Croxley Danes School : Key Stage 4 Curriculum Map

Subject: Biology **Exam Board: AQA**

Key Concepts

Cells	Organisation	Infection and Response	Bioenergetics	Homeostasis	Inheritance and Evolution	Ecology
• Structure of animal, plant, bacterial, and fungal cells • Cell specialisation and differentiation • Microscopy techniques • Cell division: mitosis and the cell cycle • Stem cells and their uses • Transport in cells: diffusion, osmosis, active transport	• Cell organisation • The digestive system • Enzymes • Food tests • The gas exchange system • The circulatory system - the heart, blood vessels and blood • Non-communicable diseases - CHD, cancer • Plant cell organisation • Transpiration and stomata • Translocation	• Communicable diseases • Viral and fungal diseases • Bacterial and protist diseases • Fighting infection - body defences • Vaccination • Antibiotics and painkillers • Developing drugs • Monoclonal antibodies (biology-only) • Plant diseases (biology-only)	• Photosynthesis: equation, factors affecting rate, required practicals • Uses of glucose from photosynthesis • Respiration: aerobic vs anaerobic • Effects of exercise on the body • Metabolism	• Principles of homeostasis • The human nervous system: structure, reflexes • The brain and the eye (biology-only) • Hormonal coordination: endocrine system, negative feedback • Controlling blood glucose (insulin, glucagon, diabetes) • Hormones in reproduction, fertility treatments (IVF) • Plant hormones: auxins, uses in	• Sexual and asexual reproduction • Meiosis • DNA, genome, and protein synthesis basics • Inherited disorders: cystic fibrosis, polydactyly • Genetic crosses and family trees • Variation and evolution by natural selection • Selective breeding and genetic engineering • Cloning (biology-only) • Extinction and the development of new species	• Levels of organisation in an ecosystem • Adaptations of organisms • Sampling techniques and required practicals • Biotic and abiotic factors • Food chains, trophic levels, biomass pyramids • The carbon cycle and water cycle • Biodiversity and human impact (pollution, deforestation, global warming) • Waste management and maintaining biodiversity

				agriculture (biology-only)		

What is the Croxley vision for this subject at Key Stage 4?

Our vision for GCSE Biology is to **inspire curiosity** and a **deep understanding of the living world**. Through **engaging lessons** and **practical investigations**, students will explore key biological concepts, **develop scientific thinking**, and appreciate the **relevance of biology to health, the environment, and modern life**. We aim to equip all learners with the knowledge and skills to succeed and to see the value of biology in shaping our future. Ultimately, we aim to empower every student to succeed in biology, whether they pursue further study or simply gain a deeper respect for the complex and interconnected living systems that shape our world

Key Stage 4 / Year Group: 9

	Spring Term 1	**Spring Term 2**	**Summer Term**
key concept	How do the **structures** of different **cells** enable them to carry out their **specific functions** and **contribute to life processes**?	How do the **structures** of different **cells** enable them to carry out their **specific functions** and **contribute to life processes**?	*SCIENCE FAIR - ACROSS BIOLOGY/CHEM/PHYSICS*
Content: (Know what…)	**CELLS PART 1** · Use the terms 'eukaryotic' and 'prokaryotic' to describe types of cells · Describe the features of bacterial	**CELLS PART 2** · Describe the processes that happen during the cell cycle, including mitosis (inc recognise and describe where mitosis occurs)	

	(prokaryotic) cells · Demonstrate an understanding of the scale and size of cells and be able to make order of magnitude calculations, inc standard form · Recall the structures found in animal and plant (eukaryotic) cells inc algal cells · Use estimations and explain when they should be used to judge the relative size or area of sub-cellular structures · Required practical 1: use a light microscope to observe, draw and label a selection of plant and animal cells · Describe the functions of the structures in animal and plant (eukaryotic) cells · Describe what a specialised cell is, including examples for plants and animals · Describe what differentiation is, including differences between animals and plants · Define the terms magnification and resolution · Compare electron and light microscopes in terms of their	· Describe stem cells, including sources of stem cells in plants and animals and their roles · Describe the use of stem cells in the production of plant clones and therapeutic cloning · Discuss the potential risks, benefits and issues with using stem cells in medical research/treatments (inc diabetes and paralysis) · Describe the process of diffusion, including examples · Explain how diffusion is affected by different factors · Define and explain "surface area to volume ratio", and how this relates to single-celled and multicellular organisms (inc calculations) · Explain how the effectiveness of an exchange surface can be increased, inc examples of adaptations for small intestines, lungs, gills roots & leaves · Describe the process of osmosis (inc calculation of water uptake & percentage gain and loss of mass of plant tissue) · Required practical 3: investigate the effect of a range of concentrations of salt or sugar solutions on the mass of	

