




Science Curriculum Map Biology

<p>Intent:</p> <ul style="list-style-type: none"> Inspire students about the world around them through a topical and challenging curriculum- give them curiosity about the world around them. Inspire a love of learning Science and aspirations to study Science at a higher level. To understand the careers that can evolve from learning different areas of Science. Support student’s emotional, social, physical, and political development. To be able to form non biased and educated discussions around development of challenging scientific technologies and ideas, within a changing world. Provide students with the knowledge and understanding to make links across subjects and contexts throughout their lives. Support students to develop empathy and understand their role and responsibility to the world around them 	<p>Intrinsic Subject Value</p> <p>Science knowledge itself. Careers, wider world, big ideas threaded through the curriculum.</p>
<p>KS2 ‘Subject’ Curriculum</p> <p>Pupils should have studied living things and their habitats, animals including humans, properties and changes of materials, earth and space, forces, evolution and inheritance, light, electricity, seasonal changes, rocks, states of matter, and sound.</p> <p>Pupils should have also been taught to plan different types of scientific enquiries to answer questions, take measurements, use a range of scientific equipment, record data and results, use test results to make predictions, report and present findings from enquires and identify scientific evidence that has been used to support or refute ideas or arguments.</p>	<p>Science themes that run through the curriculum</p> <ul style="list-style-type: none"> Careers, wider world, <ul style="list-style-type: none">  Non biased discussions around new technologies  Empathy in the world around them  Links across subjects  Fundamental building block cells linked through the curriculum <p>Disciplinary Knowledge: Scientific attitudes Experimental Skills and investigation Analysis and Evaluation Measurement</p> <p>Cells, Tissues, Organs and Systems Reproduction and Health Variation and Inheritance Life processes, Ecology and interdependence</p>

	Themes	Year 7	Year 8	Year 9

Cells, Tissues, Organs and Systems

SOL Title: Cells

Wider world and careers: Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction

Substantive Knowledge:

- All living organisms are made up of cells. Cells are the building blocks of life.
- Label parts of the microscope
- **Total magnification is calculated by multiplying eyepiece lens by objective lens magnification**
- Animal cells have an irregular shape and contain four components; nucleus, cell membrane, cytoplasm and mitochondria
- Cytoplasm-where chemical reactions take place, Cell membrane-Barrier around the cell which controls what comes in or out, Nucleus-Controls the cell and contains genetic material, Mitochondria-Respiration takes place here.
- Plant cells also contain a cell wall, a vacuole and chloroplasts
- Vacuole-Contains cell sap which keeps the cell firm, chloroplasts-photosynthesis happens here. They also contain chlorophyll which traps energy transferred from the sun, cell wall- strengthens the cell and provides support
- Specialised cells have a special shape and structure to carry out a particular job. Nerve cells carry electrical impulses around the body. Red blood cells transport oxygen around the body. Sperm cells carry male genetic material. Leaf cells found near the top of a leaf carry out photosynthesis. Root hair cells absorb water and nutrients from the soil.
 - Substances move in and out of the cells by diffusion. Diffusion is the movement of particles from a place where they are in a high concentration to a place where they are in low concentration.
 - Diffusion takes place in plant cells in the root hair cells.
 - A unicellular organism is an organism that is made up of just one cell.
 - **Bacterial structure?**
 - **An amoeba is a unicellular organism that has no fixed shape. They eat algae, bacteria and plant cells. They reproduce by binary fission.**
 - **A euglena is microscopic organism, found in fresh water. They eat bacteria and algae and reproduce by binary fission.**

Disciplinary Knowledge:

- Understanding how Robert Hooke first used a microscope to see cells
- Using a microscope to make observations of cells
- **Calculating the total magnification of different cells**
- Draw and label a plant and animal cell

Prior learning / retrieval:

- Plants are made up of different parts-including stem, leaves and flowers.

