Highfields School

Curriculum Overview

Department:	Science

Year Group		Term 1		Term 2		Term 3		Term 4			
Year 7 Topic		Speed and Gravity	Particle Model and Separating Mixtures	Metals , Non-metals, acids and alkalis	Variation and Human	Reproduction Energy Costs and Transfer	Earth Structure and Universe	Organisation and Cells	PD, Resistance and Current	Sound and Light	Interdependence and Plant Reproduction
Knowledge	Developing	Resultant forces. Use the speed formula.	pH of acids, neutral solutions and alkalis	The menstrual cycle	Energy stores.	Sedimentary, igneous and metamorphic rocks	Structure and properties of pure substances, solids, liquids and gases, melting and boiling points.	Parts of cells: cell wall, cell membrane, nucleus, cytoplasm. Function of parts of the human skeleton	Electrical conductors and insulators.	Opaque, transparent, translucent materials. Properties of sound. Amplitude, volume	Organisms in a food web - decomposers, producers and consumers
	Core	Distance-time graphs. Difference between mass and weight. weight (N) = mass (kg) x gravitational field strength (N/kg).	Reactivity of metals with oxygen and acids. Salt making with metal and acid. Neutralisation	Variation – environmental and inherited Importance of variation for survival of species. The needs of a developing foetus	Energy Sources for electricity generation. Calculating electricity cost. Energy in Food. Energy conservation.	Structure of the earth. The structure of the solar system. Use the model of the Solar System to explain observations of seasons and the length of the year.	Separating mixtures using separation techniques. Changes temperature or state can be described in terms of particles gaining or losing energy.	Function of parts of the human skeleton and antagonistic pairs of muscles Names of the parts of a microscope.	Models of potential difference. Components with resistance reduce the current flowing and shift energy to the surroundings.	Sound as vibrations, travelling in a longitudinal wave through substances. Properties of sound. wavelength, frequency, pitch. Properties of light.	The population of a species is affected by the number of its predators and prey, disease, pollution and competition. Insects are needed to pollinate food crops. Flowers are reproductive organs. What pollination means. Wind, insects and other animals can carry pollen from one flower to another. Pollen contains the male sex cells and that ovules are the female sex cells. Seeds are dispersed by different means.
	Advanced	Predict changes in speed with varying forces. Implications of gravity on space missions. Compare and contrast gravity with other forces.	Memorise the reactivity series. Given the names of an acid and an alkali, work out the name of the salt produced when they react.	If an egg is fertilised it settles into the uterus lining.	Power. Explain how energy is dissipated in a range of situations.	Describe similarities and differences between the rock cycle and everyday physical and chemical processes. How long light takes to travel between objects in the solar system. Concept of light years.	Diffusion in liquids or gases Evaporation Definitions for solute, solvent and solution. Suggest a combination of methods to separate a complex mixture and justify the choices.	The main parts of cells: cell wall, cell membrane, nucleus, cytoplasm, chloroplast, vacuole, mitochondrion. The levels of organisation in multicellular organisms: cells, tissues, organs, systems, organisms.	Calculation of resistance	How ear problems affect hearing. Predict how an image will change in different situations. Normal line; angles of incidence, refraction, reflection and emergence.	Suggest what might happen when an unfamiliar species is introduced into a food web. The role and function in reproduction of petals, stamens, ovaries. Insect- and wind-pollinated flowers are adaption.Understand how fertilisation takes place in plants. A fertilised ovule develops into a seed and a fertilised ovary develops into a fruit.
Understanding	Developing	Use distance-time graphs to illustrate journeys	Describe reactions with word equations.	Explain if characteristics are inherited, environmental or both	Comparison of energy sources.	Explain why a rock has a particular property based on how it was formed.	Name the properties of solids, liquids and gases.	Describe how properties of part of the skeleton relates to its function	Draw simple circuit diagrams	Use diagrams for description of waves.	Describe how a species' population changes as its predator or prey population changes

