Hexham Middle School
spes durat avorum

The HMS curriculum is sequenced to build on learning from first schools. Staff develop a coherent understanding of curricula across the Partnership as part of our ongoing working groups. At HMS, teachers plan in the long, medium and short-term to ensure consistency in learning experience for all children. The long-term mapping details the sequence of learning in each subject, the key themes, how reading and literacy are developed, how our personal development curriculum is embedded and the key assessment strategies to understand the security of substantive knowledge and learning. The curriculum is planned with ambition for all learners at its core. Detailed medium-term planning is produced for effective implementation and consistency giving teachers the understanding of why learning happens when it does, what pupils should already know, how they will build on this learning in the future and the end-points.

HMS Long Term Curriculum

Subject: Science

Substantive and Disciplinary Knowledge:

The HMS science curriculum is based around the theme of 'Big Ideas' in science, across Key Stage 2 and Key Stage 3 there are ten broad areas of substantive knowledge or big ideas that pupils will learn. These are: Forces, Electromagnetism, Waves, Matter, Reactions, Earth, Organisms (Animals including humans), Ecosystems (living things and their habitats) and Genes (reproduction and inheritance).

It is easier for a pupil to develop an understanding of a big idea through multiple interactions with the concepts within that idea. Therefore, pupils will study topics related to these ideas which build on complexity throughout the key stages, from simpler more concrete topics such as Properties of Materials to more abstract ones such as Particles or Atoms and Elements. This spiral design to the curriculum seeks to ensure that all pupils have a secure knowledge of the concepts within each big idea.

Procedural knowledge or 'working scientifically' is taught through and is clearly related to the substantive content of the HMS science curriculum. Working scientifically skills can be divided into the areas of: Scientific Attitudes, Experimental Skills and Investigation, Analysis and Evaluation and Measurement. Pupils will have the opportunity to develop each area of their working scientifically skills throughout each stage of the HMS science curriculum.

	Y5	Y6	Y7	Y8
Autumn Term **Big Ideas: Substantive knowledge**	**1. Matter:** • The properties of materials and their uses. • Researching the work of Spencer Silver • The particle model, solids, liquids and gases • Separating mixtures and dissolving **2. Forces:** • What is a force? Measuring forces • Galileo and Isaac Newton and gravity • Friction, air resistance and water resistance • Pulleys and levers	**1. Organisms:** • The function of the heart of circulatory system • The digestive system • Healthy lifestyle, including diet, drugs and smoking. **2. Waves:** • How light travels, how we use light to see. • Reflection and uses of reflection. • Shadow formation • The colour spectrum, Isaac Newton's colour theory	**1. Matter** • The particle model, including changes of state and diffusion **2. Organisms** • Cell structure and function **3. Forces:** • Balanced and unbalanced forces • Calculating speed, distance-time graphs • Mass, weight and gravity **4. Reactions** • Elements, compounds, mixtures • Separation Techniques, including filtration, evaporation and chromatography	**1. Matter** • Atoms, elements compounds • Naming compounds and compound formula • Polymers **2. Organisms** • Breathing and the gas exchange system • The effects of smoking, drugs and alcohol. **3. Forces:** • Contact forces, squashing and stretching, drag forces and friction **4. Matter:** • The development and structure of the periodic table • Physical and Chemical patterns of group 1, 7 and 0.

Spring Term **Big Ideas: Substantive Knowledge**	**1. Reactions:** • Reversible and irreversible change • Chemical reactions including: cooking, burning and rusting. **2. Ecosystems:** • Life cycles of animals including mammals, birds, amphibians Plant life cycle including plant reproduction	**1. Electromagnetism:** • Electricity and its dangers • Making Circuits and circuit symbols • Measuring current • Developments in electricity e.g. the work of Edison and Swan **2. Ecosystems:** • Classification of living things into broad groups (plants and animals) • The work of Carl Linnaeus • Using and constructing classification keys • Investigating the growth of microorganisms	**1. Organisms:** • Levels of organisation in multicellular organisms • Movement: the muscular and skeletal systems **2. Energy:** • Energy stores and transfers • Food and Fuels • Energy efficiency and cost **3. Reactions:** • Recognising chemical reactions • Properties of acids and alkalis • Neutralisation reactions **4. Ecosystems:** • Food chains and food webs • Disruption to food webs • Competition • Predator and prey relationships	**1. Organisms:** • Nutrients and their role in the body • Food tests • Consequences of an unhealthy diet • Structure and function of the digestive system • Digestive enzymes. **2. Forces:** • Factors affecting pressure in gases, liquids and solids **3. Earth:** • Earth structure and atmospheric composition • The rock cycle. • Global warming, climate change • Energy resources • The carbon cycle. • Extracting metals • Recycling **4. Ecosystems:** • The aerobic respiration reaction • Anaerobic respiration and fermentation