	magnification and resolution · Carry out calculations involving magnification using the formula: magnification = size of image/ size of real object -inc standard form · Bio ONLY: Describe how bacteria reproduce and the conditions required · Bio ONLY: Describe how to prepare an uncontaminated culture · Bio ONLY: Calculate cross-sectional areas of colonies or clear areas around colonies using πr^2 · Bio ONLY: Calculate the number of bacteria in a population after a certain time if given the mean division time · Bio & HT ONLY: Express answers for last two points in standard form · Required practical 2: investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition · Describe how genetic information is stored in the nucleus of a cell (inc genes & chromosomes)	plant tissue · Describe the process of active transport, including examples - gut and roots · Explain the differences between diffusion, osmosis and active transport	

Skills: (know how…)	Interpreting images of cells and organelles Understanding and applying models (e.g., cell membranes) **Required practical 1: Microscopy** Skill Focus: ● Use of a light microscope with correct technique (focusing, slide prep) ● Calculating magnification ● Drawing and labelling biological specimens ● Use of a scale bar ● Handling biological samples safely	**Required practical 2. Osmosis** (Potato practical) Skill Focus: ● Identifying independent, dependent, and control variables ● Recording mass/length accurately ● Calculating percentage change ● Plotting and interpreting graphs ● Explaining osmosis in terms of water potential	
Key vocabulary (5- 10 words)	**cell membrane, nucleus, cytoplasm, mitochondria, ribosome, cell wall, chloroplast, permanent vacuole, prokaryotic, eukaryotic, , microscope, resolution, magnification**	**diffusion, osmosis, active transport, concentration, gradient, mitosis, stem cells,**	
End of Half term assessment	Term darts with AP1 assessment (2 x 40 min tests) + RIT	End of topic test (30 minutes) + RIT task AP2 assessment (2x 40 minutes tests) + RIT task	
Planned trips / Clubs / links	Science drop-in clinic every Thursday lunchtime	Science drop-in clinic every Thursday lunchtime	

Key Stage 4 /	**Year Group: 10**		
	Autumn Term 1	**Autumn Term 2**	**Spring Term 1**

key concept	How are **multicellular organisms** structured to ensure the efficient transport and coordination of substances and systems?	How are **multicellular organisms** structured to ensure the efficient transport and coordination of substances and systems?	How does the body defend itself against pathogens, and how can science help prevent and treat infectious diseases?
Content: (Know what…)	**ORGANISATION PART 1** • Describe the levels of organisation within living organisms • Describe the digestive system and how it works as an organ system (from KS3) • Describe basic features of enzymes (inc rate calculations for chemical reactions) • Describe the lock and key theory as a model of enzyme action and explain how the shape a of the active sites makes the enzyme specific • Explain the effect of temperature and pH on enzymes • Describe the digestive enzymes, including their names, sites of production and actions • Describe how the products of digestion are used	**ORGANISATION PART 2** • Describe what happens in coronary heart disease and what statins are used for • Describe and evaluate treatments for coronary heart disease and heart failure (inc drugs, mechanical devices or transplant) • Recall that heart valves can become faulty and describe the consequences of this • Describe how patients can be treated in the case of heart failure • Describe health and the explain causes of ill-health and the relationship between health and disease • Describe how different types of diseases may interact and translate disease incidence information between graphical and numerical forms • Describe what risk factors are and give	**INFECTION AND RESPONSE** • Explain what a pathogen is and how pathogens are spread (Inc. how viruses, bacteria, protists and fungi are spread in animals and plants) • Explain how pathogenic bacteria and viruses cause damage in the body • Explain how the spread of diseases can be reduced or prevented • Describe measles, HIV and tobacco mosaic virus as examples of viral pathogens • Describe salmonella food poisoning and gonorrhoea as examples of bacterial pathogens • Describe the signs, transmission and treatment of rose black spot infection in plants as an example of fungal pathogens • Describe the symptoms, transmission and control of malaria, including knowledge of the mosquito vector as an example of a protists pathogen

