developing → Explain the definition of a wave and some properties</p> <p>Secure → Explain the properties of a wave and to describe frequency and wavelength</p> <p>Extension → Explain superposition and how this affects different waves.</p>
2. Sound 1st lesson	<p>Foundation → Describe a sound wave</p> <p>Developing → Describe sound waves in terms of vibrations</p> <p>Secure → Describe properties of sound waves in different mediums</p> <p>Extension → Explain how sound changes in different mediums using particles and vibrations</p>
3. Sound 2 nd lesson	<p>Foundation → Briefly describe how the brain receives sound signals</p> <p>Developing → Describe the process of sound travelling from our ear to our brain</p> <p>Secure → Explain how the ear works when hearing sound.</p> <p>Extension → Know auditory ranges of different animals and to explain in detail the pathway of sound for a microphone and our ear</p>
4. Transferring Energy	<p>Foundation → Know and state that energy is transferred by waves</p> <p>Developing → Describe how energy is transferred using waves</p> <p>Secure → Explain how energy from waves can be used</p> <p>Extension → Explain how energy transfers are used in everyday life</p>
5. Light part 1	<p>Foundation → State how light travels</p> <p>Developing → Describe what light is</p> <p>Secure → Draw a conclusion from an experiment</p> <p>Extension → Use the formula for speed to carry out calculations</p>
6. Light part 2	<p>Foundation → Describe different materials using the words: opaque, translucent, transparent</p> <p>Developing → Describe how we see objects</p> <p>Secure → Explain how shadows are formed</p> <p>Extension → Explain why some objects appear dull and others shiny</p>
7. Reflection	<p>Foundation → Describe how the angle of incidence is related to the angle of reflection.</p> <p>Developing → Investigate what happens when you move closer or further from a mirror</p> <p>Secure → Accurately draw ray diagrams showing how light is reflected.</p> <p>Extension → Explain why some objects appear dull and others shiny</p>
8. Refraction	<p>Foundation → Describe how light refracts</p>

	<p>Developing → Explain how light refracts and draw accurate refraction diagrams</p> <p>Secure → Interpret a diagram to explain the action of convex lens in focusing (qualitative); the human eye</p> <p>Extension → Apply an understanding of refraction to exam style questions</p>
9. Colour it white	<p>Foundation → State the colours white light is made of</p> <p>Developing → Describe what white light is and name the colours in order</p> <p>Secure → Describe how white light refracts into a spectrum.</p> <p>Extension → Explain how prisms disperse and recombine light using refraction and wavelength</p>
10. Seeing colours	<p>Foundation → Recognise that coloured objects absorb some colours and transmit or reflect others.</p> <p>Developing → Describe the effect of different coloured lights on the appearance of coloured objects.</p> <p>Secure → Explain the appearance of coloured objects in coloured lights.</p> <p>Extension → Explain observations using the emit, transmit, reflect, absorb, detect</p>
11	Revision
12	Test
13	Feedback

Extension	Students will use a wide range of appropriate descriptive and scientific terms to explain the nature and differences between light and sound waves. They will be able to apply their knowledge to everyday situations, abstract ideas and industry. They can explain how evidence supports some accepted scientific ideas, such as wave theory for light. They can rearrange and calculate the parts of the general equation for wave speed/velocity. They will use formulae for velocity, wavelength and frequency and be able to apply their calculations to a physical understanding of the wave.
Secure	Students will use appropriate scientific terminology to describe and explain the nature and differences between light waves and sound waves. They can use models to explain concepts such as velocity, amplitude, wavelength and frequency and be able to by describe what is occurring on the microscopic level. They can draw diagrams to illustrate and explain how hearing of sound waves is achieved in humans.
Developing	They can use models to explain the different properties of light and sound and will apply their knowledge to different situations. They can confidently distinguish between light and sound waves and justify their classification. With guidance they can use the general formula for the velocity of waves.
Foundation	They can draw basic diagrams and with some support to show the nature of waves, comparing light and sound as examples. They can describe the effect of different factors on how hearing is achieved using appropriate vocabulary.

