Kingfisher Curriculum Offer – AQA – Science for KS2 and KS3 including progression to GCSE single Biology (8461)

Curriculum Offer
(SLT)

Progression Map and National Curriculum Aims and Expectations
(Curriculum Lead)

Progression Map and Proposed Timescale with Core Curriculum Aims, Qualification Mapping and Teaching Schedule
(Subject Lead)

Lesson plans and Resources including Displays and Assessment
(Classroom Teacher)

Working Document - Spiral Curriculum Evidence - **(SCE). You will see this when this has represented the spiral curriculum.**
(SCE) KS3/4 shows that this subject knowledge increases with the level of the science curriculum from KS2 to KS3 up to KS4 – GCSE biology. These small steps are how the students develop over time towards the end goal from knowledge to understanding/ comprehension and up to application with Deliberate practice questions in preparation for GCSE. (Blooms Taxonomy)

Working scientifically (WS). Observation testing reproducibility, repeatability and understanding variables.

Progression Map

Level Expected at the end of:

- Key Stage 2
- Key Stage 3
- Key Stage 4
- Post 16

Key Stage 2 Kingfisher School Curriculum Offer	Key Stage 2 Content National Curriculum Expectations
Autumn Term **LKS2** **<u>Living things and their habitats</u>** Pupils should be taught to: • explore and compare the differences between things that are living, dead, and things that have never been alive. • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. **(SCE) KS3/4** • identify and name a variety of plants and animals in their habitats, including microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. **(SCE) KS3** • recognise that living things can be grouped in a variety of ways. **(SCE) KS3/4** • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • recognise that environments can change and that this can sometimes pose dangers to living things. **(SCE) KS3/4** • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • describe the life process of reproduction in some plants and animals. **(SCE) KS3/4** **<u>Plants</u>** Pupils should be taught to: • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. **(SCE) KS3/4** • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. **(SCE) KS3/4**	**Lower Key Stage 2 - Years 3 and 4** The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. 'Working scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

- investigate the way in which water is transported within plants. **(SCE) KS4**
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. **(SCE) KS3**

Animals including humans

Pupils should be taught to:

- Identify, that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. **(SCE) KS3/4**
- identify that humans and some other animals have skeletons and muscles for support, protection and movement. **(SCE) KS3**
- describe the simple functions of the basic parts of the digestive system in humans. **(SCE) KS3/4**
- identify the different types of teeth in humans and their simple functions.
- construct and interpret a variety of food chains, identifying producers, predators and prey. **(SCE) KS3/4**

UKS2 Autumn Term

Living things and their habitats

Pupils should be taught to:

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
- describe the life process of reproduction in some plants and animals. **(SCE) KS3/4**

Animals including humans

Pupils should be taught to:

- describe the changes as humans develop to old age.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Upper Key Stage 2 – Years 5 and 6

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Spring Term **LKS2** **Animals, including humans** Pupils should be taught to: • notice that animals, including humans, have offspring which grow into adults. **(SCE) KS3** • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) **(SCE) KS3** • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. **(SCE) KS4** **Rocks** Pupils should be taught to: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. **(WS)** • describe in simple terms how fossils are formed when things that have lived are trapped within rock. **(WS)** • recognise that soils are made from rocks and organic matter. **Light: All (SCE) KS3** Pupils should be taught to: • recognise that they need light in order to see things and that dark is the absence of light. **(WS)** • notice that light is reflected from surfaces. **(WS)** • recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • recognise that shadows are formed when the light from a light source is blocked by an opaque object. **(WS)** • find patterns in the way that the size of shadows change. **(WS)**	Pupils should read, spell and pronounce scientific vocabulary correctly

States of matter

Pupils should be taught to:

- compare and group materials together, according to whether they are solids, liquids or gases. **(SCE) KS3**
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) **(WS)**
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **(SCE) KS3**

Sound

Pupils should be taught to:

- identify how sounds are made, associating some of them with something vibrating. **(WS)**
- recognise that vibrations from sounds travel through a medium to the ear.
- find patterns between the pitch of a sound and features of the object that produced it. **(WS)**
- find patterns between the volume of a sound and the strength of the vibrations that produced it. **(SCE) KS3**
- recognise that sounds get fainter as the distance from the sound source increases. **(WS)**

Properties and changes of materials

Pupils should be taught to:

