HUMMERSKNOTT ACADEMY

YEAR 7 SCIENCE CURRICULUM PROGRESSION OVERVIEW

Subject Curriculum Intent:	To provide exciting contexts to help students understand the world around them. Substantive knowledge is developed through concepts which link science to real life applications. This makes science accessible for all as complex concepts and procedures are broken down into meaningful chunks which are strategically sequenced over time.							
	Autumn Term 1	**Autumn Term 1**	**Autumn Term 2**	**Autumn Term 2**	**Spring Term 1**	**Spring Term 2**	**Summer Term 1**	**Summer Term 2**
Theme	Do dock leaves really work?		Would you live in a house like this?		What is our junk food and unhealthy lifestyle actually doing to us?		What comes first the chicken or the egg?	
Topic	Nettles		Ecohouse		Junk food experiment		The chicken or the egg	
Links to prior learning	Working scientifically. Planning enquiries to questions.Recognise control variables, taking measurements and recording data. Make predictions and drawing conclusions. (KS2)		Compare and group materials on the basis of their properties such as conductivity. Give reasons for the use of everyday materials.Slids, liquids and gases.Planning different types of experiments, take measurements and record data (KS2)		Animals including humans need the right types of nutrition, they get nutrition from what they eat. Recogonise the impact of diet and exerscise on the body function. Describe the simle functions of the basic parts of the digestive system in humans. (KS2). Cells structure and function and comparison of plant and animal (KS3)		Notice that animals, including humans, have offspring whoich grow into adults. Introduced to the processes of reproduction and growth in animals. (KS2) Cells structure and function (KS3)	

Substantive knowledge headlines	Cells are the are the fundamental unit of living organismas. Observe and record using light microscopes. Functions of subcellular structures. Focus on PLANT cells. Defining acids and alaklis in terms of neutralisation reactions. Use of the pH scale and indicators to determine pH values. Hazards - Evaluating risks in practical science	Energy changes and transfer, heating and thermal equilibrium energy transfer through conduction, radiation and use of insulators. Energy can be quantified and calculated, the total energy has the same value before and after a change. Comparing power ratings and energy transferred. Fuels and energy sources. Properties of different states of matter. Changes of state in terms of the particle model.	Understanding a healthy human diet, carbohydrates, lipids, proteins, vitamins & minerals, fibre and water and why each is needed. The consequences of imbalances in the diet. Calculations of energy requirements.The hierarchrcal organisation of multicelluar organisms. The stucture and function of the gas exchange systems including adaptations to function. The mechanism of breathing - inhalation and exhalation unsing a pressure model to explain the movement of gasses. The impact of exerscise asthma and smoking on the human gas exchange system. Making predicitions using scientific knowledge.	Reproduction in humans, including structure and function of the male and female reproductive systems, menstrual cycle, gametes, fertilisation, gestation and birth, including the effect of maternal lifestyle on the foetus through placenta. Hereditary as the process by which genetic information transmitted from one generation to the next. Simple model of chromosomes, genes and DNA and development of the DNA model. Differences between species and variation between species as well as individuals of the same species. Pressure measured by ratio of force over area - acting normal to any surface.
Disciplinary knowledge headlines	Investigative work. Quizzes, recall, independent planning of key question Do dock leaves work?	Investigative work. Modelling, numeracy and problem solving. Literacy tasks. Oracy skills - the energy debate.	Investigative work. Modelling, numeracy and problem solving. Literacy tasks. Quizzes recall.	Investigative work. Modelling, numeracy and problem solving. Literacy tasks. Quizzes recall.

Links to knowledge in future units	Y7 - animal cells/Y9 prokaryotic and eukaryotic cells.KS4 Identifying the cell as the basic structural unit of all organisms. Adaptations of cells related to their functions.	Structure bonding and the properties of matter, changes of state in terms of particle kinetics, energy transfers and the relative strength of chemical bonds and intermolecular forces. (Y9 &KS4) Energy changes in a system. Power as the rate of transfer of energy, calculating energy efficiency, renewable and non-renewable energy sources.	KS4 - carbohydrates, proteins and lipids are taught as key biological molecules. Need for transport systems in multi celluar organisms. KS4 required practical role of enymes and food tests and human reaction time. Principles of nervous coordination and control in humans.	KS4 - adaptations of cells for their functions. Hormones in reproduction, hormonal and non-hormonal methods of contraception. Single gene inheritence and single gene crosses with dominant and recessive phenotypes, sex determination in humans. Genetic variation in poulations of a species. The process of natural selection leading to evolution and evidence for evolution. Importance of selective breeding, and uses of modern biotechnology including gene technology.
Key vocabulary	cell, nucleus, mitochondria, cell membrane, cell wall, cytoplasm, chloroplasts, vacuole, ribosomes, magnification, focus, acids, alkalis, indicator, neutralisation, concentration. independent variable, dependent variable, control	energy,chemical, kinetic, gravitational kinetc energy, elastic, heat, magnetic, sound, power, watts, joules, efficiency, conduction, radiation, convection, variables	carbohydrates, lipids, proteins, vitamins & minerals, fibre, Benedicts solution, Biurets solution, Ethanol, Iodine, Caffine, variables, stimulant, energy, obisity, anorexia,	gametes, sperm, egg, puperty, uterus, placenta, vagina, testes, sperm duct, urethra, fertiliatation, gestation, placenta, menstrual cycle, ovulation, hormones, genetics, inheritance, chromosomes, genes, DNA, recessive, dominant, allel, species, variation, pressure, evolution, extinction, surface area, force, pressure.

