Year 8 Science
Age Related Expectations

All children are assessed against the Age Related Expectations (ARE) within the different curriculum subjects. The ARE's are taken from the National Curriculum but are consolidated to reflect what *we* expect of a child. For example, three or four national curriculum targets might be summarised in one ARE. Judgements are generally based on a variety of different sources but will generally be a combination of on-going formative assessment in class, book work and formal summative testing.

The principal focus of science teaching in key stage 3 is to develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics. Pupils should begin to see the connections between these subject areas and become aware of some of the big ideas underpinning scientific knowledge and understanding. Pupils should begin to decide on the appropriate type of scientific enquiry and develop a deeper understanding of factors to be taken into account when collecting, recording and processing data. They should evaluate their results and identify further questions arising from them. Pupils should further develop their use of scientific vocabulary.

	Key Performance Indicators	**Age Related Expectations**
Working scientifically Science attitudes	- Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility - 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.	A child may use a variety of appropriate resources to complete task, selecting appropriate content. E.g. book, dvd, magazine, website They may compare information from different sources for relevance. They review scientific discovery in chronological order to review how ideas and models have developed with reference to investigative data.
Working scientifically Experimental skills and investigations	- Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience - Apply sampling techniques. - Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety - Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements - Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate - Make predictions using scientific knowledge and understanding	A child may create questions that can be investigated. They will follow a method logically, working as a team and make changes to the method during a practical when identified by an adult. They will identify variables that they will change, measure and keep the same. To write a method that will answer the investigation question. They will write a prediction using previous experiences and use scientific knowledge, previous examples and models to give reasons for the prediction. They will identify most hazards and suggest control measures. Select appropriate equipment
Working scientifically measurements	- Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature - Undertake basic data analysis including simple statistical techniques. - Use and derive simple equations and carry out appropriate calculation.	A child will take measurements using a range of equipment and collect repeat readings. They will calculate mode mean median, identify anomalies and may calculate the gradient of best fit line. They will use formulae eg density, pressure and create balanced equations for reactions.

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Working scientifically Analysis and evaluation	- Apply mathematical concepts and calculate results - Identify further questions arising from their results. - Present observations and data using appropriate methods, including tables and graphs - Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions - Present reasoned explanations, including explaining data in relation to predictions and hypotheses - Identify further questions arising from their results.	A child should identify possible sources of error found in the data and suggest improvements to the method to reduce these errors. They will select the most appropriate ways to present evidence. When drawing a graph to display data they will label axis correctly selecting the best scale divisions, preferably with units. They will plot points and draw a line graph with where appropriate a line of best fit to show a pattern. They will design and draw a table with correct headings or unit, including those for repeat readings. They may describe how changing the independent variable affects the dependent variable, giving examples and state whether their results support their prediction. They will use a wider range of technical terminology and continue to build an extended specialist vocabulary.
Chemistry Atoms elements and compounds	- To recognise a simple (Dalton) atomic model - To identify differences between atoms, elements and compounds - To use chemical symbols and formulae for elements and compounds - To understand conservation of mass in changes of state and chemical reactions. - To understand the concept of a pure substance - To describe chemical reactions as the rearrangement of atoms - To represent chemical reactions using formulae and equations - To explain combustion, oxidation and displacement reactions - To explain exothermic and endothermic chemical reactions. - To know the order of metals in the reactivity series - To know the varying physical and chemical properties of different elements - To know the principles underpinning the Mendeleev Periodic Table - To understand the Periodic Table: periods and groups; metals and non-metals - To understand how patterns in reactions can be predicted with reference to the Periodic Table - To identify the properties of metals and non-metals	A child will recognise that materials can be made up of one or more kinds of particles. They will describe the type and arrangement of atoms in elements, compounds and mixtures and use particle models to describe the differences. A child will describe patterns in a range of chemical reactions including displacement, endothermic and exothermic reactions and represent the reactions as equations using symbols, formulae, particle diagrams and words. They should link properties of elements to their position on Mendeleev's periodic table.
Chemistry Earth and atmosphere	- To know the composition and structure of the earth - To know the rock cycle and the formation of igneous, sedimentary and metamorphic rocks - To understand that the Earth is a source of limited resources and the efficiency of recycling - To know the carbon cycle - To know the composition of the atmosphere - To understand the production of carbon dioxide by human activity and the impact on climate.	A child should describe the different layers of the earth. They should identify the properties of rock specimens and relate this to the processes of rock formation. They should be able to describe the journey of a rock particle through all the stages of the different processes of the rock cycle, including the effect of the rate of cooling on the size of crystals formed. They should describe the physical and chemical processes by which rocks are weathered and transported and relate these to features of the environment;

