

**Hexham Middle School**  
**Progression of Age-Related Expectations**

Science	Year 5	Year 6	Year 7	Year 8
<b>Biology</b>	<b>Life exists in a variety of forms and goes through cycles – Animals</b>	<b>Living things can be classified according to observable features</b>	<b>Cells and tissues</b>	<b>Lungs and gas exchange</b>
	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.	Describe how living things are classified into groups according to characteristics and based on similarities and differences, including micro-organisms, plants and animals.	Identify cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope.	Explain the structure and functions of the gas exchange system in humans, including adaptations to function.
	Describe the changes as humans develop to old age.	Give reasons for classifying plants and animals based on specific characteristics.	Explain the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts.	Describe the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume.
	<b>The human body has a number of systems, each with its own function</b>	<b>The human body has a number of systems, each with its own function</b>	Compare the similarities and differences between plant and animal cells.	Evaluate the impact of exercise, asthma and smoking on the human gas exchange system.
	Describe the life process of reproduction in some plants and animals.	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	Explain the role of diffusion in the movement of materials in and between cells.	<b>Drugs and health</b>
		Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Describe the structural adaptations of some unicellular organisms (sex cells, ciliated cells, root hair cells, blood cells etc).	Research the effects of recreational drugs (including substance misuse) on behaviour, health and life processes
		Describe the ways in which nutrients and water are transported within animals, including humans.	Describe the hierarchical organisation of multicellular organisms (cells, tissues, organs, systems to organisms).	<b>Food and digestion</b>
		<b>Living things exhibit variation and adaptation and these may lead to evolution</b>	<b>Muscles and bones</b>	Describe the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and explain why each is needed.
		Recognise that living things have changed over time and that fossils provide information about living things	Describe the structure and functions of the human skeleton, to include support, protection, movement and making blood cells.	Describe the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food.
			Explain the interaction between skeleton and muscles, including the differences in forces exerted by various muscles	Explain the role of enzymes as biological catalysts.

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		<p>that inhabited the Earth millions of years ago.</p> <p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>Identify how animals and plants are adapted to suit their environment and that adaptation may lead to evolution.</p>	<p>Consider the function of muscles and give examples of antagonistic muscles.</p> <p><b>Animal reproduction</b></p> <p>Describe reproduction in humans, including the structure and function of the male and female reproductive systems.</p> <p>Explain the stages of the menstrual cycle.</p> <p>Describe the formation of gametes and process of fertilisation.</p> <p>Identify the main stages in gestation and birth.</p> <p>Consider the effect of maternal lifestyle on the foetus through the placenta.</p> <p><b>Plant Reproduction</b></p> <p>Describe reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.</p> <p><b>Relationships in an Ecosystem</b></p> <p>Describe the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops.</p>	<p>Consider the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases.</p> <p>Explain the importance of bacteria in the human digestive system.</p> <p><b>Nutrition and Photosynthesis</b></p> <p>Describe how plants make carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots.</p> <p>Give the reactants in, and products of, photosynthesis, and a word summary for photosynthesis.</p> <p>Explain the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere.</p> <p><b>Respiration</b></p> <p>Describe aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules which enables all the other chemical processes necessary for life.</p> <p>Write a word summary for aerobic respiration.</p>
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			<p>Assess the importance of plant reproduction through insect pollination in human food security.</p> <p>Explain how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</p>	<p>Assess the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration.</p> <p>Contrast the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.</p>
<b>Chemistry</b>	<p><b>Materials have physical properties which can be investigated and compared</b></p> <p>Compare material properties (hardness, solubility, transparency, conductivity and response to magnets).</p> <p>Know that some materials will dissolve to form a solution, and describe how to recover a substance from a solution.</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible. Explain that some changes result in the formation of new materials and that this kind of change is not usually reversible, (e.g., burning and acid on soda).</p>		<p><b>Particles</b></p> <p>Describe the different states of matter in terms of arrangements, motion and closeness of particles.</p> <p>Explain changes of state in terms of energy.</p> <p>Explain diffusion in liquids and gases driven by differences in concentration.</p> <p>Consider gas pressure in terms of particles and apply their understanding to different phenomena including vacuums.</p> <p>Appreciate the importance of the observation of Brownian motion in gases.</p>	<p><b>Atoms and Elements</b></p> <p>Consider atoms and molecules as particles.</p> <p>Draw and label a simple atomic model.</p> <p>Define the key terms atom, element, compound and molecule accurately with specific examples.</p> <p>Use chemical symbols and formulae for elements and compounds.</p> <p>Describe polymers and explain the properties of polymers in terms of their molecular arrangement.</p> <p>Consider chemical reactions as the rearrangement of atoms.</p> <p>Use word equations to represent a chemical reaction.</p>
	<p><b>The physical properties of materials determine their uses</b></p> <p>Give reasons, based on evidence from comparative and fair tests, for the</p>		<p><b>Pure and Impure Substances</b></p> <p>Recognise particle diagrams elements, compounds and mixtures.</p>	<p><b>The periodic table and reactivity</b></p> <p>Describe the varying physical and chemical properties of different elements.</p>