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. **(WS)**
- know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. **(SCE) KS3**
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. **(SCE) KS3**
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. **(WS)**
- demonstrate that dissolving, mixing and changes of state are reversible changes. **(WS)**

- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. **(SCE) KS3**

UKS2 Spring Term

Properties and changes of materials

Pupils should be taught to:

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. **(WS) (SCE) KS3**
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution **(SCE) KS3**
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating **(SCE) KS3**
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic **(WS)**
- demonstrate that dissolving, mixing and changes of state are reversible changes **(SCE) KS3/4**
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda **(SCE) KS3**

Evolution

Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago **(SCE) KS3**

Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents

Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. **(SCE) KS3/4**

Summer Term

LKS2

Uses of everyday materials

Pupils should be taught to:

- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching **(SCE) KS3**

Plants

Pupils should be taught to:

- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy **(SCE) KS3/4**

Forces and magnets

Pupils should be taught to: **All (SCE) KS3**

- compare how things move on different surfaces
- notice that some forces need contact between 2 objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having 2 poles
- predict whether 2 magnets will attract or repel each other, depending on which poles are facing

Electricity: All (SCE) KS3

Pupils should be taught to:

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors

UKS2 Summer Term

Earth and space

Pupils should be taught to:

- describe the movement of the Earth and other planets relative to the sun in the solar system **(SCE) KS3**
- describe the movement of the moon relative to the Earth
- describe the sun, Earth and moon as approximately spherical bodies
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky **(SCE) KS3**

Forces : All (SCE) KS3

Pupils should be taught to:

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

Electricity: All (SCE) KS3

Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit

Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches Use recognised symbols when representing a simple circuit in a diagram.	
Key Stage 3 Kingfisher School Curriculum Offer	**Key Stage 3 Content National Curriculum Expectations**
Autumn Term: **Year 7 and Year 8.** Motion and forces Describing motion: previous learning from Forces- forces as pushes or pulls, force arrows in diagrams, balanced and unbalanced forces, forces associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water, forces measured in newtons. **(SCE) KS2** Hooke's Law as a special case. Newtons 3 laws of motion. Contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity. Pressure in fluids, atmospheric pressure, pressure in liquids, increasing with depth; upthrust effects, floating and sinking. **Balanced forces**, Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface. Forces and motion. **(SCE) KS2** **Defining acids and alkalis**	A spiral design for understanding makes it easier for students to develop an understanding of a big idea by multiple interactions with the concepts within the idea. By connecting smaller ideas to more abstract ideas, students will be better prepared to apply these concepts when approaching an unfamiliar topic. A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. Aims The national curriculum for science aims to ensure that all pupils:

In terms of neutralisation reactions, the pH scale for measuring acidity/alkalinity; and indicators, reactions of acids with metals to produce a salt plus hydrogen, reactions of acids with alkalis to produce a salt plus water and what catalysts do.
Defining acids and alkalis in terms of neutralisation reactions, the pH scale for measuring acidity/alkalinity; and indicators, reactions of acids with metals to produce a salt plus hydrogen, reactions of acids with alkalis to produce a salt plus water what catalysts do.

Chemical reactions.

Using acids, alkalis, and various other chemicals to see what reactions occur and why. During the organization we will look at plants and animal cells along with specialized and unicellular cells.

Cells and organisation,

Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope.
The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts, the similarities and differences between plant and animal cells, the role of diffusion in the movement of materials in and between cells, the structural adaptations of some unicellular organisms, the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. **(SCE) KS4**

Specialised cells and their function:
We will look at plants and animal cells along with specialised and unicellular cells. These will include animal and plant cells and the function of each specialised cell. This will include their specific function. **(SCE) KS4**

Year 9 –
Consolidation of the previous 2 years of education, knowledge, and retrieval.

Nutrition and digestion:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.
- The students are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Scientific knowledge and conceptual understanding of the programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop a secure understanding of each key block of knowledge and concepts in order to progress to the next stage.

Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content. Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely.

They should build up an extended specialist vocabulary.

They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data.

The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to

Content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed and the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases, the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts). Health and the effects of recreational drugs (including substance misuse) on behaviour, health and life processes. **Previous learning from(SCE) KS2 on to (SCE) KS3/4, Cross curricular with Food KS3**

Photosynthesis: **Previous learning from(SCE) KS2 onto (SCE) KS3/4**
The reactants in, and products of, photosynthesis, and a word summary for photosynthesis, the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere.
The adaptations of leaves for photosynthesis, energy Calculation of fuel uses and costs in the domestic context. comparing energy values of different foods (from labels) (kJ). comparing power ratings of appliances in watts (W, kW). Comparing amounts of energy transferred (J, kJ, kW hour).