	• Describe the features and functions of bile and state where it is produced and released from • Required practical 4: use qualitative reagents to test for a range of carbohydrates, lipids and proteins • Required practical 5: investigate the effect of pH on the rate of reaction of amylase enzyme • Describe the structure of the human heart and lungs (inc how lungs are adapted for gaseous exchange) • Explain how the heart moves blood around the body (inc role and position of the aorta, vena cava, pulmonary artery & vein and coronary arteries) • Explain how the natural resting heart rate is controlled and how irregularities can be corrected • Describe the structure and function of arteries, veins and capillaries • Use simple compound measures such as rate and carry out rate calculations for blood flow • Describe blood and identify its different components, inc identifying blood cells from	examples discussing human and financial costs of non-communicable diseases at local, national and global levels • Describe what cancer is and explain the difference between benign and malignant tumours • Describe the known risk factors for cancer, including genetic and lifestyle risk factors • Describe plant tissues (epidermal, palisade mesophyll, spongy mesophyll, xylem, phloem and meristem) and describe their functions • Explain how the structure of plant tissues are related to their function within the leaf (plant organ) inc stomata and guard cells • Recall the plant parts that form a plant organ system that transports substances around the plant • Explain how root hair cells, xylem and phloem are adapted to their functions • Describe the process of transpiration and translocation including the role of the different plant tissues • Explain how the rate of transpiration can be affected by different factors (inc naming the factors)	• Describe defences that stop pathogens entering the human body (inc skin, nose, trachea & windpipe, stomach) • Recall the role of the immune system • Describe how white blood cells destroy pathogens • Describe how vaccination works, including at the population level • Explain how antibiotics and painkillers are used to treat diseases, including their limitations • Describe how sources for drugs have changed over time and give some examples • Describe how new drugs are tested, including pre-clinical testing and clinical trials (inc double blind trials and placebos) • Bio & HT ONLY: Describe what monoclonal antibodies are and why they are useful • Bio & HT ONLY: Describe how monoclonal antibodies are produced • Bio & HT ONLY: Explain how monoclonal antibodies are used for diagnosis, research, chemical testing and disease treatments • Bio & HT ONLY: Evaluate the advantages and disadvantages of monoclonal antibodies (inc side effects) • Bio & HT ONLY: Describe some observable

	photographs/diagrams ● Describe the functions of blood components, including adaptations to function	● Describe the role of stomata and guard cells in the control of gas exchange and water loss	signs of plant disease, and how plant diseases can be identified ● Bio ONLY: Give examples of plant pathogens ● Bio ONLY: Give examples of plant ion deficiencies and their effects ● Bio ONLY: Describe physical, chemical and mechanical defence responses of plants
Skills: (know how…)	Interpreting flow diagrams (e.g. blood circulation) **Required practical 3. Enzymes** (e.g., effect of pH on amylase) Skill Focus: ● Measuring temperature and time accurately ● Controlling variables (e.g. temperature, enzyme concentration) ● Identifying optimum pH ● Interpreting colour change as reaction progresses ● Evaluating method and sources of error **Required practical 4. Food Tests** (Benedict's, Biuret, Iodine) Skill Focus: ● Following multiple test procedures methodically	Analysing lifestyle data (e.g. health and heart disease risk) Interpreting correlation vs causation (e.g. lifestyle and heart disease) Evaluating the effect of lifestyle choices using data (e.g., obesity, smoking, alcohol) Doing biological drawings of stomata and guard cells	Evaluating the effectiveness of drugs and vaccines Understanding experimental design (e.g. placebo and double-blind trials) Interpreting data on disease transmission and immunity Risk analysis (e.g. antibiotic resistance, side effects of treatments) **Required practical 10. Culturing Microorganisms** (Effect of antibiotics/disinfectants) (Biology only) Skill Focus: ● Aseptic technique and safety (Bunsen burner, sterilisation) ● Measuring inhibition zone diameter ● Calculating area of inhibition zone (πr^2) ● Comparing effectiveness of antimicrobial agents ● Recognising and controlling contamination risks