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	<p>particular uses of materials, including metals, wood and plastic.</p>		<p>Use melting and boiling points to determine a pure or impure substance.</p> <p>Use the key terms dissolve, solute, solvent and solution.</p> <p>Undertake simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography.</p> <p>.</p> <p><b>Chemical Reactions</b></p> <p>Understand that chemical reactions involve the rearrangement of atoms.</p> <p>Define acids and alkalis in terms of neutralisation reactions.</p> <p>Use the pH scale for measuring acidity/alkalinity; and indicators.</p> <p>Investigate the reactions of acids with metals to produce a salt plus hydrogen.</p> <p>Investigate the reactions of acids with alkalis to produce a salt plus water.</p>	<p>Describe the principles underpinning the Mendeleev Periodic Table</p> <p>Describe the Periodic Table: periods and groups; metals and non-metals.</p> <p>Compare the physical and chemical properties of metals and non-metals</p> <p>Explain how patterns in reactions can be predicted with reference to the Periodic Table.</p> <p>Research the properties of metals and non-metals.</p> <p><b>Earth and Atmosphere</b></p> <p>Describe the composition of the Earth.</p> <p>Recall the structure of the Earth.</p> <p>Describe the rock cycle and the formation of igneous, sedimentary and metamorphic rocks.</p> <p>Consider Earth as a source of limited resources and the efficacy of recycling.</p> <p>Describe the carbon cycle and anthropogenic contribution.</p> <p>Recall the composition of the atmosphere</p> <p>Consider the production of carbon dioxide by human activity and the impact on climate.</p>
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<b>Physics</b>	<b>There are contact and non-contact forces; these affect the motion of objects</b>	<b>Light &amp; sound can be reflected &amp; absorbed and enable us to see &amp; hear</b>	<b>Forces and motion</b>	<b>Forces</b>
	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.	Recognise that light appears to travel in straight lines.	Describe forces as pushes or pulls, arising from the interaction between two objects.	Describe forces: associated with deforming objects; stretching and squashing – springs; friction between surfaces, pushing things out of the way; resistance of air and water.
	Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.	Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.	Use force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces.	Define forces as measured in newtons, measurements of stretch or compression as the force applied is changed.
	Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	Explain that we see things because light travels from light sources to our eyes or from light sources to objects and to our eyes.	Study speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time).	Investigate force-extension linear relation; Hooke's Law.
	<b>Day, night, month, seasons &amp; years are caused by the position and movement of the Earth</b>	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Represent a journey on a distance-time graph.	Consider work done and energy changes on deformation.
	Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.	<b>Electricity can make circuits work and can be controlled to perform useful functions</b>	Describe the forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only).	<b>Energy Transfers</b>
	Describe the movement of the Moon relative to the Earth.	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in a circuit.	Describe opposing forces and equilibrium: including weight held by stretched spring or supported on a compressed surface.	Define the term energy as the ability to do work.
	Describe the Sun, Earth and Moon as approximately spherical bodies.	Compare and give reasons for variations in how components function, including brightness of bulbs, loudness of buzzers and switches.	Investigate non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity.	Describe heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one through contact (conduction) or radiation; such transfers tending to reduce the temperature difference.
	Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across sky.	Use recognised symbols when representing a simple circuit in a diagram.	<b>Energy</b>	Assess the use of insulators to minimise heat transfer.
			Consider energy as a quantity that can be quantified and calculated.	<b>Electricity and Electromagnetism</b>