SOL Title: Structure and function of body systems

Wider world and careers: Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction, zoologist, environmental scientist

Substantive Knowledge:

- Review plant and animal cells
- Multicellular organisms are made of many cells. They are organised into layers. Cells – Tissues – Organs – Organ systems – Organisms
- Basic structure and function of digestive system (No enzymes)
- **In the small intestine, villi, help to increase the surface area and aid in absorption of nutrients**
- Keeping microbes out and the basic immune system links to bacteria and white blood cells
- Gas exchange takes place inside the lungs – oxygen is taken in and carbon dioxide is given out
- Oxygen enters through the mouth and nose. It then travels down the windpipe, through a bronchus, then a bronchiole, into an alveolus and diffuses into the blood
- The alveoli create a large surface area. They have thin walls and are only one cell thick – This means that gas exchange can occur quickly
- Exhaled air is warmer and contains more carbon dioxide and water vapour than inhaled air but less oxygen
- When you inhale, muscles between the ribs and the diaphragm contract. This increases the volume inside your chest. The pressure decreases and air is drawn into the lungs
- When you exhale muscles between your ribs and the diaphragm relax. This decreases the volume inside the chest. The pressure increase and air is forced out of your lungs
- The skeleton is made up of bones. It has four important functions – support the body, protect the organs, allow movement, and make blood.
- Red and white blood cells are produced in bone marrow found in the centre of some bones
- **Red blood cells are needed to carry oxygen around the body**
- **White blood cells are used to protect against infection**
- Joints occur where two or more bone join together
- Cartilage in joints stop bones rubbing together
- Bones are held together by ligaments. Muscles are attached to bones by tendons
- Keeping microbes out and the basic immune system
- **Antagonistic muscles are pairs of muscles that work together at a joint. When on muscle contracts, the other muscles relax.**

Disciplinary Knowledge:

- Use pie charts to explain how much of different gases are present in inhaled and exhaled air.
- Be able to measure lung volume using a plastic bottle

Body system and enzymes

Wider world and careers: Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction, zoologist, environmental scientist

Substantive Knowledge:

- Review plant and animal cells
- **Nervous system and the brain**
- **Describe the structures and functions of parts of the brain – Medulla, Cerebrum, Cerebellum**
- Review Structures and roles in the digestive system – Mouth, gullet, stomach, small intestine, large intestine, rectum, anus.
- During digestion large molecules such as lipids and proteins are broken down into small molecules. They then pass into the blood where they are used by the body
- **The small intestine has tiny structures called villi on the wall. These give it a large surface area and help it to absorb nutrients quickly.**
- **Enzymes are proteins that can break large molecules into small molecules. They are biological catalysts which means they speed up digestion without being used up**
- Carbohydrates are digested in the mouth, stomach and small intestine
- **Carbohydrase – Carbohydrates into sugar. It is found in your saliva.**
- Proteins are digested in the stomach and small intestine.
- **Protease is used to break proteins into amino acids**
- Acid in the stomach helps with digestion and kills harmful microorganisms
- Digestion of lipids takes place in the small intestine.
- **Lipase is an enzyme that breaks down lipids into fatty acids and glycerol**
- Digestion of lipids is helped by bile which is made in the liver. **Bile breaks lipids into smaller droplets which makes it easier for lipase enzymes to work on it.**
- Lock and Key model of enzyme activity – Substrate/Product/Active site
- Effect of temperature on Enzymes – Works the best at an optimum temperature. **Over this temperature it becomes denatured – shape changes – no longer fits with the substrate.**
- **Enzymes in industry**
- Give examples of how enzymes are used in industrial processes

Disciplinary Knowledge:

- Investigating enzymes pH and temperature
- Making observations and taking measurements
- Analysing data from the results of the investigation

Prior learning / retrieval:

