

**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.

Hexham Middle School  
Progression of Age-Related Expectations

		<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>
--	--	--	---	--

Hexham Middle School  
Progression of Age-Related Expectations

			<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>Calculate density from mass and volume data.</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>Explain the anomaly of ice-water transition in basic terms of density and the differences between water and other similar molecules (e.g., CO<sub>2</sub>).</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>The periodic table and reactivity</b></p> <p>Describe the varying physical and chemical properties of different elements.</p>	

Hexham Middle School  
Progression of Age-Related Expectations

	<p>particular uses of materials, including metals, wood and plastic.</p>		<p><b>Pure and Impure Substances</b></p> <p>Explain the difference between elements, compounds and mixtures.</p> <p>Explain the concept of a pure substance. Use the terms saturated and solubility to describe how different substances may dissolve in water.</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>Describe how to identify pure substances (from their particle models, boiling points, chromatography etc).</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>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>
--	--	--	---	--

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

			<b>Earth and Atmosphere</b>	
			Describe the composition of the Earth.  Recall the structure of the Earth.  Describe the rock cycle and the formation of igneous, sedimentary and metamorphic rocks.	
<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.  Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.  Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	Recognise that light appears to travel in straight lines.  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.  Explain that we see things because light travels from light sources to our eyes or from light sources to objects and to our eyes.  Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Describe forces as pushes or pulls, arising from the interaction between two objects.  Use force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces.  Study speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time).  Represent a journey on a distance-time graph.  Explain the meaning of relative motion: trains and cars passing one another.	Describe forces: associated with deforming objects; stretching and squashing – springs; friction between surfaces, pushing things out of the way; resistance of air and water.  Define forces as measured in newtons, measurements of stretch or compression as the force applied is changed.  Investigate force-extension linear relation; Hooke's Law.  Consider work done and energy changes on deformation.
	<b>Day, night, month, seasons &amp; years are caused by the position and movement of the Earth</b>			<b>Energy Transfers</b>
	Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.  Describe the movement of the Moon relative to the Earth.	<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).  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.  Consider energy as a quantity that can be quantified and calculated.  Explain why the total energy has the same value before and after a change (conservation of energy)

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

	<p>Describe the Sun, Earth and Moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across sky.</p>	<p>Compare and give reasons for variations in how components function, including brightness of bulbs, loudness of buzzers and switches.</p> <p>Use recognised symbols when representing a simple circuit in a diagram.</p>	<p>Investigate non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity.</p> <p><b>Energy</b></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. 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. Describe the auditory range of humans and animals.</p> <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>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>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.</p> <p>Assess the use of insulators to minimise heat transfer.</p> <p>Explain energy transfers: e.g., changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.</p> <p><b>Electricity and Electromagnetism</b></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>
--	---	--	---	---

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

			<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>	<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>
<b>Working Scientifically</b>	<b>Planning investigations</b>	<b>Planning investigations</b>	<b>Scientific Attitudes</b>	<b>Scientific Attitudes</b>
	<p>Pupils can plan an enquiry.</p> <p>Pupils can identify and manage variables.</p>	<p>Pupils can ask questions.</p> <p>Pupils can plan an enquiry.</p> <p>Pupils can identify and manage variables.</p>	<p>Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility.</p> <p>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.</p>	<p>Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility.</p> <p>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.</p>
	<b>Conducting experiments</b>	<b>Conducting experiments</b>		
	<p>Pupils can use equipment to take measurements.</p>	<p>Pupils can use equipment to take measurements.</p>		

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

Pupils explore how to improve the quality of data.	Pupils explore how to improve the quality of data.	<b>Experimental Skills and Investigations</b>	<b>Experimental Skills and Investigations</b>
Pupils understand the role of repeat readings.	Pupils understand the role of repeat readings.	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.
<b>Recording evidence</b>	<b>Recording evidence</b>	<b>Experimental Skills and Investigations</b>	<b>Experimental Skills and Investigations</b>
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.	<b>Reporting findings</b>	<b>Reporting findings</b>
<b>Reporting findings</b>	<b>Reporting findings</b>	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.
Pupils process findings to develop conclusions and identify causal relationships.	Pupils process findings to develop conclusions and identify causal relationships.	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 use displays and presentations to report on findings.	Pupils use displays and presentations to report on findings.	Apply sampling techniques.	Apply sampling techniques.
Pupils explain confidence in findings.	Pupils explain confidence in findings.	<b>Analysis and evaluation</b>	<b>Analysis and evaluation</b>
<b>Conclusions and predictions</b>	<b>Conclusions and predictions</b>	<b>Analysis and evaluation</b>	<b>Analysis and evaluation</b>
Pupils can analyse data.	Pupils can analyse data.	Apply mathematical concepts and calculate results.	Apply mathematical concepts and calculate results.
Pupils can draw conclusions.	Pupils can draw conclusions.	Present observations and data using appropriate methods, including tables and graphs.	Present observations and data using appropriate methods, including tables and graphs.
Suggest further comparative or fair tests.	Pupils can develop investigation further.		



Hexham Middle School  
Progression of Age-Related Expectations

			<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>
--	--	--	--	--