Long Term Plan
GCSE Science- Biology

Year 1

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
GCSE Unit	Biology 1 – Cell Biology	Biology 1- Organisation	Biology 1- Infection and Response (Part 1)	Biology 1- Infection and Response (Part 2)	Biology 1- Bioenergetics	Biology 2- Homeostasis and Response (Part 1)
GCSE Topics	B1	B2	B3	B3	B4	B5
Retrieval	KS3 Cells	B1	B1, B2	B1, B2	B1, B2, B3	B1, B2, B3, B4
Knowledge and Learning	**Cell Biology** Cells are the basic unit of all forms of life. In this section we explore how structural differences between types of cells enables them to perform specific functions within the organism. For an organism to grow, cells must divide by mitosis producing two new identical cells. Stem cell technology is a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells.	**Organisation** In this section we will learn about the human digestive system which provides the body with nutrients and the respiratory system that provides it with oxygen and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system. 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.	**Infection and Response** This section will explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced using vaccination. Since the 1940s a range of antibiotics have been developed which have proved successful against several lethal diseases caused by bacteria.	**Infection and Response** This section will explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced using vaccination. Since the 1940s a range of antibiotics have been developed which have proved successful against several lethal diseases caused by bacteria.	**Bioenergetics** This section explores how plants harness the Sun's energy in photosynthesis to make food. This process releases oxygen which has built up over millions of years in Earth's atmosphere. Both animals and plants use this oxygen to oxidise food in aerobic respiration, transferring the energy organisms need to function. In contrast, anaerobic respiration does not require oxygen. During vigorous exercise, the human body cannot supply cells with sufficient oxygen and switches to anaerobic respiration, supplying energy but causing lactic acid build-up in muscles, leading to fatigue.	**Homeostasis and Response** Cells in the body can only survive within narrow physical and chemical limits. Pupils will explore how they require a constant temperature and pH, as well as a constant supply of dissolved food and water. They will learn about control systems and what these consist of. We will explore the structure and function of the nervous system and how it brings about fast responses. We will also explore the hormonal system, which usually brings about slower changes and plays a role in reproduction, including how scientists have developed contraceptive drugs and drugs to increase fertility.

Long Term Plan
GCSE Science- Biology

Enrichment/ Experiences	Light microscopy of animal and plant cells Preparing onion epidermis slides Measuring cell size using magnification calculations Osmosis investigation with potato cylinders Diffusion modelling with gels/food dye Mitosis modelling with beads or diagrams	Digestive system simulation Effect of pH/temperature investigation Heart or lung dissection (or virtual dissection) Testing for sugars, starch, protein, lipids Pulse rate or breathing rate investigation Water transport in plants (celery xylem dye experiment)	Microbe transmission simulation using UV gel/fluorescent powder. Modelling immune response. Disease transmission simulation. Investigating handwashing effectiveness. Comparing viral, bacterial, fungal and protist diseases with case studies.	Antibiotic inhibition simulation (paper discs & safe indicators) Modelling antibiotic resistance (selection pressure activity) Drug development and clinical trials simulation Plant disease identification (TMV, rose black spot, nutrient deficiency cards)	Photosynthesis rate investigation (light intensity & pondweed) Chromatography of leaf pigments Measuring energy content in food (calorimetry) Greenhouse simulation (modelling limiting factors) Aerobic vs anaerobic respiration demonstration (yeast CO_2 production)	Reaction time investigation (ruler drop or digital app) Nervous system pathway modelling Structure of the brain & neurones (diagram-based practical) Effect of exercise on heart rate Temperature regulation exploration using warm/cool objects.
Cross-curricular	Maths: Standard form, orders of magnitude, magnification formula. Art: Accurate scientific drawing of cells. PSHE: Stem cell ethics debate. PE: cell respiration and energy transfer.	Food Tech: macronutrients, digestion, enzyme application. Maths: Rate calculations Geography: plant adaptations in different climates. PE: impact of exercise on circulatory and respiratory system.	History**:** Spanish flu, cholera, Black Death. Maths**:** Interpreting graphs of infection rates. Geography**:** global incidence of diseases. English**:** writing public health information leaflets.	PSHE**:** sexual health (prevention), clinical trials, placebos. History**:** Alexander Fleming and Penicillin discovery. Maths**:** probability, reading bar charts and scatter graphs.	Maths**:** interpreting rate graphs, inverse square law (higher tier). Geography: climate and plant growth.	Maths**:** calculating mean reaction time & range (spec page 15). PE**:** link between training, fatigue, coordination. PSHE**:** fertility treatments, contraception ethics.
Curriculum End Point / Goal	Pupils will demonstrate their **Subject Knowledge**, their **Working Scientifically skills** and apply **Maths in Science** through regular topic tests, exam question revision and ultimately in the completion of 2 exams: **Biology 1, Biology 2.**					