		<ul style="list-style-type: none"> Some animals have skeletons and muscles for support, protection and movement. <p>Links to KS3 NC: Cells and organisation-</p> <ul style="list-style-type: none"> Cells as the fundamental unit of living organisms Functions of different parts of the cell Similarities and differences between plant and animal cells Role of diffusion in the movement of materials in and between cells Structural adaptations of some unicellular organisms <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>	<ul style="list-style-type: none"> Be able to describe how a bell jar can be used to model what happens during breathing <p>Prior learning / retrieval:</p> <ul style="list-style-type: none"> Identify that humans and some other animals have skeleton and muscles for support, protection and movement. All living organisms are made up of cells. Cells are the building blocks of life. Label parts of the microscope Animal cells have an irregular shape and contain four components; nucleus, cell membrane, cytoplasm and mitochondria Cytoplasm-where chemical reactions take place, Cell membrane-Barrier around the cell which controls what comes in or out, Nucleus-Controls the cell and contains genetic material, Mitochondria-Respiration takes place here. Specialised cells have a special shape and structure to carry out a particular job. Nerve cells carry electrical impulses around the body. Red blood cells transport oxygen around the body. Sperm cells carry male genetic material. Leaf cells found near the top of a leaf carry out photosynthesis. Root hair cells absorb water and nutrients from the soil. Substances move in and out of the cells by diffusion. Diffusion is the movement of particles from a place where they are in a high concentration to a place where they are in low concentration. Diffusion takes place in plant cells in the root hair cells. <p>Links to KS3 NC:</p> <ul style="list-style-type: none"> The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms The structure and functions of the gas exchange system in humans including adaptations to function The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume The structure and function of the human skeleton and muscles including the measurement of force exerted by different muscles The functions of muscles and examples of antagonistic muscles. <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>	<ul style="list-style-type: none"> All living organisms are made up of cells. Cells are the building blocks of life. Label parts of the microscope Animal cells have an irregular shape and contain four components; nucleus, cell membrane, cytoplasm and mitochondria Cytoplasm-where chemical reactions take place, Cell membrane-Barrier around the cell which controls what comes in or out, Nucleus-Controls the cell and contains genetic material, Mitochondria-Respiration takes place here. Specialised cells have a special shape and structure to carry out a particular job. Nerve cells carry electrical impulses around the body. Red blood cells transport oxygen around the body. Sperm cells carry male genetic material. Leaf cells found near the top of a leaf carry out photosynthesis. Root hair cells absorb water and nutrients from the soil. Substances move in and out of the cells by diffusion. Diffusion is the movement of particles from a place where they are in a high concentration to a place where they are in low concentration. Diffusion takes place in plant cells in the root hair cells. <p>Links to KS3 NC:</p> <ul style="list-style-type: none"> the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed calculations of energy requirements in a healthy daily diet 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) the importance of bacteria in the human digestive system <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>
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Reproduction and Health

SOL Title: Reproduction

Wider world and careers: Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction

Substantive Knowledge:

Review cells as link to specialised sperm and egg cells

- Adolescence involves both emotional and physical changes. During adolescence your body goes through physical changes called puberty
- Puberty takes place between the ages of 9-14 in most people with girls tending to start puberty before boys. Most changes take place in the reproductive system
- During puberty- Pubic hair/underarm hair growth, body smell stronger, emotional changes, growth spurt, breasts develop, ovaries release egg cells, periods start, hips widen, voice breaks, testes and penis get bigger, shoulders widen, hair grows on face and chest.
- Puberty is caused by sex hormones
- The function of the male reproductive system is to produce sperm cells and release them inside a female. The main parts of the male reproductive system are: testes, scrotum, sperm ducts, urethra, penis
- The function of the female reproductive system is to produce egg cells. The main parts of the female reproductive system are: ovaries, oviducts, uterus, cervix, vagina, urethra.
- Gametes are reproductive cells. To create a new organism, the nucleus of the sperm and the nucleus of the egg have to join together – this is fertilisation.
- **The oviduct is linked with cilia which waft the egg along the inside of the oviduct to towards the uterus.**
- During intercourse, the male releases semen into the vagina – this is ejaculation.
If a sperm cell meets an egg cell fertilisation can happen. The fertilised egg divides several times to form a ball of cells called an embryo. This attaches to the lining of the uterus and develops into a baby – implantation
- In all mammals the time in the uterus from fertilisation until birth is known as gestation. It takes around 9 months in humans
- After 8 weeks of growth the embryo is called a fetus
- There are three important structures inside the uterus; placenta, umbilical cord and fluid sac
- Around 40 weeks the baby is ready to be born, the mother's cervix relaxes and the muscles of the uterus contract. This pushes the baby out of the vagina.
- The female reproductive system works in a sequence called the menstrual cycle which lasts around 28 days.
- Pregnancy can be avoided by using contraception e.g. condoms and the contraceptive pill
- Inside the flower there are both male and female reproductive parts; The stamen is the male part and