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			<p>Explain why the total energy has the same value before and after a change (conservation of energy)</p> <p>Compare the starting and the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures (not covered in detail: changes in positions in a field, in elastic distortions and in chemical compositions).</p> <p>Explain changes with temperature in the motion and spacing of particles.</p> <p>Compare energy values of different foods (from labels) (kJ).</p> <p>Compare power ratings of appliances in watts (W, kW).</p> <p>Calculate and compare amounts of energy transferred (J, kJ, kW hour).</p> <p>Assess domestic fuel bills, fuel use and costs.</p> <p>Compare fuels and consider renewable and non-renewable energy resources.</p> <p><b>Waves</b></p> <p>Explain that sound is produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal.</p> <p>Describe the auditory range of humans and animals.</p>	<p>Describe electric currents, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge.</p> <p>Investigate potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current.</p> <p>Investigate differences in resistance between conducting and insulating components (quantitative).</p> <p>Describe electrostatic forces as the separation of positive or negative charges when objects are rubbed together: transfer of electrons.</p> <p>Explain the idea of electric field, forces acting across the space between objects not in contact.</p> <p>Consider magnetic poles, attraction and repulsion.</p> <p>Plot magnetic fields with compass, representation by field lines (HW project).</p> <p>Study Earth's magnetism, compass and navigation (HW project).</p> <p>Investigate the magnetic effect of a current, electromagnets, D.C. motors (principles only).</p>
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			<p>Describe light waves travelling through a vacuum; speed of light.</p> <p>Investigate the transmission of light through materials: absorption, diffuse scattering and specular reflection.</p> <p>Use the ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the eye.</p> <p>Consider light as transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras.</p> <p>Describe colours using different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.</p>	
<b>Working Scientifically</b>	<b>Planning investigations</b>	<b>Planning investigations</b>	<b>Scientific Attitudes</b>	<b>Scientific Attitudes</b>
	Pupils can plan an enquiry.	Pupils can ask questions.	Identify variables and describe how to control them. Begin to evaluate accuracy, precision, repeatability and reproducibility.	Identify variables and describe how to control them. Begin to evaluate accuracy, precision, repeatability and reproducibility.
	Pupils can begin to identify variables.	Pupils can plan an enquiry.		
	<b>Conducting experiments</b>	<b>Conducting experiments</b>	Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review.	Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review.
	Pupils can use equipment to take measurement s.	Pupils can use equipment to take measurements.		
	Pupils explore how to improve the quality of data.	Pupils explore how to improve the quality of data.		

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	Pupils understand the role of repeat readings.	Pupils understand the role of repeat readings.	<b>Experimental Skills and Investigations</b>	<b>Experimental Skills and Investigations</b>
	<b>Recording evidence</b>	<b>Recording evidence</b>	Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience.	Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience.
	Pupils record work with diagrams and label them.	Pupils record work with diagrams and label them.	Make predictions using scientific knowledge and understanding.	Make predictions using scientific knowledge and understanding.
	Pupils can display data using labelled diagrams, keys, tables and bar charts.	Pupils can display data using labelled diagrams, keys, tables and bar charts.	Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.	Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.
	Pupils can display data using line graphs.	Pupils can display data using line graphs.	Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety.	Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety.
	<b>Reporting findings</b>	<b>Reporting findings</b>	Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements.	Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements.
	Pupils process findings to develop conclusions and identify causal relationships.	Pupils process findings to develop conclusions and identify causal relationships.	Apply sampling techniques.	Apply sampling techniques.
	Pupils use displays and presentations to report on findings.	Pupils use displays and presentations to report on findings.	<b>Analysis and evaluation</b>	<b>Analysis and evaluation</b>
	Pupils explain confidence in findings.	Pupils explain confidence in findings	Apply mathematical concepts and calculate results.	Apply mathematical concepts and calculate results.
	<b>Conclusions and predictions</b>	<b>Conclusions and predictions</b>	Present observations and data using appropriate methods, including tables and graphs.	Present observations and data using appropriate methods, including tables and graphs.
	Pupils can analyse data.	Pupils can analyse data.		
	Pupils can draw conclusions.	Pupils can draw conclusions.		
	Suggest further comparative or fair tests.	Pupils can develop investigation further.		