HUMMERSKNOTT ACADEMY

YEAR 8 SCIENCE CURRICULUM PROGRESSION OVERVIEW

Subject Curriculum Intent: Consolidate KS3 knowledge to prepare for GCSE.

	Autumn Term 1	Autumn Term 2	Autumn Term 2	Spring Term 1	Spring 1	Spring 2	Summer 1	Summer 2
Theme	When is the tipping point?		What is it all really, is it all just smoke and mirrors? (Peppers Ghost)		Let's rock it		The Human machine	
Topic	Life on our planet		All smoke and mirros		What makes the best rocket?		How is the human body like a machine?	
Links to prior learning	Energy Resources (Ecohouse) Climate Change Food Webs (Food chains, predators and prey) Plants (Requirements for growth)		It covers how sounds are made through vibrations, how they travel through different materials, and how pitch and volume relate to the source of the sound. In light, it explores how light travels in straight lines, how we see objects, the formation of shadows, and the effects of reflection and refraction.		Forces, Earth and space. Prior knowledge on gravity, air resistance, mass and weight, and introduces balanced/unbalanced forces. For space will require understanding of the Earth's rotation, day and night, the movement of the planets, solar system, and seasons.		The human skeleton and muscles, including movement, support, and protection. Understanding of nutrition, exercise, and the importance of muscles and bones for health.	
Substantive knowledge headlines	Understanding the differences between renewable and non-renewable energy sources (Physics: Energy changes and transfers), the environmental impact of human activity such as global warming and pollution (Biology: Interactions and interdependencies), the processes of photosynthesis and the structure and function of plant cells (Biology: Nutrition and respiration), food chains and food webs (Biology: Interactions and interdependencies), the interdependence of organisms in an ecosystem (Biology: Interactions and interdependencies), including food webs and insect pollinated crops, and the carbon cycle (Biology: Material cycles). It also supports working scientifically through practical investigations and the evaluation of data.		Understanding of wave behaviour, including transverse and longitudinal waves, and key properties such as frequency, amplitude, wavelength, and speed. To know how sound and light waves travel, interact with materials, and are used in applications like ultrasound and echo location. Knowledge of the human auditory system and the structure and function of the eye. Understand reflection, refraction, colour/light, filters, and how lenses and pinhole cameras work. This includes concepts like the law of reflection, ray diagrams, and the electromagnetic spectrum.		Understanding of forces and space. This includes different types of forces (gravity, air resistance, upthrust, friction), how forces interact (balanced vs unbalanced), and their effects on motion. Understand mass vs weight, gravitational field strength, and how to calculate weight. Explores the solar system, names and characteristics of planets, moons, and the structure of the universe including galaxies and stars. To know seasons, day and night cycles, constellations, light years, and introduces major theories such as the Big Bang. To explore concepts of streamlining, how it reduces drag, and how this applies in rocket and satellite design.		Understanding of the human musculoskeletal system, including bones, joints, muscles, ligaments, tendons, cartilage, and their roles in movement, support, protection, shape, and blood cell production. Knowledge of different muscle types (skeletal, cardiac, smooth), how antagonistic muscle pairs function, and how muscles contract to produce movement. To know levers, linkages, pivots, moments, and Hooke's Law, including how forces cause movement or changes in shape, and how to calculate work done.	
Disciplinary knowledge headlines	To plan and carry out scientific investigations, identify independent, dependent, and control variables, and evaluate the reliability and accuracy of results. Students should develop skills in analysing and interpreting data from charts, graphs, and practical work, as well as communicating findings using appropriate scientific vocabulary. Students must also use models to explain processes such as the carbon cycle and photosynthesis, apply logical reasoning to environmental issues, and justify conclusions based on evidence. Collaborative enquiry, problem-solving (e.g. wind turbine challenge), and critical thinking		Develop skills in observing and measuring wave behaviour through practical investigations. Identify and control variables, use scientific equipment correctly (e.g. ray boxes, mirrors, protractors), and record data accurately. Analyse graphs to form conclusions based on evidence, and evaluate experimental methods. Modelling wave behaviour using diagrams and explaining observations with scientific vocabulary.		Develops scientific skills, including planning fair tests, making predictions, identifying independent, dependent, and control variables, and conducting practical investigations. Measure and record results to interpret graphs, and calculate results using equations. Practical work includes investigating the effect of shape on streamlining, comparing mass and weight on different planets, and constructing bottle rockets. Communication skills are also developed through writing explanations, and interpreting scientific data.		Develop scientific skills, plan and conduct practicals involving force measurement, muscle strength testing, elastic behaviour, Hooke's Law, and moment calculations using real-life equipment (scales, Newton meters, levers). Make predictions, identify variables, draw diagrams, record and analyse data, and evaluate outcomes. Apply understanding to abstract real world concepts such as sports science.	