Long Term Plan
GCSE Science- Biology

Year 2

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
GCSE Unit	Biology 2- Homeostasis and Response (Part 2)	Biology 2- Inheritance and Evolution (Part 1)	Biology 2- Inheritance and Evolution (Part 2)	Biology 2- Ecology	Revision	
GCSE Topics	B5	B6	B6	B7		
Retrieval	B1, B2, B3, B4	B1, B2, B3, B4, B5	B1, B2, B3, B4, B5	B1, B2, B3, B4, B5, B6		
Knowledge and Learning	**Homeostasis and Response** Cells in the body can only survive within narrow physical and chemical limits. Pupils will explore how they require a constant temperature and pH as well as a constant supply of dissolved food and water. They will learn about control systems and what these control systems consist of. We will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes and how it plays a role in reproduction, including how scientists have developed contraceptive drugs and	**Inheritance, Variation and Evolution** In this section we will discover how the process of meiosis and how it leads to the production of unique offspring. Pupils will learn about genetic mutation and how it can be harmful or helpful. They will explore variation generated by mutations and sexual reproduction and how this is the basis for natural selection. This will lead to gaining an understanding of the process of selective breeding, leading on to further advancements of cloning and genetic engineering. Pupils will look at the controversy and ethical issues surrounding these advances.	**Inheritance, Variation and Evolution** In this section we will discover how the process of meiosis and how it leads to the production of unique offspring. Pupils will learn about genetic mutation and how it can be harmful or helpful. They will explore variation generated by mutations and sexual reproduction and how this is the basis for natural selection. This will lead to gaining an understanding of the process of selective breeding, leading on to further advancements of cloning and genetic engineering. Pupils will look at the controversy and ethical issues surrounding these advances.	**Ecology** Pupils will explore how carbon and water are constantly being recycled before looking into ecosystems and how species interact before looking at how species are adapted to both biotic and abiotic conditions. Pupils will explore how humans need to engage with the environment in a sustainable way how humans are threatening biodiversity as well as the natural systems that support it. We will also consider some actions we need to take to ensure our future health, prosperity, and well-being.		

Long Term Plan
GCSE Science- Biology

	drugs to increase fertility.					
Enrichment/ Experiences	Blood glucose regulation modelling activity Investigating hormonal responses (case studies of endocrine glands) Reflex arc practical demonstration Fertility treatment decision-making activity Homeostatic control feedback-loop modelling	DNA extraction from fruit Building DNA models Punnett square and inheritance case studies Meiosis modelling with beads and paper chromosomes Investigating variation within a population	Natural selection simulation Camouflage and predator-prey simulation Fossil formation demonstration Selective breeding comparison activity Evolution timeline construction	Quadrant sampling and biodiversity calculations Food web construction using species cards Water cycle and carbon cycle modelling Local habitat survey Decomposition investigation		
Cross-curricular	Maths: graphing blood glucose levels. Food Tech: diet and diabetes. PSHE: hormones, puberty, fertility.	Maths: probability. English: ethical debate. History: Darwin, Alfred Wallace. Art: drawing of evolutionary trees	Geography: environmental variation History: fossil discoveries timeline PSHE: genetic engineering discussion	Geography: biomes, climate and sustainability. Maths: sampling, mean. PSHE: sustainability and human impact.		
Curriculum End Point / Goal	Pupils will demonstrate their **Subject Knowledge**, their **Working Scientifically skills** and apply **Maths in Science** through regular topic tests, exam question revision and ultimately in the completion of 2 exams: **Biology 1, Biology 2.**					