	Core	Draw force diagrams for gravity related problems. Use the formula to compare weights on different planets.	Place an unknown metal in the reactivity series. Identify the best indicator using data provided. Use data and observations to determine pH of a solution. Explain how neutralisation reactions are used in a range of situations.	Explain how variation helps a particular species in a changing environment or a specific environment Use a diagram to show stages in development of a foetus from the production of sex cells to birth Describe causes of low fertility in male and female reproductive systems.	Comparison of energy usage and cost of devices. Show how energy is transferred between energy stores in a range of real-life examples.	Identify the causes of weathering and erosion and describe how they occur. Construct a labelled diagram to identify the processes of the rock cycle. Explain why places on the Earth experience different daylight hours and amounts of sunlight during the year.	Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles. Explain changes in state in terms of changes to the energy of particles. Explain how substances dissolve using the particle model. Use evidence from chromatography to identify unknown substances.	Explain how properties of part of the skeleton relates to its function Explain why some organs contain muscle tissue Explain how antagonistic muscles produce movement Simple comparison animal and plant cells. Function and uses of specialised cells	Draw a circuit diagram to show how voltage can be measured in a simple circuit. Use the idea of energy to explain how voltage and resistance affect the way components work.	Explain the properties of sound using observations. Explain light transmission through different colours, lenses and transparent.	Explain effects of environmental changes and toxic materials on a species' population. Explain issues with human food supplies in terms of insect pollinators.
	Advanced	Varying speeds measured by observers. Explain unfamiliar observations where weight changes.	Be able to deduce whether a physical or chemical change has occurred based on appearance. Consider the uses of metals based on their properties. Use the reactivity series to deduce whether a reaction will happen. Describe a method for how to make a neutral solution from an acid and alkali.	Critique claims that a particular characteristic is inherited or environmental. Predict implications of a change in the environment on population. Use ideas of variation to explain why one species may adapt better to an environmental change. Deduce how contraception and fertility treatments work. Predict the effect of a mothers lifestyle on the developing foetus.	Energy transfers for electrical devices. Evaluate consequences of electricity generation. Suggest actions in response to electricity demand. Calculate the useful energy and the amount dissipated, given values of input and output energy. Explain why processes such as swinging pendulums or bouncing balls cannot go on forever, in terms of energy.	Identify factors that indicate fast and slow processes of change on Earth. Describe the appearance of planets or moons from diagrams showing their position relative to the Earth and Sun. Describe how space exploration and observations are affected by the scale of the universe. Predict patterns in day length, Sun's intensity or shadows at different latitudes.	Draw particle diagrams to explain observations about changes of state, gas pressure and diffusion. Use the solubility curve of a solute to explain observations about solutions. Choose the most suitable technique to separate out mixtures of substances.	Use a diagram to predict the result of a muscle contraction or relaxation. Predict the consequences of damage to a joint, bone or muscle Suggest factors that affect the force exerted by different muscles Evaluate technology for improving human movement. Explain how specialised cell adaptations are linked to functions.	Predict the effect of changing the rating of a battery or a bulb on other components in a series or parallel circuit. Justify the sizes of voltages in a circuit, using arguments based on energy.	Describe sound waves using diagrams or oscilloscope pictures. Predictions of light based on the surfaces of materials, and the types of materials. Specular reflection and scattering.	Explain how toxic substances can accumulate in human food. Label these parts of a diagram of a flower: petal, sepal, stamen, carpel, ovary, ovule. Explain the roles of these parts of a flower: petals, stamens, ovaries, ovules. Suggest the mode of pollination for different flowers based upon their features. Give examples of seeds that are dispersed by the wind, animals, water and explosive means.
Skill	developing	measure times and distance	Safely handle corrosive chemicals.	Plot bar charts or line graphs	To build and fly compressed air rockets.	Identify different rock types.	Separate using filtration and evaporation.	To use a microscope to focus on low power.	Given a table of voltage against current. Describe the pattern in the results.	Practical investigative skills.	From food chains
	Core	Use appropriate equipment to measure weight.	Simple practicals with metals and acid.	Plot bar charts or line graphs to show discontinuous or	Calculations using data. Compare the percentages of	Describe features of different rock types. Describe weathering from	Classify solids, liquids and gases. Draw a cooling curve graph. Use melting and	To produce temporary slides suitable for viewing with a microscope.	Given a table of voltage against current. Use the ratio of voltage to current to	Practical investigative skills.	Combine food chains to form a food web Manual dexterity when dissecting the