SOL Title: Health and Lifestyle

Wider world and careers:

Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction, zoologist, environmental scientist

Substantive Knowledge:

Links cells to systems

- Nutrients are essential substances that your body needs to survive. They are carbohydrates, lipids, proteins, vitamins, minerals, water and fibre
- Food tests are used to find out which nutrients a food contains
- To remain healthy, you must eat a balanced diet. This means eating food containing the right amounts of nutrients in the right amounts.
- Energy is food is measured in joules/kilojoules
- Underweight people often lack energy and can suffer from a vitamin or mineral deficiency which can cause problems such as a poor immune system.
- Overweight people have an increased risk of heart disease, stroke, diabetes and some cancers
- A deficiency is when a person does not have enough of a certain vitamin or mineral
- Drugs are substances that alter the chemical reactions that take place inside the body.
- Medicinal drugs have health benefits
- Recreational drugs are taken for enjoyment
- If a person becomes dependent on a drug they have an addiction
- A person with an addiction can suffer from withdrawal symptoms if they stop taking the drugs.
- Alcoholic drinks contain the drug ethanol
- Ethanol is a depressant which slows down the nervous system.
- Drinking large amounts of alcohol over a long time can cause stomach ulcers, heart disease and brain and liver damage.
- A person with an alcohol addiction is called an alcoholic
- Smoking tobacco causes breathing problems, cancer, heart attacks and strokes
- Passive smoking is when you breathe in someone else's smoke which increases the risk of the non-smoker to develop respiratory and circulatory conditions
- Tobacco smoke contains nicotine. This is a stimulant which speeds up the nervous system. It is also addictive. It also contains Tar which irritates and narrows the airways. Carbon monoxide is a poisonous gas which stops the blood from carrying as much oxygen as it should.

Disciplinary Knowledge:

- Carry out food tests for starch, protein, fat and sugar in different food
- **Estimate the energy requirements of different people using data from graphs**

Links to New technologies

Links to body Systems and enzymes

		<p>includes the anther and filament. The carpel is the female part and includes the stigma, style and ovary</p> <ul style="list-style-type: none"> • Pollination occurs when pollen from the anther is transferred to the stigma. It is caused by insects or the wind. • Fertilisation in plants occurs when the nucleus of a pollen grain joins with the nucleus of the ovule. • After fertilisation the ovary develops into a fruit and the ovules become seeds. • A seed needs water, oxygen and warmth for germination (growth) • Seeds are dispersed by wind, water, animal and explosive. • Animals can disperse fruits and seed internally and externally <p>Disciplinary Knowledge:</p> <ul style="list-style-type: none"> • Carry out a flower dissection <p>Prior learning / retrieval: Pupils should be able to:</p> <ul style="list-style-type: none"> • Recall that living things produce offspring of the same kind but normally offspring vary and are not identical to their parents • Understand that animals, including humans, have offspring which grow into adults. <p>Links to KS3 NC: Reproduction –</p> <ul style="list-style-type: none"> • Reproduction in humans including structure and function of the male and female reproductive systems • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation. <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>	<p>Prior learning / retrieval: Pupils should be able to:</p> <ul style="list-style-type: none"> • Recognise the impact of diet, exercise, drugs and lifestyle on the way bodies function • Describe the simple functions of the basic parts of the digestive system in humans • Identify that animals, including humans, need the right types and amount of nutrition and nutrition comes from food eaten. <p>Links to KS3 NC: Nutrition and digestion-</p> <ul style="list-style-type: none"> • Contents of a healthy human diet • Calculations of energy requirements in a daily diet • Consequences of imbalances in the diet including obesity, starvation and deficiency diseases. • Tissues and organs of the human digestive system • Importance of bacteria in digestion <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>	
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Variation and Inheritance