Links to knowledge in future units	**Working Scientifically** **Practical Investigations:** The presentation encourages scientific enquiry through activities like designing wind turbines, which supports the specification's emphasis on developing investigative skills, such as planning experiments, controlling variables, and analyzing data. Use of quadrats to sample populations in a habitat. **Physics** **Energy Resources:** The discussion on renewable and non-renewable energy sources, as well as the environmental impact of fossil fuels, aligns with the specification's focus on energy changes and transfers. **Biology** **Photosynthesis:** The presentation's coverage of photosynthesis, including leaf structure and adaptations, aligns with the specification's emphasis on understanding the process and its importance in the ecosystem. **Food Chains and Webs:** Discussions on food chains, food webs, and the impact of human activity on ecosystems correspond with the curriculum's focus on ecological relationships and biodiversity. **Carbon Cycle:** The exploration of the carbon cycle in the presentation supports the specification's requirement for students to understand how materials are cycled through the environment. .	**Working Scientifically** **Planning investigations:** collecting and analysing data, understanding variables, graphing results, and evaluating methods. **Physics** **Waves:** properties of waves, transverse and longitudinal waves, wave speed, sound and ultrasound, and uses of reflection and refraction (including lenses and cameras). **Light** – reflection, refraction, the human eye, colour, and the electromagnetic spectrum.	**Working Scientifically** **Planning and conducting investigations:**Analysing data, calculating values using equations, Drawing conclusions and evaluating methods. **Physics:** Forces: Contact and non-contact forces, Weight and mass, gravitational field strength, Resultant forces, balanced/unbalanced forces, streamlining and effects on motion, The solar system, planets, satellites, The Big Bang theory and evidence (e.g. red shift, cosmic microwave background), Light years and astronomical distances.	**Working Scientifically** **Practical skills:** measuring, analysing and evaluating using scientific vocabulary, Drawing conclusions from results. **Biology:**Skeletal and muscular systems, Function of skeleton: support, movement, protection, Structure of joints and muscle interaction, Antagonistic muscle pairs. **Physics:** Forces, Force and extension (Hooke's Law), Work done = force × distance, Moments, pivots, and levers
Key vocabulary	Renewable, Non-renewable, Fossil fuels, Combustion, Carbon dioxide, Greenhouse gases, Global warming, Climate change, Acid rain, Efficiency, Energy transfer, Energy resources, Photosynthesis, Chloroplast, Chlorophyll, Glucose, Stomata, Producer, Consumer, Herbivore, Carnivore, Omnivore, Food chain, Food web, Respiration, Decay, Carbon cycle, Sedimentary rock, Igneous rock, Metamorphic rock, Weathering, Deposition, Erosion, Precipitation.	Amplitude, Wavelength, Frequency, Hertz, Oscillation, Transverse wave, Longitudinal wave, Medium, Vacuum, Echo, Ultrasound, Reflection, Refraction, Incident ray, Reflected ray, Refracted ray, Normal, Angle of incidence, Angle of reflection, Angle of refraction, Specular reflection, Diffuse scattering, Lens, Retina, Iris, Pupil, Cornea, Optic nerve, Cochlea, Ossicles, Pinhole camera, Luminous, Non-luminous, Prism, Filter, Spectrum, Absorb, Transparent, Translucent, Opaque, Ray diagram, Hypothesis, Prediction, Variable (independent, dependent, control).	Gravity, Mass, Weight, Newtons, Air resistance, Friction, Upthrust, Balanced forces, Unbalanced forces, Resultant force, Streamlined, Force diagram, Contact force, Non-contact force, Gravitational field strength, Universe, Galaxy, Solar system, Planet, Star, Moon, Satellite, Orbit, Axis, Rotation, Revolution, Day, Night, Seasons, Tilt, Equator, Hemisphere, Constellation, Light year, Red shift, Cosmic microwave background, Big Bang, Hypothesis, Prediction, Variable (independent, dependent, control).	Skeleton, Bone marrow, Femur, Humerus, Vertebrae, Cartilage, Ligament, Tendon, Synovial fluid, Joint, Ball and socket joint, Hinge joint, Fixed joint, Pivot joint, Muscle, Contract, Relax, Antagonistic muscles, Skeletal muscle, Smooth muscle, Cardiac muscle, Tissue, Organ, Organ system, Lever, Pivot, Fulcrum, Load, Effort, Linkage, Force, Moment, Work done, Newton metre, Hooke's Law, Elastic potential energy, Extension, Variable (independent, dependent, control), Energy transfer, Gravitational potential energy.