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			<p>Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.</p> <p>Present reasoned explanations, including explaining data in relation to predictions and hypotheses.</p> <p>Evaluate data, showing awareness of potential sources of random and systematic error.</p> <p>Identify further questions arising from their results.</p> <p><b>Measurement</b></p> <p>Understand and use SI units and chemical nomenclature.</p> <p>Use and derive simple equations and carry out appropriate calculations.</p> <p>Undertake basic data analysis including simple statistical techniques.</p>	<p>Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.</p> <p>Present reasoned explanations, including explaining data in relation to predictions and hypotheses.</p> <p>Evaluate data, showing awareness of potential sources of random and systematic error.</p> <p>Identify further questions arising from their results.</p> <p><b>Measurement</b></p> <p>Understand and use SI units and chemical nomenclature.</p> <p>Use and derive simple equations and carry out appropriate calculations.</p> <p>Undertake basic data analysis including simple statistical techniques.</p>
<b>Demonstrating Greater Depth in Science</b>	<p>Explain the reasons for changes as humans develop</p> <p>Compare the life cycles of different animals and plants</p> <p>Explain how the properties of a material make it useful.</p> <p>Explain changes of state in terms of heating and cooling</p>	<p>Justify the classification of unusual types of organism</p> <p>Explain how the circulatory system and digestive system work together to carry out their function</p> <p>Explain how the adaptations of organisms enable survival.</p> <p>Explain how random change can lead to the evolution of a species</p>	<p>Explain how specialised cells are adapted to carry out their function.</p> <p>Explain how the skeletal and muscular system are adapted to carry out their function.</p> <p>Explain the purpose of changes which occur during puberty.</p> <p>Explain how a plants reproductive parts, including seeds are adapted to carry out their function.</p>	<p>Explain how the gas exchange and digestive systems are adapted to carry out their function.</p> <p>Explain how leaves are adapted to carry out photosynthesis</p> <p>Explain the effects of exercise on aerobic and anaerobic respiration</p> <p>Explain and predict displacement reactions, representing these with word equations</p>

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	<p>Explain the effect of surface area on air resistance or water resistance</p> <p>Evaluate evidence for the force of gravity, the shape of Earth and the Heliocentric model</p> <p>Correctly identify variables and suggest improvements to investigation methodology</p>	<p>Explain how the interaction of light with different media may affect what is seen.</p> <p>Explain, using the idea of electrons the effect of changing the number of cells or bulbs in an electrical circuit in terms of current and voltage.</p>	<p>Explain how changes in population may affect other organisms in an ecosystem</p> <p>Explain the properties of solids, liquid and gases in terms of particle energy and particle arrangement</p> <p>Explain why impure substances do not have sharp melting points</p> <p>Explain simple separation techniques in terms of particles</p> <p>Describe concentrated and dilute acids in terms of particles</p> <p>Name salts formed from neutralisation reactions and write word equations to describe these reactions</p> <p>Explain the meaning of relative motion: trains and cars passing one another.</p> <p>Explain how an object's mass affects the force of gravity.</p> <p>Explain energy transfer from one source to another</p> <p>Suggest how the efficiency of an appliance may be improved, using ideas of dissipation.</p> <p>Explain the relationship between frequency, pitch, loudness and amplitude</p>	<p>Name compounds from chemical formulae</p> <p>Explain the properties of sedimentary, metamorphic and igneous rock.</p> <p>Explain factors affecting drag forces in terms of particles</p> <p>Compare methods thermal energy transfer (conduction, convection and radiation)</p> <p>Explain how charged particles cause static electricity in terms of repulsion or attraction</p> <p>Explain the factors affecting the strength of an electromagnet</p>
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