Summer Term **Big Ideas: Substantive Knowledge**	**1. Organisms:** • Stages of the human life cycle, including gestation, puberty and old age **2. Earth:** • Evidence that the earth is round • Planets and their orbit round the sun • Phases of the moon. • Seasons.	**5. Genes:** • Inherited and acquired characteristics • Environmental adaptations • Evolution of characteristics • Fossil formation and the work of Mary Anning	**1. Waves** • What is sound? • Amplitude and Frequency • The ear and hearing • What is light? • Interaction of light and materials • Reflection and refraction • Colour **2. Genes:** • Puberty and adolescence • Reproductive organs • Fertilisation and implantation • Foetal development • Menstrual Cycle • Contraception **3. Ecosystems:** • Structure and function of a flower • Fertilisation • Seed dispersal • Germination	**1. Ecosystems:** • The photosynthesis reaction • Leaf structure and function • Plant minerals **2. Energy:** • Work, energy and machines • Energy and temperature • Energy transfer: conduction and convection • Energy transfer radiation **3. Electromagnetism:** • Static electricity • Current and potential difference • Series and parallel circuits • Magnetism and magnetic field • Electromagnets

Procedural Knowledge Working Scientifically. **The development of procedural knowledge is linked with and taught through the delivery of each Big Idea.**	**Scientific Attitudes:** • Describe the work of other scientists **Experimental Skills and Investigation:** • Use a range of equipment safely • Taking measurements with increasing accuracy • Identify and control variables where appropriate **Analysis and Evaluation:** • Draw and interpret bar charts, line graphs and scatter graphs • Report and present findings from enquiries, beginning to draw conclusions **Measurement:** • Use units appropriately	**Scientific Attitudes:** • Describe the work of other scientists • Understand how a theory develops using scientific evidence **Experimental Skills and Investigation:** • Use a range of equipment safely • Take accurate measurements, taking repeat measurements where appropriate • Identify and control variables **Analysis and Evaluation:** • Draw and interpret bar charts, line graphs, scatter graphs and classification keys • Drawing axes with increasing independence • Report and present findings from enquiries, including conclusion and explanation • Begin to evaluate investigations suggesting improvements **Measurement:** • Use units appropriately	**Scientific Attitudes:** • Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas **Experimental Skills and Investigation:** • Use a range of equipment safely • Identify a range of scientific equipment • Identify and control variables • Begin to explain why certain variables have been controlled **Analysis and Evaluation:** • Select an appropriate way to present data using a range of tables and graphs • Draw and explain conclusions based on data, identifying patterns or causal relationships • Evaluate investigations • Begin to suggest improvements to investigations based on accuracy, precision or reliability **Measurement:** • Use and understand SI units • Use simple equations to carry out appropriate calculations	**Scientific Attitudes:** • Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas **Experimental Skills and Investigation:** • Use a range of equipment safely • Select equipment based on its suitability • Identify and control variables • Explain why certain variables have been controlled **Analysis and Evaluation:** • Select an appropriate way to present data using a range of tables and graphs • Draw and explain conclusions based on data, identifying patterns or causal relationships • Evaluate investigations • Suggest improvements to investigations based on accuracy, precision or reliability **Measurement:** • Use and understand SI units • Convert between SI units • Use simple equations to carry out appropriate calculations.

Assessing the end-points	**There is regular use formative assessment each lesson. Through multiple choice quizzes etc. Pupil's work in their books is assessed regularly using success criteria based on age related expectations**	**There is regular use formative assessment each lesson. Through multiple choice quizzes etc. Pupil's work in their books is assessed regularly using success criteria based on age related expectations**	**There is regular use formative assessment each lesson. Through multiple choice quizzes etc. Pupil's work in their books is assessed regularly using success criteria based on age related expectations In key stage 3 pupils will sit an exam style test at the end of each term.**	**There is regular use formative assessment each lesson. Through multiple choice quizzes etc. Pupil's work in their books is assessed regularly using success criteria based on age related expectations In key stage 3 pupils will sit an exam style test at the end of each term.**
Personal development/ Careers	**Each year group will take part in at least one workshop delivered by outside agencies such as the Industrial Cadets, Newcastle University STEM ambassadors or the Sea Cadets. This promotes an awareness of careers related to science and the role of science outside the classroom.**			
Reading and literacy	**In each topic, throughout the science curriculum, there is use of the HMS reading strategy VIPERS, this helps pupils improve their reading comprehension related to science specific texts. Disciplinary literacy is promoted every lesson using buzzwords. Pupils are given buzzwords lists at the start of each topic and are encouraged to learn and use these words in their own work.**			