HUMMERSKNOTT ACADEMY

YEAR 9 SCIENCE CURRICULUM PROGRESSION OVERVIEW

Subject Curriculum Intent: To provide exciting contexts to help students understand the world around them. Substantive knowledge is developed through concepts which link science to real life applications. This makes science accessible for all as complex concepts and procedures are broken down into meaningful chunks which are strategically sequenced over time.

	Autumn Term 1	Autumn Term 1	Autumn Term 2	Autumn Term 2	Spring Term 1	Spring Term 1	Spring Term 2	Spring Term 2	Spring Term 2	Summer Term 1	Summer Term 2	Summer Term 2
Theme												
Topic	Introduction to Chemistry	Biology 1	Physics 1	Chemistry 1	Biology 2	Chemistry 2	Physics 3	Chemistry 3	Biology 3	Biology 4	Chemistry 4	Physics 4
Links to prior learning	Atoms, elements and compounds.	Cells and organisation. Working scientifically (Y7/8)	Electricity, circuits, conventional circuit symbols (KS2)	Atoms, elements and compounds. Hazard symbols (Y7)	Structure and Function of living things (Y7/8)	Atoms, elements and compounds. Pure and impure substances.	Describing motion (Y8)	Atoms, elements and compounds.	Cells and organisation including hierarchical organisation (Y8)	Cell structure and function (Y7/8)	Chemical reactions. Energetics (Y8)	Magnetism and magnetic fields
Substantive knowledge headlines	Recognise the varying physical and chemical properties of different elements. Explain the principles underlying the Mendeleev periodic table. Interpret the periodic table in terms of periods and groups; metals and non-metals. Identify the properties on metals/non-metals and the chemical properties of metal/non-metal oxides.	Observe, interpret and record cell structure using a light microscope. Use and derive simple equations and carry out appropriate calculations to calculate magnification. Recognise variation between cells and consider how cell adaptation is linked to function.	Identify current as a flow of charge that is measured in amperes. Identify potential difference, measured in volts, battery and bulb ratinggs; resistance measured in ohms as the ratio of potential difference to a current.	Defining acids and alkalis in terms of neutralisation reactions. Using the pH scale to measure acidity/alkalinity. Use of indicators. Reaction of acids with metals and alkalis.	Hierarchical organisation and the need for transport systems in multicellular organisms. Process of heredity. Recognise the structutre of DNA and how this was elucidated. Understand types of variation, why it occurs and the importance of maintaining diversity.	The particulate nature of matter. Differences between atoms, elements and compunds. Techniques for separating mixtures: filtration, evaporation, distillation and chromatography. Apply mathematical concepts and calculate results.	Speed and the quantitative relationship between average speed, distance and time. Distance time graphs and relative motion. Understand and use SI units, use and derive simple equations and carry out appropriate calculations.	Chemical reactions are the rearrangement of atoms. Representing chemical reactions using formulae and equations. Understanding combustion, thermal decomposition, oxidation and displacement reactions.	Cells as fundamental units, similarities and differences between plant and animal cells. Plants make COOH in their leaves by photosynthesis and gain mineral nutrients and water from the soil.Role of stomata in gas exchange. Reactants and products of photosynthesis.	Aerobic and anaerobic respiration enables a chemical processes necessary for life. A word summary for aerobic respiration. Differences between anaerobic and aerobic respiration.	Chemical reactions as the rearrangement of atoms. Understanding combustion, thermal decomposition, oxidation and displacement reactions. Explaining exo and endothermic reactions.	Understand repulsion and attraction at the poles. Plot manetic fields to represent field lines, explain the Earth's magnetism, compass and navigation. Investigate the magnetic effect of a current, electromagnets and DC motors.