		Accurately measure times and distance. Draw distance-time graphs.	Observe colour changes when using indicators. Safely handle corrosive chemicals.	continuous variation data. Identify key events on a diagram of the menstrual cycle.	energy wasted by renewable. To build and fly compressed air rockets.	a series of experiments.	boiling points to predict states. Experiment how temperature affects the solubility of a compound. Chromatography experiments	To draw pencil diagrams which relate to observations of their specimens. Practical investigative skills.	determine the resistance.		flower and displaying the parts.
	Advanced	Draw and interpret distance-time graphs. Use and rearrange the formula.	Carry out displacement reactions of metals. Name salts.		Comparison of advantages and disadvantages. Identifying social, economic and environmental consequences. Evaluating evidence. Evaluate analogies and explanations for the transfer of energy.	Explain rock properties. Be able to work out the phases of the Moon based on the position of the Sun and Moon.	Conclude and evaluate practical work in terms of particles and their energy. Analyse and interpret solubility curves. Evaluate the evidence for identifying substances using separating techniques.	Produce bubble-free temporary slides suitable for viewing with a microscope. To be able to use a microscope to focus on low and high power.	Use an analogy like water in pipes to explain why part of a circuit has higher resistance. Draw conclusions about safety risks, from data on voltage, resistance and current.	Use diagrams for comparison of waveforms. Explain how multiple mirror devices work, using ray diagrams.	Make a deduction based on data about what caused a change in the population of a species. Using a microscope to observe pollen grains.

Department:	Science

Year Group		Term 1				Term 2			Term 3 and 4				Term 5 and Term 6			
Year 8 Topic		Forces		Matter		Organisms		Magnets	Energy		Earth		Waves		Ecosystems	
		Contact Forces	Pressure	Periodic table	Elements	Breathing	Digestion		Energy and work	Heating and Cooling	Climate	Earth Resources	Effects	Properties	Respiration	Photosynthesis
Knowledge	Developing	Forces in equilibrium	Identify forces	The Periodic table has periods and Groups.	Symbols of the most common elements.	Parts and functions of the respiratory system	Parts of the digestive system	Identify magnets and electromagnets	Simple machine make it easier to do work	State that conduction, convection and radiation pathways for energy transfer	The composition of Earth's atmosphere.	Earth resources are finite Recycling reduces the need to extract resources.	Movement of particles in waves	Transverse waves transfer energy and/or information	Respiration	Plants and algae are producers Plants photosynthesise
	Core	Stretching and compressing due to unbalanced forces	Relationship between weight and upthrust Pressure effects of different stresses on a solid object	Metals are generally on the left side non-metals on the right. Metals can be in a reactivity series.	Elements and compounds. Practical diagrams of elements and compound. Chemical formula of compounds.	Breathing and Gas exchange Find out how recreation drugs might affect body systems	Balanced Diet, protein, fat, carbohydrates, sugars, vitamins and minerals Parts and functions of the digestive system	Properties of magnets and electromagnets	Work Action of simple machines	Describe the conduction, convection and radiation pathways for energy transfer	Greenhouse gases and the greenhouse effect. Global warming and climate change. Fossil fuels and the effect of burning them.	Most metals are found as compounds, minerals An ore is a mineral worth mining. Reactivity series and use of carbon	Direction of transfer of energy Ultrasound and Ultraviolet	Waves do not transfer matter	Respiration Aerobic respiration Anaerobic respiration Uses of Yeast fermentation	Most photosynthesis takes place in leaves and green parts of plants
	Advanced	How sports technology reduces drag Forces on accelerating objects	Explain underwater effects using pressure. Stress as a cause of	Identify and use patterns in properties and chemical reactions to	Name simple compounds using rules A compounds and chemical bonds.	Evaluate a treatment for a lung disease Predict how a change in the gas exchange		Magnetic fields, strength of electromagnets	Identification of simple machines	Describe how an object's temperature changes	The carbon cycle.	The more reactive a metal, the more difficult it is to separate it from its compound.	Loudspeakers turn electrical signals into pressure waves of sound	For transverse waves, the direction of vibration is perpendicular	Details of aerobic and anaerobic respiration	Mechanics of photosynthesis The function of chlorophyll and stoma .