Domestic fuel bills:
Fuel use and costs, fuels and energy resources.
Electricity and electromagnetism Current electricity, electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge.

Potential difference:
Volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current, differences in resistance between conducting and insulating components (quantitative). **Previous learning from(SCE) KS2**

Static electricity:
separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects, the idea of electric field, forces acting across the space between objects not in contact. **Previous learning from(SCE) KS2**

Magnetism:

maximise their pupils' engagement with and motivation to study science.

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 Science – key stage 3 3 become aware of some of the big ideas underpinning scientific knowledge and understanding.

Examples of these big ideas are the links between structure and function in living organisms, the particulate model as the key to understanding the properties and interactions of matter in all its forms, and the resources and means of transfer of energy as key determinants of all of these interactions.

They should be encouraged to relate scientific explanations to phenomena in the world around them and start to use modelling and abstract ideas to develop and evaluate explanations.

Pupils should understand that science is about working objectively, modifying explanations to take account of new evidence and ideas and subjecting results to peer review.

Pupils should decide on the appropriate type of scientific enquiry to undertake to answer their own questions 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.

'Working scientifically' is described separately at the beginning of the programme of study but must always be taught through and clearly related to substantive science content in the programme of study.

Teachers should feel free to choose examples that serve a variety of purposes, from showing how scientific ideas have developed historically to reflecting modern developments in science.

Magnetic poles, attraction and repulsion, magnetic fields by plotting with compass, representation by field lines, Earth's magnetism, compass and navigation, the magnetic effect of a current, electromagnets, D.C. motors (principles only). **Previous learning from(SCE) KS2** **Genetics and evolution:** Inheritance, chromosomes, DNA and genes, heredity as the process by which genetic information is transmitted from one generation to the next. The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. **(SCE) KS4** Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction, the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material. **(SCE) KS4** **Pure and impure substances:** The concept of a pure substance, mixtures, including dissolving, diffusion in terms of the particle model, simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography, the identification of pure substances. Spring Term: **Year 7 and Year 8.** **Observations where sound** Reflected, transmitted or absorbed by different media. Explain observations of how sound travels using the idea of a longitudinal wave. Describe the amplitude and frequency of a wave from a diagram or oscilloscope picture. Use drawings of waves to describe how sound waves change with volume or pitch. Waves - Observed waves, Sound waves, frequencies of sound waves, auditory range of humans and animals. Energy and waves, pressure waves transferring energy. **Previous learning from(SCE) KS2** **Light waves:**	Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge, including the use of scientific nomenclature and units and mathematical representations.

Ray model to explain imaging in mirrors, the human eye, colours, and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. **Previous learning from(SCE) KS2** **Pressure in fluids:** atmospheric pressure, decreases with increase of height as weight of air above decreases with height, pressure in liquids, increasing with depth; upthrust effects, floating and sinking pressure measured by ratio of force over area – acting normal to any surface. Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles. Explain changes in states in terms of changes to the energy of particles **Year 9** **Consolidation of the previous 2 years of education, knowledge, and retrieval.** **Genetics and evolution Inheritance:** Chromosomes, DNA and genes, heredity as the process by which genetic information is transmitted from one generation to the next. **(SCE) KS4** **The variation between species:** **Previous learning from(SCE) KS2 onto (SCE) KS4** Between individuals of the same species means some organisms compete more successfully, which can drive natural selection. **Changes in the environment** may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction, the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material. **Previous learning from(SCE) KS2 and (SCE) KS4** Summer Term: **Year 7 and Year 8.** **Due to transition this year I will be checking understanding and filling gaps in learning from earlier in the year.** **Cells and organisation:** Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope. **(SCE) KS4**	

Uni-cellular organisms are adapted: (SCE) KS4
How they carry out functions that in multi-cellular organisms are done by different types of cells, Animal and plant cells.
The structural adaptations of some unicellular organisms, the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.