Keywords for learning in the order to be learnt:

vacuum	An empty space containing NO particles
velocity	The distance moved by an object in a unit time
wavelength	The length of one complete wave measured in metres
frequency	The number of waves passing a point in one second
hertz	The unit we measure frequency in

transverse wave	Waves (vibrations) that move at right angles from their direction of movement eg light
longitudinal wave	Waves(vibrations) that move in the same direction of the wave eg sound
oscilloscope	Device that shows the shape of waves
translucent	Absorbs some light
transparent	Allows light through
opaque	Blocks light

Year 8: HSW Physics

Lesson number	Key learning objectives
1.Data in Science	<p>Foundation → Recall keywords and plot graph with a grid</p> <p>Developing → Recall keywords and plot a graph without a grid</p> <p>Secure → Draw a graph unaided and use keywords to describe pattern</p> <p>Extension → Draw a graph unaided correctly and explain patterns with scientific terms eg- proportional, correlation and non-proportional.</p>
2. Planning a method	<p>Foundation → Identify the correct variables in this investigation</p> <p>Developing → Write a method</p> <p>Secure → Write a detailed method which would give reliable and reproducible data.</p> <p>Extension → Give a detailed risk assessment</p>
3. Practical and Data	<p>Foundation → Fill in a table and collect results.</p> <p>Developing → Use a frame to create headings in a table and collect results safely.</p> <p>Secure → Create a table with support and collect results safely.</p> <p>Extension → Make their own results table and collect results independently.</p>
4. Analysis of practical	<p>Foundation → Describe patterns in the graph</p> <p>Developing → Describe patterns in the graph and explain them</p> <p>Secure → Describe patterns in the graph, explain them, and evaluate the accuracy and reliability of the practical</p> <p>Extension → Describe patterns in the graph, explain them, and evaluate the accuracy and reliability of the practical including disadvantages and advantages</p>
5. Planning a practical	<p>Foundation → Identify the variables in this investigation and carry out a method safely</p> <p>Developing → Identify correct variables in this investigation and carry out a method safely</p> <p>Secure → Identify correct variables in this investigation and carry out a method safely and accurately</p> <p>Extension → Identify correct variables in this investigation and carry out a method safely, accurately and so it will be reproducible</p>
6. Practical and Data	<p>Foundation → Fill in a table and collect results</p> <p>Developing → Use a frame to create headings in a table and collect results safely</p> <p>Secure → Create a table with support and collect results safely</p> <p>Extension → Create a table and collect results safely</p>
7. Analysis of practical	<p>Foundation → Describe patterns in the graph</p> <p>Developing → Describe patterns in the graph and explain them.</p> <p>Secure → Describe patterns in the graph, explain them, and evaluate the accuracy and reliability of the practical.</p> <p>Extension → Describe patterns in the graph, explain them, and evaluate the accuracy and reliability of the practical including disadvantages and advantages.</p>

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Extension	Extension students should be able to plan a practical ensuring the method it is accurate, reproducible and valid of the method. They should be able to give an extensive and detailed risk assessment considering all elements of safety when carrying out a practical. Draw a graph independently ensuring the type of graph, labels, units and data plotted are correct. They should be able to describe the patterns shown within the graph and link trends to scientific explanations using relevant keywords to demonstrate understanding.
Secure	Students who are working at a secure level should be able to plan a practical considering the accuracy, reproducibility and validity of the method. They should be able to give a detailed risk assessment considering most elements of safety when carrying out a practical. Secure level students should be able to draw a graph independently with most elements correct. They should be able to describe the patterns shown within the graph and linking scientific models and using most of the relevant keywords to demonstrate understanding.
Developing	Developing students are expected to be able to plan a practical with support. They should be able to give a risk assessment considering some elements of safety when carrying out a practical. Developing students should be able to draw a graph unaided. They should be able to describe the patterns shown within the graph and use some relevant keywords to demonstrate understanding.
Foundation	Students that are working at a foundation level should be able to carry out a practical with a method provided. They should be able to give a risk assessment with prompts ensuring the practical is carried out safely. They should be able to draw some types of graphs with little help. Foundation students should be able to describe some patterns shown within the graph and attempt to explain possible reasons for the trends shown.

Keywords for learning in the order to be learnt:	
Independent variable	The variable (thing) we change
Dependent variable	The variable (thing) we measure
Control variables	The variables (things) we keep the same
Accuracy	A measurement result is judged to be close to the true value.
Precision	Measurements are very similar. They will be very similar to the mean value.
Reproducibility	Measurements would show a similar pattern if the experiment was repeated.
Validity	Does the investigation answer the question properly?