	• Identifying food groups by colour change • Using appropriate lab safety techniques (e.g., heating) • Recording and interpreting qualitative data		
Key vocabulary (5- 10 words)	**tissue, organ, enzyme, substrate, active site, amylase, protease, lipase, bile, digestive system, circulatory system, heart, ventricle, atrium, pacemaker, valves, blood, plasma, vein, capillary, alveoli, bronchus, trachea, bronchiole**	**statins, stent, coronary artery, risk factor, communicable, non-communicable, xylem, phloem, palisade mesophyll, spongy mesophyll, stomata, guard cells, waxy cuticle, transpiration, translocation**	**pathogen, bacteria, virus, fungi, protist, immune system, antibody, antigen, vaccination, antibiotic, painkiller, drug trial, placebo, monoclonal antibody, hybridoma**
End of Half term assessment		End of topic test (30 minutes) + RIT task AP1 assessment (40 minutes test) + RIT task	End of topic test (30 minutes) + RIT task
Planned trips / Clubs / links	Science drop-in clinic every Thursday lunchtime	Science drop-in clinic every Thursday lunchtime	Science drop-in clinic every Thursday lunchtime
Key Stage 4 / **Year Group: 10**			
	Spring 2	**Summer 1**	**Summer 2**
Key Concept	How do organisms **transfer energy** to fuel life processes such as **respiration** and **photosynthesis**?	How do organisms **interact** with **each other** and **their environment**, and how do these interactions shape **ecosystems**?	How do organisms **interact** with **each other** and **their environment**, and how do these interactions shape **ecosystems**?

Content: (Know what…)	**BIOENERGETICS** • Describe what happens in photosynthesis, including using a word equation and recognise the chemical formulas for carbon dioxide, water, oxygen & glucose • Explain why photosynthesis is an endothermic reaction • Recall the limiting factors of photosynthesis • Explain how limiting factors affect the rate of photosynthesis, including graphical interpretation (limited to one factor) • HT ONLY: Explain how the limiting factors of photosynthesis interact, inc graphical interpretation (two/three factors) • HT ONLY: Explain how limiting factors are important to the economics of greenhouses, including data interpretation • HT ONLY: Explain and use inverse proportion in the context of photosynthesis • Required practical 6: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as	**ECOLOGY PART 1** • Recall what an ecosystem is • Describe which resources animals and plants compete for, and why they do this • Explain the terms 'interdependence' and 'stable community' • Name some abiotic and biotic factors that affect communities • Explain how a change in an abiotic or biotic factor might affect a community • Describe structural, behavioural and functional adaptations of organisms • Describe what an extremophile is • Represent the feeding relationships within a community using a food chain and describe these relationships • Explain how and why ecologists use quadrats and transects • Describe and interpret predator-prey cycles • Required practical 9: measure the population size of a common species in a habitat. Use sampling to investigate the effect of one factor on distribution	**ECOLOGY PART 2** • Describe what biodiversity is, why it is important, and how human activities affect it • Describe the impact of human population growth and increased living standards on resource use and waste production • Explain how pollution can occur, and the impacts of pollution • Describe how humans reduce the amount of land available for other animals and plants • Explain the consequences of peat bog destruction • Describe what deforestation is and why it has occurred in tropical areas • Explain the consequences of deforestation • Describe how the composition of the atmosphere is changing, and the impact of this on global warming • Describe some biological consequences of global warming • Describe both positive and negative human interactions in an ecosystem and explain their impact on biodiversity • Describe programmes that aim to reduce the negative effects of humans on