Earth and atmosphere:
The composition of the Earth, the structure of the Earth, the rock cycle and the formation of igneous, sedimentary and metamorphic rocks, Earth as a source of limited resources and the efficacy of recycling, the carbon cycle, the composition of the atmosphere, the production of carbon dioxide by human activity and the impact on climate. **(SCE) KS4**

Space physics:
Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) **Previous learning from(SCE) KS2**

Our Sun as a star:
Stars in our galaxy, other galaxies the seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance.
Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies. **Previous learning from(SCE) KS2**

Year 9 Consolidation of the previous 2 years of education, knowledge, and retrieval.

The particulate nature of matter:
The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure, changes of state in terms of the particle model.
Atoms, elements and compounds, a simple (Dalton) atomic model, differences between atoms, elements and compounds. **Previous learning from(SCE) KS3**

Chemical symbols and formulae:
Elements and compounds, conservation of mass changes of state and chemical reactions. **Previous learning from(SCE) KS3**

Chemical and physical reactions:
Chemical and physical reactions as the rearrangement of atoms, representing chemical reactions using formulae and using equations, combustion, thermal decomposition, oxidation and displacement reactions. **Previous learning from(SCE) KS3**

Pure and impure substances:
The concept of a pure substance, mixtures, including dissolving, diffusion in terms of the particle model, simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography, the identification of pure substances. **Previous learning from(SCE) KS3**

Transition missed gaps in learning:
Unhealthy lifestyle, subject area will contain Alcohol, smoking, drugs and and unhealthy diet as well as the facts of the effects on the body and others.

Healthy lifestyle: subject areas will include benefits of exercise, healthy nutrition, digestive system including food tests and enzymes. This will include the effects on the body as well as how to test what foods contain within them. **Previous learning from(SCE) KS2 and KS4**
Space physics: Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars. **Previous learning from(SCE) KS2**

Gravity forces between Earth and Moon:
Earth and Sun (qualitative only), our Sun as a star, other stars in our galaxy, other galaxies, the seasons and the Earth's tilt, day length at different times of year, in different hemispheres, the light year as a unit of astronomical distance. **Previous learning from(SCE) KS2**

Key Stage 4 Kingfisher School Curriculum Offer :- Including Upper 3, Post 16 A and Post 16 B.	**Key Stage 4 Content National Curriculum Expectations**
Autumn Term: **Year 10/11** **Cell biology Prokaryotic and eukaryotic cells:** • explain how the main sub-cellular structures of eukaryotic cells (plants and animals) and prokaryotic cells are related to their functions, including the nucleus/genetic material, plasmids, mitochondria, chloroplasts and cell membranes • explain how electron microscopy has increased our understanding of sub-cellular structures • explain the aseptic techniques used in culturing organisms. Growth and development of cells • describe the process of mitosis in growth, including the cell cycle • explain the importance of cell differentiation • describe cancer as the result of changes in cells that lead to uncontrolled growth and division • describe the function of stem cells in embryonic and adult animals and meristems in plants • discuss potential benefits and risks associated with the use of stem cells in medicine • explain the role of meiotic cell division in halving the chromosome number to form gametes. Information, explain how the structure of different types of cell relate to their function in a tissue, an organ or organ system, or the whole organism. Cells may be specialised to carry out a particular function: • sperm cells, nerve cells and muscle cells in animals • root hair cells, xylem and phloem cells in plants. Cells are the basic building blocks of all living organisms. **Previous learning from(SCE) KS3**	Subject Content Introduction These GCSE subject criteria set out the knowledge, understanding, and skills for GCSE specifications in biology, to ensure progression from key stage 3 national curriculum requirements and the possibility of development into A level. They provide the framework within which awarding organisations create the detail of the subject specifications. Subject aims and learning outcomes. This document sets out the learning outcomes and content coverage required for GCSEs in the sciences. In subjects such as the sciences, where topics are taught in progressively greater depth over the course of key stage 3 and key stage 4, GCSE outcomes may reflect or build upon subject content which is typically taught at key stage 3. There is no expectation that teaching of such content should be repeated during the GCSE course where it has already been covered at an earlier stage. GCSE study in the sciences provides the foundations for understanding the material world. Scientific understanding is changing our lives and is vital to the world's future prosperity, and all students should be taught essential aspects of the knowledge, methods, processes and uses of science. They should be helped to appreciate how the complex and diverse phenomena of the natural world can be described in terms of a small number of key ideas relating to the sciences which are both inter-linked and are of universal application.