		Proportionality of force and extension in deforming materials	damage to solid objects	describe periods and predict positions of elements	Polymer structure	system affect other processes						Use data to evaluate proposals for recycling materials.	Compressions and rarefactions in sound waves	to that of the wave Describe the effect of combining waves		
Understanding	Developing	State whether an object in an unfamiliar situation is in equilibrium	State what forces affect why objects either sink or float	Identify a trend in physical properties	Given chemical formulae, name the compounds, elements present	Describe the affect the gas exchange system of exercise, smoking and asthma	State possible health effects of unbalanced diets from data provided	Chose magnets for practical applications	State how simple machines are used	Changing temperature happens due to of energy transfer	Identify parts of a carbon cycle diagram.	State why recycling of some materials is particularly important	Effects of waves on living skin cells	Identify a properties from either longitudinal or transverse waves	Word equations to describe aerobic respiration	Describe ways plants obtain resources for photosynthesis.
	Core	Explain why an object in an unfamiliar situation is in equilibrium Describe factors which affect the size of frictional and drag forces Describe how materials behave as they are stretched or squashed.	Use diagrams to explain observations of fluids in terms of unequal pressure. Explain why objects either sink or float	Use data to describe a trend in physical properties. Describe the reaction of an unfamiliar Group 1 or 7 element.	Be able to interpret the formulae of compounds in terms of number and type of each element. using their chemical formulae. Given chemical formulae, name the compounds, elements present and their relative proportions.	Explain how exercise, smoking and asthma affect the gas exchange system Explain how the parts of the gas exchange system are adapted to their function	Describe possible health effects of unbalanced diets from data provided Describe how organs and tissues involved in digestion are adapted for their role Describe digestion process from mouth to cell	Use field lines to predict magnetic behaviour	Describe how simple machines are useful	Changing temperature in terms of energy transfer Explain how a method of thermal insulation	Use a diagram to show how carbon is recycled in the environment and through living things. Describe how human activities affect the carbon cycle.	Explain why recycling of some materials is particularly important Describe how some of Earth's resources are turned into useful materials or recycled.	Effects of waves of varying frequencies on living skin cells	Describe the properties of different longitudinal and transverse waves	Word equations to describe aerobic and anaerobic respiration. Comparison of aerobic and anaerobic respiration.	Explain why other organisms are dependent on photosynthesis.
	Advanced	Describe what happens to the length of a spring when the force on it changes	Use and rearrange the pressure formula Explain why effects of forces vary depending on surface area	Use data showing a pattern in physical properties to estimate a missing value, to find similarities, patterns and anomalies. Use observations of patterns in chemical reactions to predict behaviour	Use observations from chemical reactions to distinguish between element or a compound. Use particle diagrams to predict physical properties. Compare and contrast, with justification, the properties of elements and compounds	Explain observations about changes to breathing rate and volume Explain how changes in volume and pressure inside the chest move gases in and out of the lungs	Make deductions from medical symptoms showing problems with the digestive system.	Explain use of magnets in navigation	Compare and contrast simple machines	Sketch diagrams to show convection currents in unfamiliar situations.	Describe how global warming can impact on climate and local weather patterns. Evaluate the implications of a proposal to reduce carbon emissions.	Justify the choice of extraction method for a metal, given data about reactivity. Suggest factors to take into account when deciding whether extraction of a metal is practical.	Explain how audio equipment converts sound into a changing pattern of electric current.	Use the wave model to explain observations of the reflection, absorption and transmission of a wave	Explain how specific activities involve aerobic or anaerobic respiration. Suggest how organisms living in different conditions use respiration	Explain why organisms are dependent on photosynthesis. Word equations to describe photosynthesis Suggest reasons for adaptations of leaves, roots and stems.