	pondweed • Describe how the glucose produced in photosynthesis is used by plants • Describe what happens in respiration including using a word equation and recognise the chemical formulas for carbon dioxide, water, oxygen & glucose • Describe aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred • Recognise the equations for aerobic respiration, anaerobic respiration in muscles and anaerobic respiration in plants and yeast cells. • Recall what type of respiration fermentation is and its economic importance. • Describe what happens to heart rate, breathing rate and breath volume during exercise and why these changes occur • Explain what happens when muscles do not have enough oxygen and define the term oxygen debt	• Describe the processes involved in the carbon cycle • Describe the processes involved in the water cycle • Bio ONLY: Explain how temperature, water and availability of oxygen affect the rate of decay of biological material • Bio ONLY: Explain how the conditions for decay are optimised by farmers and gardeners, and the reasons for this • Bio ONLY: Describe how methane gas can be produced from decaying materials for use as a fuel • Bio ONLY: Required practical 10: investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change • Bio ONLY: Explain how environmental changes can affect the distribution of species in an ecosystem (temperature, water and atmospheric gases)	ecosystems and biodiversity • Bio ONLY: Describe the different trophic levels and use numbers and names to represent them • Bio ONLY: Describe what decomposers are and what they do • Bio ONLY: Construct pyramids of biomass accurately from data and explain what they represent • Bio ONLY: State how much energy producers absorb from the Sun and how much biomass is transferred • Bio ONLY: Explain how biomass is lost between trophic levels, including the consequences of this and calculate efficiency between trophic levels • Bio ONLY: Explain the term 'food security' and describe biological factors that threaten it • Bio ONLY: Explain how the efficiency of food production can be improved • Bio ONLY: Explain the term 'factory farming', including examples, and ethical objections • Bio ONLY: Explain the importance of maintaining fish stocks at a level where breeding continues • Bio ONLY: Explain some methods that can help to conserve fish stocks

	• HT ONLY: Explain what happens to accumulated lactic acid in the body • Explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids • Explain what metabolism is, including examples		• Bio ONLY: Describe how modern biotechnology is used in food production, including the fungus Fusarium as an example • Bio ONLY: Describe the uses of genetically modified organisms in insulin and food production
Skills: (Know how…)	**Required practical 5. Photosynthesis** (Light and pondweed) Skill Focus: • Measuring rate using bubble count or volume of gas over time • Controlling variables (light intensity, temperature, CO_2) • Using light distance in inverse square law (H tier) • Graphing and interpreting trends • Linking results to biological theory of photosynthesis	**Required practical 9. Decay** (Effect of temperature on milk decay) **(Biology only)** Skill Focus: • Measuring temperature and pH accurately • Controlling variables • Understanding decay in terms of enzymes and bacteria • Interpreting rate of decay • Identifying practical limitations	**Required practical 8. Field Investigation** (Quadrats + Transects) Skill Focus: • Random sampling using quadrats • Systematic sampling with transects • Calculating mean, mode, % cover, area • Recognising biotic/abiotic factors • Analysing distribution patterns (e.g., zonation)
Key vocabulary (5- 10 words)	**photosynthesis, chlorophyll, light intensity, carbon dioxide, temperature, limiting factor, glucose, starch, respiration, aerobic, anaerobic, lactic acid, oxygen debt, metabolism**	**ecosystem, habitat, population, community, biodiversity, producer, consumer, decomposer, predator, prey,**	**quadrat, transect, random, representative, pollution, global warming, deforestation, peat bogs**
End of Half term	End of topic test (30 minutes) + RIT task	Biology Paper 1 mock exam (1 hour 15) (Biology only 1 hour 45) + RIT	End of topic test (30 minutes) + RIT task

assessment			
Planned trips / Clubs / links	Science drop-in clinic every Thursday lunchtime	Science drop-in clinic every Thursday lunchtime	Science drop-in clinic every Thursday lunchtime

Key Stage 4 /	**Year Group: 11**		
	Autumn Term 1	**Autumn Term 2**	**Spring Term 1**
key concept	How do organisms **detect** and **respond** to changes in their **internal and external** environments to maintain **stability**?	How do organisms **detect** and **respond** to changes in their **internal and external** environments to maintain **stability**?	How does **genetic material** influence **variation** in organisms, and how does this lead to **evolutionary change** over time?
Content: (Know what…)	**HOMEOSTASIS AND RESPONSE 1** • Describe what homeostasis is and why it is important stating specific examples from the human body • Describe the common features of all control systems • State the function of the nervous system and name its important components • Describe how information passes through the nervous system • Describe what happens in a reflex action and why reflex actions are important • Explain how features of the nervous system are adapted to their function, including a reflex arc (inc all types of neurone and the synapse)	**HOMEOSTASIS AND RESPONSE 2** • Describe the endocrine system, including the location of the pituitary, pancreas, thyroid, adrenal gland, ovary and testis and the role of hormones • State that blood glucose concentration is monitored and controlled by the pancreas • Describe the body's response when blood glucose concentration is too high • Explain what type 1 and type 2 diabetes are and how they are treated • HT ONLY: Describe the body's response when blood glucose concentration is too low	**INHERITANCE, VARIATION AND EVOLUTION 1** • Describe features of sexual and asexual reproduction • Describe what happens during meiosis and compare to mitosis • Describe what happens at fertilisation • Bio ONLY: Explain advantages of sexual and asexual reproduction • Bio ONLY: Describe examples of organisms that reproduce both sexually and asexually (malarial parasites, fungi, strawberry plants and daffodils) • Describe the structure of DNA and its role in storing genetic information inside the cell • Explain the term 'genome' and the importance of the human genome (specific