Cell metabolism: • explain the mechanism of enzyme action including the active site, enzyme specificity and factors affecting the rate of enzymatic reaction • describe cellular respiration as an exothermic reaction which is continuously occurring in all **living cells:** • compare the processes of aerobic and anaerobic respiration. **PE curriculum Cross curricular.** • explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, lipids and proteins. **Previous learning from(SCE) KS3** A tissue is a group of cells with a similar structure and function. Organs are aggregations of tissues performing specific functions. Organs are organised into organ systems, which work together to form organisms. **Human circulatory system:** • describe the human circulatory system, including the relationship with the gaseous exchange system, and explain how the structure of the heart and the blood vessels are adapted to their functions • explain how red blood cells, white blood cells, platelets and plasma are adapted to their functions in the blood. **PE curriculum Cross curricular. Previous learning from(SCE) KS2/3** **Health, disease and the development of medicines Health and disease:** • describe the relationship between health and disease • describe different types of diseases (including communicable and noncommunicable diseases) • describe the interactions between different types of disease. **Year 11 Photosynthesis Importance of photosynthesis:** **Previous learning from(SCE) KS2/KS3** • describe the process of photosynthesis and describe photosynthesis as an endothermic reaction • describe photosynthetic organisms as the main producers of food and therefore biomass for life on Earth • explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis	These key ideas include: • the use of conceptual models and theories to make sense of the observed diversity of natural phenomena. • the assumption that every effect has one or more cause. • that change is driven by differences between different objects and systems when they interact. • that many such interactions occur over a distance without direct contact. • that science progresses through a cycle of hypothesis, practical experimentation, observation, theory development and review. • that quantitative analysis is a central element both of many theories and of scientific methods of inquiry. These key ideas are relevant in different ways and with different emphases in the three subjects: examples of their relevance are given for each subject in the separate sections below for biology. GCSE specifications in this science studied concurrently should enable students to: • develop scientific knowledge and conceptual understanding through the specific disciplines of biology. • develop understanding of the nature, processes and methods of science, through different types of scientific enquiries that help them to answer scientific questions about the world around them. • develop and learn to apply observational, practical, modelling, enquiry and problem-solving skills, both in the laboratory, in the field and in other learning environments. • develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively. Furthermore, the sciences should be studied in ways that help students to develop curiosity about the natural world, insight into

• explain the interaction of these factors in limiting the rate of photosynthesis.
Required practical.

Non-communicable diseases in humans:

• recall that many non-communicable human diseases are caused by the interaction of a number of factors. To include cardiovascular diseases, many forms of cancer, some lung and liver diseases and diseases influenced by nutrition, including type 2 diabetes
• explain the effect of lifestyle factors, including exercise, diet, alcohol and smoking, on the incidence of non-communicable diseases at local, national and global levels
• evaluate some different treatments for cardiovascular disease.

Health, disease and the development of medicines Health and disease:
• describe the relationship between health and disease
• describe different types of diseases (including communicable and noncommunicable diseases)
• describe the interactions between different types of disease.
• how diseases are tested and the stages to complete a full drug trial. **Previous learning from(SCE) KS3**

Spring Term:

Year 10/11

Human respiratory system including its relationship to the heart as a double pump and its function:
We will also learn how the plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis. **Previous learning from(SCE) KS2/3 and PE curriculum Cross curricular.**

Students should be able to explain how the structure of root hair cells, xylem and phloem are adapted to their functions:
Students should explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration.

Transport systems Transport in cells:

how science works, and appreciation of its relevance to their everyday lives. The scope and nature of such study should be broad, coherent, practical and satisfying, and thereby encourage students to be inspired, motivated and challenged by the subject and its achievements.

The two main dimensions of the content:

The ways in which GCSE specifications in the three sciences should enable students to show their understanding of the concepts and methods of science are spelt out below in two main sections. The first section explains the main ways in which working scientifically should be developed and assessed. Specifications should encourage the development of knowledge and understanding in science through opportunities for working scientifically. Awarding organisations should identify in their assessment strategy how, over a cycle of assessments, they will ensure that working scientifically is developed and assessed through the subject content.

The second section sets out the key ideas and subject contents for biology. These content sections also set out the depth of treatment for both teaching and learning. Awarding organisations' specifications should be designed to set out the level of understanding which pupils are expected to acquire.

