THE HIGHFIELD SCHOOL

Curriculum Plan
Department/subject: Science Year 9
Our Vision: **We take opportunities and aspire to excellence**
Our Intent:

- All students will experience a curriculum richness, breadth and depth
- The curriculum equips every student with the knowledge and skills for the future in our local area and beyond
- The curriculum builds on prior knowledge and creates a 'web of knowledge'
- Gaps in knowledge and skills are identified and addressed quickly

Year	Biology – Autumn to February	Chemistry – Autumn to February	Physics – Autumn to February
Knowledge to be taught	**Unit – Inheritance, Evolution and health** • The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients. • Describe how a species' population changes as its predator or prey population changes. • Explain effects of environmental changes and toxic materials on a species' population. • Suggest what might happen when an unfamiliar species is introduced into a food web. • Develop an argument about how toxic substances can accumulate in human food. • Make a deduction based on data about what caused a change in the population of a species.	**Unit – Foundations in Chemistry** • The elements in a group all react in a similar way and sometimes show a pattern in reactivity. • As you go down a group and across a period the elements show patterns in physical properties. • Metals are generally found on the left side of the table, non-metals on the right. • Group 1 contains reactive metals called alkali metals. • Group 7 contains non-metals called halogens. • Group 0 contains unreactive gases called noble gases. • Use data to describe a trend in physical properties. • Describe the reaction of an unfamiliar Group 1 or 7 element.	**Unit – Electricity and Magnetism** • Introduction to circuit symbols and how to correctly draw circuit diagrams • Understanding of the rules for current and potential difference in a series circuit • Understanding of the rules for current and potential difference in a parallel circuit • Defining electrical resistance and making use of the V = I x R equation • Required practical: how does the length of a wire affect resistance? • Identifying the key features of key electrical components: thermistors and LDRs • Required practical: how does changing the potential difference affect the current flowing through a resistor, a lightbulb and a diode? • Analysis and graph plotting of practical results

	• There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment, and some is a combination. • Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment. • Explain whether characteristics are inherited, environmental or both. • Plot bar charts or line graphs to show discontinuous or continuous variation data. • Explain how variation helps a particular species in a changing environment. • Explain how characteristics of a species are adapted to particular environmental conditions. • Predict implications of a change in the environment on a population. • Use the ideas of variation to explain why one species may adapt better than another to an environmental change. • Critique a claim that a particular characteristic is inherited or environmental. • Inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being	• Use data showing a pattern in physical properties to estimate a missing value for an element. • Use observations of a pattern in chemical reactions to predict the behaviour of an element in a group. • Predict the position of an element in the Periodic table based on information about its physical and chemical properties. • Choose elements for different uses from their position in the Periodic table. • Use data about the properties of elements to find similarities, patterns and anomalies. • Most substances are not pure elements, but compounds or mixtures containing atoms of different elements. They have different properties to the elements they contain. • Use particle diagrams to classify a substance as an element, mixture or compound, and as molecules or atoms. • Name simple compounds using rules: change non-metal to –ide; mono, di, tri prefixes; and symbols of hydroxide, nitrate, sulfate and carbonate. • The symbols of hydrogen, oxygen, nitrogen, carbon, iron, zinc, copper, sulfur, aluminium, iodine, bromine, chlorine, sodium, potassium, magnesium.	• Feedback lesson for homework task (flexible) • Learning how to conventionally wire an electrical plug correctly • Defining electrical power and making use of the equations: P = I x V and P = I2 R • Identifying power as the rate of transfer of energy and subsequent use of the equations: E = P x t and E = Q x V • Understanding the key components of the National grid and how it remains efficient • Looking at magnetic poles and how magnetic fields form between (and around) these poles • Recognising how to create an electromagnet and the how to change the strength of it • Identifying where magnets can be used to carry out tasks and recognising when the use of an electromagnet or permanent magnet is preferable.

	transferred from parents to offspring during reproduction. ● Chromosomes are long pieces of DNA which contain many genes. Gametes, carrying half the total number of chromosomes of each parent, combine during fertilisation. ● Use a diagram to show the relationship between DNA, chromosomes and genes. ● Use a diagram to show how genes are inherited. ● Explain how a change in the DNA (mutation) may affect an organism and its future offspring. ● Explain why offspring from the same parents look similar but are not usually identical. ● The DNA of every individual is different, except for identical twins. ● There is more than one version of each gene e.g. different blood groups. ● Suggest arguments for and against genetic modification. ● Suggest benefits from scientists knowing all the genes in the human genome. ● Determine how the number of chromosomes changes during cell division, production of sex cells and fertilisation.	● Name compounds using their chemical formulae. ● Given chemical formulae, name the elements present and their relative proportions. ● Represent atoms, molecules and elements, mixtures and compounds using particle diagrams. ● Use observations from chemical reactions to decide if an unknown substance is an element or a compound. ● Use particle diagrams to predict physical properties of elements and compounds. ● Deduce a pattern in the formula of similar compounds and use it to suggest formulae for unfamiliar ones. ● Compare and contrast the properties of elements and compounds and give a reason for differences. ● Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light. ● Thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating. ● Chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved.	