	• Required practical 7: plan and carry out an investigation into the effect of a factor on human reaction time • Bio ONLY: State the function of the brain and how it is structured, including identifying the cerebral cortex, cerebellum and medulla on a diagram of the brain • Bio ONLY: Describe the functions of different regions of the brain • Bio & HT ONLY: Explain how neuroscientists have been able to map regions of the brain to particular functions • Bio ONLY: State the function of the eye and how it is structured, including names of specific parts • Bio ONLY: Describe the functions of different parts of the eye, including relating structure to function • Bio ONLY: Describe what accommodation is, and how it is carried out • Bio ONLY: Explain what myopia and hyperopia are and how they are treated, including interpreting ray diagrams • Bio ONLY: Describe how body temperature is monitored and controlled	• HT ONLY: Explain how glucagon interacts with insulin to control blood glucose levels in the body • Describe how water, ions and urea are lost from the body • Describe the consequences of losing or gaining too much water for body cells • HT ONLY: Recall that protein digestion leads to excess amino acids inside the body and describe what happens to these • Describe how the kidneys produce urine • HT ONLY: Describe the effect of ADH on the permeability of the kidney tubules and explain how the water level in the body is controlled by ADH • Describe how kidney failure can be treated by organ transplant or dialysis and recall the basic principles of dialysis • Describe what happens at puberty in males and females, inc knowledge of reproductive hormones • Describe the roles of the hormones involved in the menstrual cycle (FSH, LH and oestrogen) • HT ONLY: Explain how the different hormones interact to control the menstrual cycle and ovulation	examples from spec only) • Bio ONLY: Describe the structure of DNA, including knowledge of nucleotide units • Bio & HT ONLY: Explain complementary base pairing in DNA • Bio & HT ONLY: Explain the relationship between DNA bases (ATCG), amino acids and proteins • Bio & HT ONLY: Describe how proteins are synthesised on ribosomes, including protein folding and its importance for protein function • Bio & HT ONLY: Explain what mutations are, and the possible effects of mutations • Bio & HT ONLY: Explain what non-coding parts of DNA are, and why they are important • Describe how characteristics are controlled by one or more genes, including examples • Explain important genetic terms: gamete, chromosome, gene, allele, genotype, phenotype, dominant, recessive, homozygous and heterozygous • Explain and use Punnet square diagrams, genetic crosses and family trees • HT ONLY: Construct Punnet square diagrams to predict the outcomes of a monohybrid cross

	• Bio & HT ONLY: Explain how the body's responses act to raise or lower temperature in a given context	• Describe how fertility can be controlled by hormonal and non-hormonal methods of contraception (giving specific examples from the spec) • HT ONLY: Explain how hormones are used to treat infertility, inc the steps in IVF • HT ONLY: Evaluate the risks and benefits of fertility treatments • HT ONLY: Describe the functions of adrenaline and thyroxine in the body, and recall where they are produced • HT ONLY: Explain the roles of thyroxine and adrenaline in the body as negative feedback systems • Bio ONLY: Describe hormone-linked plant responses, to include phototropism and gravitropism and the role of auxin • Bio & HT ONLY: Describe the functions of gibberellins and ethene in plants • Required practical 8: investigate the effect of light or gravity on the growth of newly germinated seedling • HT ONLY: Explain the use of plant growth hormones are used in agriculture and horticulture (auxins, ethene and gibberellins)	• Describe cystic fibrosis and polydactyly as examples of inherited disorders • Evaluate social, economic and ethical issues concerning embryo screening when given appropriate information • Describe how the chromosomes are arranged in human body cells, including the function of the sex chromosomes • Explain how sex is determined and carry out a genetic cross to show sex inheritance