SOL Title: Variation and inheritance

Big Idea:

Organisms are organised on a cellular basis and have a finite life span

Wider world and careers:

Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction, zoologist, environmental scientist, genetic councillor

Substantive Knowledge:

- Review structure of cell to understand genes and chromosomes
- Differences in characteristics within a species are known as variation
- Inherited variation comes from characteristics inherited from your parents
- Variation caused by your surroundings is called environmental variation. Many characteristics are affected by both
- Characteristics that can only have certain values show discontinuous variation
- Characteristics that can be any value within a range show continuous variation
- You inherit characteristics from your parents in your DNA.
- DNA is arranged into long strands called chromosomes. Each chromosome is divided into sections of DNA. The sections of DNA that contain the information to produce a characteristic are called genes**
- Watson, Crick, Franklin and Wilson worked together to produce a model of the structure of DNA.

Disciplinary Knowledge:

- Be able to describe the predator-prey relationship using a graph**
- Carry out investigation into the variation in arm span of humans
- Represent variation within a species using graphs**
- Explain how scientists worked together to develop the DNA model (Franklin, Wilkins, Watson and Crick)**

Prior learning / retrieval:

- Be able to notice that animals, including humans, have offspring which grows into adults
- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- 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

Links to KS3 NC:

New technology

Organisms are organised on a cellular basis and have a finite life span

Wider world and careers:

Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction, zoologist, environmental scientist, genetic councillor, pathology

Substantive Knowledge:

- Review structure of cell to understand genes and chromosomes
- Review the Structure of bacteria**
- Genetics
- Know what is meant by the term allele
- Know how to predict the characteristics of an organism using a Punnett square
- Know how to perform agentic cross
- Make predictions about genetic disorders, cystic fibrosis and polydactyly
- Know what the role of a genetic councillor is
- Understand what selective breeding is and how it is used technology
- Understand how the process of selective breeding is carried out
- Give the advantages and disadvantages of genetic selective breeding
- Give the advantages and disadvantages of genetic engineering
- Genetic engineering and a simple description of what the process involves
- Cloning and examples of plant and animal cloning
- Explain why Scientists clone organisms
- Advantages and disadvantages of cloning organisms
- Biotechnology, what this process is
- Links to fermentation and give examples where this is carried out
- Describe the word equation for fermentation
- Describe how cheese and yoghurt is made
- DNA fingerprinting and forensic Science
- Explain how DNA fingerprinting is carried out
- Identify suspects from DNA fingerprints
- Describe other uses for DNA finger printing as a technology
- Using blood typing for forensic Science
- Describe the parts that make up the blood
- Describe the ways that the time of death can be identified using temperature, appearance of the body and the insects found in the body
- Understanding the work of a pathologist
- Explain how a pathologist carries out their role
- Explain hoe dental records help to identify a body
- Explain how using bite marks can help solve a violent crime



Disciplinary Knowledge:

- Understand how the process of selective breeding is carried out

			<ul style="list-style-type: none"> • Heredity as the processes by which genetic information is transmitted from one generation to the next • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model • Differences between species • The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • The variation between species and between individuals of the same species • The importance of maintaining biodiversity and the use of gene banks to preserve heredity material <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>	<ul style="list-style-type: none"> • Be able to explain the basic method of how to genetically engineer bacteria <p>Prior learning / retrieval:</p> <ul style="list-style-type: none"> • Structure of eukaryotic cells and prokaryotic cells • Know the fermentation and respiration chemical reactions and word and symbol equations • You inherit characteristics from your parents in your DNA. • DNA is arranged into long strands called chromosomes. Each chromosome is divided into sections of DNA. The sections of DNA that contain the information to produce a characteristic are called genes • Watson, Crick, Franklin and Wilson worked together to produce a model of the structure of DNA. • Be able to notice that animals, including humans, have offspring which grows into adults <p>Links to KS3 NC:</p> <ul style="list-style-type: none"> • Heredity as the processes by which genetic information is transmitted from one generation to the next • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model • Differences between species • The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • The variation between species and between individuals of the same species <p>The importance of maintaining biodiversity and the use of gene banks to preserve heredity material</p> <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Use of key terminology: DNA, Selective breeding, Genetic Engineering, DNA, phenotype, genotype, gene, allele, cloning, tissue culture,</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>
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DNA and Evolution

Substantive Knowledge:

- Be able to show understanding of the DNA Structure
- Explain how Watson and Crick worked collaboratively to build a model of the structure of DNA
- Explain the importance of the human genome project
- Natural Selection and Evolution
- Explain the role of the fossil record as evidence for natural selection
- Give examples of how animals evolve such as the peppered moth
- Charles Darwin and the theory of Natural Selection
- Explain how Darwin came up with the Theory for Evolution
- Use examples of evidence such as Darwin's Finches
- Explain how Scientists work collaboratively using peer review
- Explain other pieces of evidence as to why the theory of Natural Selection is now widely accepted
- Discuss the importance of Alfred Wallace in the process of Natural Selection
- Extinction and conservation  
- Explain what is meant by an endangered species
- Discuss the different methods of conservation used in sustainable development
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Disciplinary Knowledge:

- Explain the role of the fossil record as evidence for natural selection
- Discuss the observations that Darwin made and observe what he concluded from his observations
- Explain other pieces of evidence as to why the theory of Natural Selection is now widely accepted
- Discuss the importance of Alfred Wallace in the process of Natural Selection
- Explain how Watson and Crick worked collaboratively to build a model of the structure of DNA

Prior learning / retrieval:

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- Recognise that living things produce offspring of the same kind but normally offspring vary and are not identical to their parents