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Biology Interactions and interdependencies.	- To analyse the interdependence of organisms. - To understand how organisms affect, and are affected by, their environment. - To understand the role of variation in enabling closely related living things to survive in the same ecosystem. - To know the importance of plant reproduction through insect pollination in human food security - To understand heredity - To understand a simple model of chromosomes, genes and DNA in heredity - The understand the importance of the differences between species - To identify the variation between individuals within a species as being continuous or discontinuous. - To understand that the variation which can drive natural selection. - To understand that changes in the environment may leave organisms less well adapted, which in turn may lead to extinction - To understand the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.	A child should explain how variation has benefits and limitations for the survival of organisms in specific habitats. They may describe similarities and differences in organisms of the same species (natural selection and extinction) and begin to attribute these to environmental or inherited factor, recognising that inherited and environmental causes of variation cannot be completely separated. They should identify and name organisms found in a particular habitat and describe how they are adapted to the changing environmental conditions. They should represent the relationships between organisms using pyramids, food chains and webs and be able to explain the effects of changes within these like the use of pesticides or weed killer. They should describe how organisms contribute to the carbon and nitrogen cycle. They should consider the implications of GM crops on food security and ecosystems. A child should link knowledge of reproduction to describe the process by which genetic information is transmitted from one generation to the next and use a model to show how we inherit features like eye colour.
Biology Structure and function of living organisms.	- The process of photosynthesis - The role of the roots - The role of leaf stomata in plants - To consolidate knowledge of mechanisms of plant reproduction - The dependence of almost all life on Earth on the transfer of solar energy.	A child will describe how a plant is adapted for the process of photosynthesis including how the function of the stomata controls the gaseous exchange in the leaf. They should explain the effects of changing light intensity on photosynthesis. They will describe the similarities and differences between photosynthesis and respiration in plants and construct equations for both processes.
Physics Energy	- To understand heating and thermal equilibrium: - To know temperature difference between two objects leads to energy transfer from the hotter to the cooler one through contact (conduction) or radiation. - To know transfers of heat energy tends to reduce the temperature difference between materials.	A child should collect and interpret temperature data from a substance changing state and use this to describe the stages of the heating or cooling curve. They distinguish between heat and temperature and describe energy flow as the result of temperature difference. They should describe the process of heat energy transfer through conduction, convection, radiation and evaporation in terms of the particle model, describing how changes with temperature affect motion and spacing of particles causing changes in density.
Physics Electricity and electromagnets	- To understand magnetic poles, attraction and repulsion - To compare magnetic fields by plotting with compass and represent with field lines - To explain the magnetic effect of a current through electromagnets, D.C. motors (principles only).	A child should draw magnetic fields to indicate that magnetic fields travel from north to south and describe how this affects the shape and direction of magnetic fields when repelling or attracting materials. They should identify factors affecting the strength of electromagnets and give examples of the use of electromagnets eg How does an electric bell work?
Physics Space	- To know that gravitational force is weight and is different on the moon. - weight = mass x gravitational field strength (g), on Earth g=10 N/kg, - To know our Sun as a star and there are other stars in our galaxy, other galaxies - To understand the seasons in relation to the Earth's tilt, day length at different times of year, in different hemispheres	A child should use the formula to calculate weight on the moon and earth and compare mass and weight in different places. A child should describe the relative positions of the planets and their conditions compared to Earth. Describe how the tilt of a planet affects day length with examples. They should describe the causes of eclipses using a simple model of the Sun, Earth and Moon system.