Skills: **(know how…)**	Interpreting response pathways (stimulus → receptor → effector) Understanding control systems and feedback loops Investigating human reactions (e.g. reaction time required practical) **Required practical 6. Reaction Time** (Ruler drop test) Skill Focus: ● Designing a test controlling the other variables so results can be compared (e.g., rest, caffeine, distractions) ● Taking repeated measurements ● Calculating means ● Analysing human error and reaction time variability ● Understanding ethics in human testing	Evaluating fertility treatments and ethical considerations Applying knowledge of systems to unfamiliar scenarios **Required practical 7. Plant Responses** (Phototropism or Gravitropism) **(Biology only)** Skill Focus: ● Setting up and observing controlled conditions ● Measuring plant growth/angle ● Describing plant hormone action (auxins) ● Drawing conclusions from growth patterns ● Evaluating experiment design (e.g., light direction)	Interpreting Punnett squares and genetic diagrams Analysing and interpreting family trees Applying probability to genetic outcomes
Key vocabulary **(5- 10 words)**	**homeostasis, receptor, coordinator, effector, response, neuron, reflex, synapse,**	**hormone, endocrine, insulin, glucagon, diabetes, negative feedback, adrenaline, thyroxine, IVF**	**DNA, chromosome, gene, allele, genotype, phenotype, dominant, recessive, homozygous, heterozygous, meiosis, mutation, evolution, natural selection, extinction**

End of Half term assessment	End of topic test (30 minutes) + RIT task	End of topic test (30 minutes) + RIT task Paper 1 Mock exam (1 hour 15) (Biology only 1 hour 45)	
Planned trips / Clubs / links	Science drop-in clinic every Thursday lunchtime	Science drop-in clinic every Thursday lunchtime	Science drop-in clinic every Thursday lunchtime
Key Stage 4 /	**Year Group: 11**		
	Spring 2	**Summer 1**	**Summer 2**
Key Concept	How does **genetic material** influence **variation** in organisms, and how does this lead to **evolutionary change** over time?		
Content: **(Know what…)**	**INHERITANCE, VARIATION AND EVOLUTION 2** ● Describe what variation is and how it can be caused within a population ● Describe mutations and explain their influence on phenotype and changes in a species ● Explain the theory of evolution by natural selection ● Describe how new species can be formed ● Describe what selective breeding is ● Explain the process of selective		

	breeding, including examples of desired characteristics and risks associated with selective breeding ● Describe what genetic engineering is, including examples, and how it is carried out ● Explain some benefits, risks and concerns related to genetic engineering ● HT ONLY: Explain the process of genetic engineering, to include knowledge of enzymes and vectors ● Bio ONLY: Describe different cloning techniques, to include: tissue culture, cuttings, embryo transplants and adult cell cloning ● Bio ONLY: Describe the ideas proposed by Darwin in his theory of natural selection and explain why this theory was only gradually accepted ● Bio ONLY: Describe other inheritance-based theories that existed (apart from the theory of natural selection), and the problems with these theories ● Bio ONLY: Describe the work of Alfred Russel Wallace ● Bio ONLY: Explain how new species		

	can be formed ● Bio ONLY: Describe how our understanding of genetics has developed over time, to include knowledge of Mendel ● Describe some sources of evidence for evolution ● Describe what fossils are, how they are formed and what we can learn from them ● Explain why there are few traces of the early life forms, and the consequences of this in terms of our understanding of how life began ● Describe some of the causes of extinction ● Describe how antibiotic-resistant strains of bacteria can arise and spread (inc MRSA) ● Describe how the emergence of antibiotic-resistant bacteria can be reduced and controlled, to include the limitations of antibiotic development ● Describe how organisms are named and classified in the Linnaean system ● Explain how scientific advances have led to the proposal of new		

	models of classification, inc three-domain system • Describe and interpret evolutionary trees		
Skills: (Know how…)	**Understanding and debating ethics in genetic engineering** **Evaluating evidence for theories of evolution and natural selection**		
Key vocabulary (5- 10 words)	**DNA, chromosome, gene, allele, genotype, phenotype, dominant, recessive, homozygous, heterozygous, meiosis, mutation, evolution, natural selection, extinction**		
End of Half term assessment	End of topic test (30 minutes) + RIT task Paper 2 Mock exam (1 hour 15) (Biology only 1 hour 45)		
Planned trips / Clubs / links	Science drop-in clinic every Thursday lunchtime		