				<ul style="list-style-type: none">• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution <p>Links to KS3 NC:</p> <ul style="list-style-type: none">• Heredity as the processes by which genetic information is transmitted from one generation to the next• A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model• Differences between species• The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation• The variation between species and between individuals of the same species <p>The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material</p> <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Use of key terminology: DNA, bases, adenine, Thymine, Cytosine, Guanine, sugar phosphate backbone, Darwin, Wallace, fossil Record, endangered species, Natural Selection,</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>
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	Themes	Year 7	Year 8	Year 9
	<p>Life processes, Ecology and interdependence</p>	<p><u>SOL Title: Ecosystems</u></p> <p>Big Idea: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms</p> <p><u>Wider world and careers:</u> <i>Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction, zoologist, environmental scientist</i></p> <p>Substantive Knowledge:</p> <ul style="list-style-type: none"> • MRS GREN • Recalling plant and animal cells and where photosynthesis takes place • Plants and algae are producers – they make their own food by photosynthesis • Photosynthesis: carbon dioxide + water = glucose + oxygen • Animals compete for food, water, mates and space. Plants compete for light, water, space and minerals • Adaptations are characteristics that help an organism to survive and reproduce. • Predator and prey species are interdependent – a change in the population of one animal directly affects the population of the other • Food chains show the transfer of energy between organism. A food web is a set of linked food chains. • Toxic chemicals can build up in organisms in a food chain until they reach harmful levels. This is called bioaccumulation • Interdependence is the way in which organisms depend on each other to survive, grow and reproduce • Organisms can co-exist within a habitat as they each have a different niche <p>Disciplinary Knowledge:</p> <ul style="list-style-type: none"> • <p>Prior learning / retrieval:</p> <ul style="list-style-type: none"> • Describe how plants need water, light and a suitable temperature to grow and stay healthy • Identify the functions of different parts of flowering plants; roots, stem/trunk, leaves and flowers • Understand how water is transported within plants <p>Links to KS3 NC:</p> <ul style="list-style-type: none"> • The reactants in and products of; photosynthesis and a word summary for photosynthesis • Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life • A word summary for aerobic respiration 		<p><u>SOL Life processes</u></p> <p><u>Wider world and careers:</u> <i>Careers in microbiology, cancer research scientists, doctors, nurses, corona virus, lifesaving medicines, understanding diseases, personalising medicines, immunity against disease, growing organs, reproduction, zoologist, environmental scientist</i></p> <p>Substantive Knowledge Respiratory system overview and cardiovascular system overview</p> <ul style="list-style-type: none"> • Review plant and animal cells structure • Review the structure of the lungs and breathing • All cells inside your body need glucose and oxygen for respiration. During respiration energy is transferred. Glucose and oxygen are carried around the body in blood and passed to the cells that need them. • To transfer energy from glucose, aerobic respiration takes place inside mitochondria • Aerobic respiration glucose + oxygen = carbon dioxide + water (+energy) • If no oxygen is present, energy can be transferred from glucose using anaerobic respiration • Anaerobic respiration: glucose = lactic acid (+energy) • Fermentation is a type of anaerobic respiration performed by microorganisms. It is used in bread and beer making. This unit must go before new technologies • Fermentation: glucose = ethanol + carbon dioxide (+energy) • Photosynthesis takes place in chloroplasts. • Leaf Structure • Chloroplasts contain chlorophyll which traps the light needed for photosynthesis • Stomata allow gases to enter and leave a leaf. Guard cells open the stomata during the day and close them at night • Plants need minerals for healthy growth. For example, nitrates are needed to make amino acids. Amino acids join together to form proteins, which are used for growth • Explain what is meant by Chemosynthesis <p>Disciplinary Knowledge:</p> <ul style="list-style-type: none"> • Investigating the starch in a leaf and the effect of light, dark and Chlorophyll • Investigate the factors that affect the growth of yeast • Observe the stomata from clear nail varnish • Investigate the factors that affect the rate of respiration • Investigate the factors that affect the body when exercise is undertaken <p>Prior learning / retrieval:</p> <ul style="list-style-type: none"> • Describe how plants need water, light and a suitable temperature to grow and stay healthy

		<ul style="list-style-type: none"> • The process of anaerobic respiration in humans and micro-organisms, including fermentation and a word summary for anaerobic respiration • The differences between aerobic respiration in terms of the reactants, the products formed and the implications for the organism <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Summative assessment: Short Answer recall question assessment End of term assessment</p>		<ul style="list-style-type: none"> • Identify the functions of different parts of flowering plants; roots, stem/trunk, leaves and flowers <p>Understand how water is transported within plants</p> <ul style="list-style-type: none"> • Recalling plant and animal cells and where photosynthesis takes place • Plants and algae are producers – they make their own food by photosynthesis • Photosynthesis: carbon dioxide + water = glucose + oxygen <p>Links to KS3 NC:</p> <ul style="list-style-type: none"> • The reactants in and products of; photosynthesis and a word summary for photosynthesis • Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life • A word summary for aerobic respiration • The process of anaerobic respiration in humans and micro-organisms, including fermentation and a word summary for anaerobic respiration • The differences between aerobic respiration in terms of the reactants, the products formed and the implications for the organism <p>Disciplinary literacy: Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Use of Key Terminology: Respiration, Photosynthesis, phloem, xylem, stomata, chloroplasts, palisade layer, spongy layer, Chemosynthesis</p>
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