	• Find out why scientist Watson, Crick and Franklin were so important. • Natural selection is a theory that explains how species evolve and why extinction occurs. • Use evidence to explain why a species has become extinct or adapted to changing conditions. • Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction. Within an ecosystem, having many different species ensures resources are available for other populations, like humans. • Evaluate whether evidence for a species changing over time supports natural selection. • Explain how a lack of biodiversity can affect an ecosystem. • Describe how preserving biodiversity can provide useful products and services for humans. • Predict and explain the changes in a population over time due to natural selection. • Suggest an explanation, based on data, for how a particular evolutionary change occurred.	• Write word equations from information about chemical reactions. • Explain why a reaction is an example of combustion or thermal decomposition. • Predict the products of the combustion or thermal decomposition of a given reactant and show the reaction as a word equation. • Explain observations about mass in a chemical or physical change. • Use particle diagrams to show what happens in a reaction. • Compare the pros and cons of fuels in terms of their products of combustion. • Use known masses of reactants or products to calculate unknown masses of the remaining reactant or product. • Devise a general rule for how a set of compounds reacts with oxygen or thermally decomposes. • Balance a symbol equation. • Use mass of reactant in equation to determine mass of product eg magnesium and oxygen.	

	• Evaluate ways of preserving plant or animal material for future generations. • Find out how recreation drugs might affect different body systems.		
Keywords	Ecosystem Environment Population Inherited characteristics DNA Chromosomes Gene Population Natural selection Extinct	Atom Element Group Period Electron Proton Neutron Electronic Structure Reactivity Chemical	Potential Difference Current Charge Circuit Magnet Field Pole Resistance Electromagnet Induce
Links to prior knowledge	Students will have learnt about animals including humans at KS2 and this will expand on their understanding. In KS3 they will also have learnt about Reproduction, Nutrition and Digestion.	In KS2 students will have learnt about the particle model of matter and the states of matter. In KS3 students learn more about particles and how they respond in chemical reactions, and their basic internal structure.	•
How knowledge is assessed	• An end of unit test will cover the main ideas in the topic. This will be marked by the teacher and a feedback lesson will go over the assessment in detail. • Green pens are used for self and peer assessment to build up students' understanding of their own misconceptions and ideas. • Homework tasks via Show My Homework.	• An end of unit test will cover the main ideas in the topic. This will be marked by the teacher and a feedback lesson will go over the assessment in detail. • Green pens are used for self and peer assessment to build up students' understanding of their own misconceptions and ideas. • Homework tasks via Show My Homework.	• An end of unit test will cover the main ideas in the topic. This will be marked by the teacher and a feedback lesson will go over the assessment in detail. • Green pens are used for self and peer assessment to build up students' understanding of their own misconceptions and ideas. • Homework tasks via Show My Homework.

How gaps will be addressed	• Gaps in knowledge will be identified by any of the strategies above. • Formally marked work will require a response from the student and subsequent work in lessons will link back to the areas of need. • End of unit test feedback to require one lesson dedicated to addressing gaps in knowledge and exam skills	• Gaps in knowledge will be identified by any of the strategies above. • Formally marked work will require a response from the student and subsequent work in lessons will link back to the areas of need. • End of unit test feedback to require one lesson dedicated to addressing gaps in knowledge and exam skills	• Gaps in knowledge will be identified by any of the strategies above. • Formally marked work will require a response from the student and subsequent work in lessons will link back to the areas of need. • End of unit test feedback to require one lesson dedicated to addressing gaps in knowledge and exam skills
Cultural capital lessons	Incorporated in lessons e.g. work of Franklin, Watson and Crick, Personal: Lifestyle and use of drugs Moral: Preserving plants (seed vault)	Physical: Practical techniques, health and safety, development of fine motor and dexterity skills. Cultural: How new ideas are accepted by Society.	Physical: Practical techniques, health and safety, development of fine motor and dexterity skills.