	developing	Measuring forces	Accurately measure forces and surface areas	Plot graphs with assistance	Carry out simple practicals with assistance	Label a model for showing the mechanism of breathing	Design a diet for a person with specific dietary needs	Plan investigation of electromagnets with assistance	Presenting data with assistance	Sketch graphs	Identify if a claim that human activity is causing global warming or climate change	With assistance extract a metal by reduction with carbon	Construct and test a basic loudspeaker with assistance	Draw and label a wave	To carry out a simple investigation with assistance	Use a microscope
	Core	Measuring extension of materials	Investigate relationships between force, area and pressure	Plot graphs	Carry out simple practicals where elements are chemically combined.	Evaluate a model for showing the mechanism of breathing	Calculate food requirements for a healthy diet, using information provided.	Plan investigation of electromagnets	Investigation planning Presenting data	Sketch graphs Evaluating claims	Evaluate claims that human activity is causing global warming or climate change.	Extract a metal by reduction with carbon.	Construct and test a basic loudspeaker	Investigate reflection and refraction	Plan with assistance and carry out a simple investigation	Use a microscope to produce a labelled diagram
Skill	Advanced	Draw force-extension graphs Interpret force-extension graphs	Using the pressure formula to find an unknown variable	Interpret graphs and make predictions for missing data.			Critique claims for a food product or diet by analysing nutritional information	Design improved magnetic devices	Analysis of results	Justifying quality of evidence	Evaluate the implications of a proposal to reduce carbon emissions.	Take part in a debate about whether it is right to open a mine in an area of natural duty.	Evaluate electricity production by wave energy using data for different locations and weather conditions	use the idea of wavefronts to explain reflection and refraction	To plan and carry out an investigation	Explain the advantages of using a microscope in Biology

Department:	

Year Group		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 9 Topic SCIENCE (SLH)							
Knowledge	Core	To learn about Independent variable, dependant variables and control variables.	To be able to use continuous data. To be able to spot anomalies. To construct a hypothesis.	To know the meaning of precise, accurate, repeatable and reproducible.	To know the term reliable, hypothesis and theory. To learn about decimal form.	Pulling together practical skills, variables, tables and graphs.	To recap repeatable and reproducible. Pulling together practical skills, variables, tables and graphs.
	Challenge	To use the variables to correctly construct a results table and graph.	To deal with anomalous results in data.	To use an appropriate number of significant figures.	To write a conclusion from their results.	Looking at graph correlation.	Looking at speed calculations.
Understanding	Core	To identify IV, DV from tables and graphs.	To understand instrumentation requires calibrating.	To understand the meaning of accurate and precision. To understand the meaning of repeatable and reproducible.	To recognise expressions in a decimal form.	To understand how changing the independent variable effects the dependent variable.	To understand different sized spinners will fall at different speeds.
	Challenge	To independently construct a line graph with appropriate scales.	To independently construct a line graph with a line of best fit.	To explain the difference between precise and accurate. To explain the difference between repeatable and reproducible.	To assess if a method is usable.	Using the results to plot a graph and interpret the graph.	Look at results ensuring they are accurate.

Skill	Core	To be able to identify and name apparatus. To carry out a practical and construct a results table.	To be able to read scales. To be able to predict results.	To compare different conditions. To make estimates of the results of simple calculations.	To be able to write a method. To decide if an experiment is reliable. To identify theories.	To carry out experiments to determine the amount of energy.	To make and time the spinners falling accurately.
	Challenge	To carry out a practical and construct a graph.	To look at pattern in graphs.	To recap and identify variables.	To use expressions in a decimal form. To make order of magnitude calculations.	To use evidence to justify a prediction.	To use repeat experiments to average results correctly.