Disciplinary knowledge headlines	Research how and why scientific theories have developed as earlier explanations are modified to take account of new findings and ideas. Quizzes.	Recall cell knowledge and introduce prokayotic and eukaryotic cells. Use of light microscopes to develop working scientifically skills needed for KS4. Students to calculate magnification using given formula.	Recall circuits with practical activity. Develop further with the introduction of ammeters/voltmeters. Introduction and use of V=IR clacultions. Exam questions.	Investigative work to test a range of indigestion remedies to determine which is best at neutralising acids. Numeracy - calulating concentration of a solutions.	Recall of organisation and cell specialisation. Organisaton of the respiratory system - story boards,data.Variation - numeracy, investigative work and analysing data.Exam questions.	Interpretation of diagrams, investigative work, analysing and interpreting data. Applying maths skills to construct graphs.Exam questions.	Investigative work to make and recird observations. Converting units and use equations (S=D/T) to calculate results. Interpretation of distance/time graphs. Literacytask - precision and accuracy.Exam questions.	Construction of word equations and simple symbol equations. H tier to start balancing equations. Investigative work. Interpreting results, using observations to draw conclusions. Exam questions.	Recall quiz. Investigative work, making predictions and invetigate to test predictions. Interpret results. Identify further questions arising from the results. Exam questions.	Applying knowledge to explain the response of the body to exercise. Testing a hypothesis through investigative work. Construct graphs and explain data in relation to the hypothesis and prediction.	Measure quantities accurately in experimental work, describe terms endothermic and exothermic, comparing and interpreting data, design an experiment	Investigative work. Make and record observations and explain them in terms of the theory covered.
Links to knowledge in future units	Atomic structure and the Periodic table. The modern Periodic table organisation. Properties, trends and chemical reactivity of elements in the Periodic table.	Identifying the cell as the basic structural unit of all organisms. Adaptations of cells related to their functions. The main sub-cellular structures of eukaryotic and prokaryotic cells. Required Practical work for GCSE.	Measuring resistance using p.d and current measurments. Exploring V=IR, including graphical relationships. Studying tha domestic a.c supply, including live, neutral and earth mains wires and power transfer related to p.d.	The chemistry of acids; reactions with some metals and carbonates. pH as a measure ofhydrogen ion concentration and its numerical scale.	Cell Biology - aerobic/anaerobic respiration Transport systems - circulatory system . The development of scientific thinking.	Chemical analysis, distinguishing between pure and impure substances. Experimental skills and strategies. The development of scientific thinking.	Forces and motion, estimating speeds and acceleration. Deceleration and braking distances. Interconverting units and using the appropriate number of significant figures in calculations.	Composition of matter. Reactions occur when molecules collide. Deterrmination of empirical formulae from the ratio of atoms of different kinds. Balanced chemical equations, ionic equations and state symbols.	Photosynthesis as the key process for food production and therefore biomass for life. The process of, and factors affecting the rate, of photosynthesis.	The importance of cellular respiration, the process of aerobic and anaerobic respiration.	Measurement of energy changes in chemical reactions (qualitative). Bond breaking, bond making, activation energy and reaction profiles.	Exploring the magnetic fields of permanent and induced magnets, magnetic effects have currents, how solenoids enhance the effect, how transformers are used in the national grid and the reasons for their use.
Key vocabulary	Periodic table, elements, atomic number, atomic mass, Mendeleev	nucleus, cytoplasm, mitochondria, ribosome, vacuole, prokayotic, ekaryotic, light microscope, magnification, resolution	circuit, symbols, voltmeter, ammeter, resistance, potential difference, current	acid, alkali, neutral, hazard, neutralisation, conentration, pH scale indicator	cell, tissue, organ, systems, specialisation, respriratory, trachea, bronchus, bronchioles, alveoli, genes, chrmosomes, DNA, continuous, discontinuous, variation	analysis, conclusion, atoms, elements, compounds, separation, filtration, evaporation, distillation, chromatography	distance/time graphs, precision, accuracy, gradient, stationary, SI units	chemical reaction, formulae, word equation, decomposition, oxidation, analysis	photosynthesis, chloroplast, chlorophyll, oxygen, glucose, carbon dioxide, ethanol	mitochondria, aerobic, anaerobic, respiration, indeoendent, dependent and control variables, hypothesis, prediction	exothermic, endothermoc, oxidation, decomposition, combustion	electromagnet, magnetic field, current, voltage, potential difference