The content sections also set out the mathematical skills required for each science discipline. In order to be able to develop their skills, knowledge and understanding in science, students need to have been taught, and demonstrate competence, to select and apply the appropriate areas of mathematics relevant to the subject.

The mathematics should be at levels up to, but not beyond, the requirements specified in GCSE mathematics for the appropriate tier.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling

• explain how substances are transported into and out of cells through diffusion, osmosis and active transport. Transport systems in multicellular organisms • explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area: volume ratio **Previous learning from(SCE) KS2/3** • describe some of the substances transported into and out of a range of organisms in terms of the requirements of those organisms, to include oxygen, carbon dioxide, water, dissolved food molecules, mineral ions and urea. **Previous learning from(SCE) KS2/3** Communicable diseases and non-communicable diseases in humans. • explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants • describe a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS • describe the non-specific defence systems of the human body against pathogens • explain the role of the immune system of the human body in defence against disease • describe how monoclonal antibodies are produced • describe some of the ways in which monoclonal antibodies can be used • describe physical plant defence responses (including leaf cuticle, cell wall) • describe chemical plant defence responses (including antimicrobial substances) • describe different ways plant diseases can be detected and identified, in the lab and in the field. **Year 10/11** **Homeostasis - Hormonal coordination and control in humans:** • describe the principles of hormonal coordination and control by the human endocrine system • explain the roles of thyroxine and adrenaline in the body, including thyroxine as an example of a negative feedback system • describe the roles of hormones in human reproduction, including the menstrual cycle • explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle • explain the use of hormones in contraception and evaluate hormonal and nonhormonal methods of contraception • explain the use of hormones in modern reproductive technologies to treat infertility. Homeostasis in humans	knowledge, including the use of scientific nomenclature and units and mathematical representations.

• explain the importance of maintaining a constant internal environment in response to internal and external change • explain how insulin controls blood sugar levels in the body. **Previous learning from(SCE) KS3 and PE curriculum Cross curricular.** • explain how glucagon interacts with insulin to control blood sugar levels in the body • compare type 1 and type 2 diabetes and explain how they can be treated • describe the function of the skin in the control of body temperature • explain the effect on cells of osmotic changes in body fluids • describe the function of the kidneys in maintaining the water balance of the body • describe the effect of ADH on the permeability of the kidney tubules • explain the response of the body to different temperature and osmotic challenges. **Plant hormones:** • explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropism's and gravitropism's • describe some of the effects of plant hormones, relating to auxins, gibberellins and ethene • describe some of the different ways in which people use plant hormones to control plant growth. **Previous learning from(SCE) KS3** Summer Term: **Year 10/11** **Students should be able to explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants. Students should be able to:** • discuss the human and financial cost of these non-communicable diseases to an individual, a local community, a nation or globally • explain the effect of lifestyle factors including diet, alcohol and smoking on the incidence of non-communicable diseases at local, national and global levels. Treating, curing and preventing disease • explain the use of vaccines and medicines in the prevention and treatment of disease • describe the process of discovery and development of potential new medicines, including preclinical and clinical testing	

• explain how the spread of communicable diseases may be reduced or prevented in animals and plants, to include a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS. **Hormonal coordination and control in humans:** • describe the principles of hormonal coordination and control by the human endocrine system. • explain the roles of thyroxine and adrenaline in the body, including thyroxine as an example of a negative feedback system • describe the roles of hormones in human reproduction, including the menstrual cycle • explain the interactions of FSH, LH, Oestrogen and progesterone in the control of the menstrual cycle • explain the use of hormones in contraception and evaluate hormonal and nonhormonal methods of contraception • explain the use of hormones in modern reproductive technologies to treat infertility. Plant hormones • explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropism's and gravitropism's • describe some of the effects of plant hormones, relating to auxins, gibberellins and ethene • describe some of the different ways in which people use plant hormones to control plant growth. **The nervous system enables humans to react to their surroundings and to coordinate their behaviour:** The brain controls complex behaviour. It is made of billions of interconnected neurones and has different regions that carry out different functions. Students should be able to relate the structures of the eye to their functions. This includes: • accommodation to focus on near or distant objects • adaptation to dim light. **Year 10/11** **This term will have one lesson pre week as exam question paper and techniques for answering the exam questions- The deliberate practice questions are based on the exam questions they have been using for the past 2 years with me. Exam practice key notes and techniques.** **Variation and evolution:**	

• state that there is usually extensive genetic variation within a population of a species • recall that all variants arise from mutations, and that most have no effect on the phenotype, some influence phenotype and a very few determine phenotype • describe evolution as a change in the inherited characteristics of a population over time through a process of natural selection which may result in the formation of new species • explain how evolution occurs through natural selection of variants that give rise to phenotypes best suited to their environment • describe the evidence for evolution, including fossils and antibiotic resistance in bacteria • describe the impact of developments in biology on classification systems 19 • describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and explain the impact of these ideas on modern biology. **Previous learning from(SCE) KS2/3** **Inheritance, variation and evolution Reproduction:** • explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms. The genome and gene expression • describe DNA as a polymer made up of two strands forming a double helix • describe the genome as the entire genetic material of an organism • explain the following terms: gamete, chromosome, gene, allele/ variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype • describe simply how the genome, and its interaction with the environment, influence the development of the phenotype of an organism • discuss the potential importance for medicine of our increasing understanding of the human genome 18 • describe DNA as a polymer made from four different nucleotides; each nucleotide consisting of a common sugar and phosphate group with one of four different bases attached to the sugar • recall a simple description of protein synthesis • explain simply how the structure of DNA affects the proteins made in protein synthesis • describe how genetic variants may influence phenotype; in coding DNA by altering the activity of a protein • describe how genetic variants may influence phenotype in non-coding DNA by altering how genes are expressed. An ecosystem is the interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment. **Previous learning from(SCE) KS3**	

New Year 11 in 2024-2025, with the previous year 10 and year 11 working on the same curriculum to fill knowledge gaps as there has been several years where there was no Science teacher, I have had to fill knowloedge gaps. Year 11 will be displayed at the end of Summer 2 term 2025-202.6

Post 16 Group A and Group B - Kingfisher School Curriculum Offer	Post 16 Content National Curriculum Expectations
Further knowledge for retakes/ Filling learning gaps to assist in a retake or first take on the GCSE Biology (8461)	**As Ks4. Year 10 and Year 11.** **I have also included the required practical's as these questions normal have 10-15 marks in the 2 exams the students take.** **These are the high-grade scoring questions to help their understanding and progression as they are retaking the Biology 8461 at the end of the year.**

AQA Science – Biology Single (8461) - 2 exams, from a two- year course.

Intent

It is our intention to recognise the importance of science in every aspect of daily life. We give the teaching and learning of science the prominence it requires. The scientific area of learning is concerned with increasing pupils' knowledge and understanding of our world, and with developing skills associated with science as a process of enquiry. It will develop the natural curiosity of the child, encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence. We intend to build a science curriculum which develops learning and results in the acquisition of knowledge and build a science curriculum which, enables students to become enquiry-based learners.

Learners have not been able to access a full science curriculum for a variety of reasons and therefore have lost confidence within the subject and lack prior knowledge. As part of building a thorough science curriculum with the future plan for all learners to access, science, students will first complete a KS3 curriculum, which will include all three sciences, spread through the first 3 years of their learning with us. This enables learners to familiarise themself with the lab, equipment, and key vocabulary through simple investigative and evaluative many practical experiments as individuals, partners and groups.

Implementation

- A clear and comprehensive scheme of work in line with the National Curriculum where teaching and learning should show progression within the strands of KS3 science and GCSE AQA 8641 Biology Science, as they progress.
- Students have access to key subject-specific language and their meanings to understand and apply to their written, mathematical and verbal communication of their scientific skills.
- Students will use a range of resources to develop their knowledge and understanding that is integral to their learning and develop their understanding of working scientifically.
- Teaching and learning should plan for practical investigative opportunities within science lessons, including the required practical experiments.
- The required practical activities listed in the GCSE Biology specification (8461) have been written to ensure that students have the opportunity to experience all of the Apparatus and Techniques (AT) criteria required by Ofqual.
- Students will reflect on previous learning and cross-curricular links will be made wherever possible.
- Students will be able to build on prior knowledge and link ideas together, enabling them to question and become enquiry-based learners.
- Where applicable links to science will be made to develop the student's topical learning in Mathematics, English, PE, ASDAN, and Food classes.

Impact

- Students will retain knowledge that is pertinent to science, with a real-life context.
- Students will be able to question ideas and reflect on their knowledge.
- Students will work collaboratively and practically to investigate and experiment.
- Students will be able to explain the process they have taken and reason scientifically.