

CURRICULUM MAP

Subject	Biology
Head of Department	Hazel Nash

SCHOOL INTENT

Rutlish School Vision: Rutlish School is committed in providing **the highest quality education and opportunities** for students.

*Through all we do, we prepare students for opportunities, responsibilities and experiences later in life. We aim to inspire, enable and facilitate lifelong learners able to build on their individual strengths and capabilities, who achieve their ambitions. We seek to support our students becoming **healthy, happy, successful** modern people young adults; knowledgeable, kind, aware, confident, capable and skilful members of society. (Curriculum Intent)*

Rutlish School Mission Statement: “**Modeste, Strenue, Sancte: Be modest, be thorough, pursue righteousness**”

We want students to:

succeed (we strive to provide pathways to support their success)

embrace challenge, build resilience, overcome setbacks and become increasingly independent in pursuit of their goals

be aware of their responsibilities and feel confident to participate and contribute to society. (Curriculum Intent)

Rutlish School: Curriculum Intent

Rutlish School provides a meaningful, broad and balanced curriculum, which is accessible to all, as well as supports and challenges all students.

The School aims to:

- ensure that the curriculum is designed for every student of every ability and every background to be supported in making the best possible progress and attainment from their starting point;
- ensure all students can successfully access the curriculum offer, making any reasonable adjustments required where particular needs are identified;
- ensure that the curriculum is accessible to all abilities and that planning and teaching aim to support, stretch and challenge all learners across a full range of abilities;
- provide a curriculum that is sequenced to build skills and knowledge throughout students' time at Rutlish School, to equip them for their next steps in education, and careers and in life;
- provide a curriculum that promotes a deeper and wider understanding of the world outside of the classroom;
- ensure our curriculum consistently promotes high moral standards, social and self-awareness and allow students to form informed opinions on social issues such as, equality, diversity and inclusivity as well as the practical aspects of society;
- provide opportunities for students to personalise and apply learning in other contexts, including personal and cross-curricular;
- provide students with the skills and knowledge necessary to becoming independent, analytical, critical, and innovative thinkers;
- provide opportunity to encourage students' curiosity, creativity, self-expression, resilience, and confidence;
- develop staff to deliver skills beyond their own subject specialism and incorporate cross curricular initiatives, in particular Literacy, Reading, Numeracy, ICT and Enterprise;
- ensure that our curriculum offer support for different educational and career pathways, including EBACC and vocational;
- provide consistent opportunities for students to develop and enhance their reading skills, and support is provided to ensure all students are able to access the curriculum.

DEPARTMENT INTENT

The science curriculum at Rutlish school is designed to give students the substantive and disciplinary knowledge they need to understand the science they come across in the world around them and differentiate it from pseudoscience. We aim to address any misconceptions that students may hold prior to lessons.

We aim to prepare the students for their future lives by giving them the skills to apply their knowledge in unfamiliar situations and to undertake a STEM career if they so choose. We aim to give them an understanding of the range of STEM careers available to them.

We want to develop students who are analytical and open minded in their approach to new information, who understand the importance of taking an ethical approach to scientific decision making. We aim to strengthen our students as independent thinkers who understand the value of asking questions.

Through our curriculum we aim to challenge students' preconceptions about science and the world around them. We aim to develop the understanding that science is for everyone.

Our curriculum is designed to encourage students' curiosity about the world around them and to help them make informed decisions throughout their lives.

KEY STAGE 3 RATIONALE/ INTENT

Ensure that all students are equipped with the foundation (building blocks) for Science. To instil an appreciation for Science. Develop practical skills and ensure that all students are on the same level when completing the KS3 Science course.

KEY STAGE 4 RATIONALE/ INTENT







Aim to give students an understanding of the range of careers available to them. Ensure that they are literate in science and have the ability to apply knowledge and skills to the outside world. Climate change/vaccines etc. Ensure they have the technical language. Ensure they have the motor skills and background knowledge especially needed in KS5.

KEY STAGE 5 RATIONALE/ INTENT

Providing the substantive knowledge to access the undergraduate course at university. Disciplinary knowledge – research skills

YEAR 7						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
KNOWLEDGE	UNIT OF WORK: 1. Cells	UNIT OF WORK: 1. Cells 2. Interdependence	UNIT OF WORK: 2. Interdependence 3. Reproduction	UNIT OF WORK: 3. Reproduction	UNIT OF WORK: 4. Inheritance	UNIT OF WORK: 4. Inheritance
	<ul style="list-style-type: none"> Microscopes Animal and plant cells Specialised cells Unicellular organisms Movement of substances Organs and organ systems 	<ul style="list-style-type: none"> Skeletal system Muscular system Muscle fatigue investigation Food chains and food webs Disruptions to food chains and food webs 	<ul style="list-style-type: none"> Ecosystems Quadrat investigation Plant reproduction (including flower dissection) Pollination, fertilisation and germination 	<ul style="list-style-type: none"> Seed dispersal Female and male reproductive systems Puberty Menstrual cycle Fertilisation Pregnancy 	<ul style="list-style-type: none"> Variation Continuous and discontinuous variation Genes, chromosomes and inheritance DNA 	<ul style="list-style-type: none"> Genetics Selective breeding Genetic engineering
KEY SKILLS	Practical investigations <ul style="list-style-type: none"> Microscopy Obtain and record a clearly focused image of a microscopic object Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Recording data from experiments Substitution into equations Biological drawings Evaluation of advantages and disadvantages Make deductions on how living things work based on cells, tissues, organs and systems 	Practical investigations <ul style="list-style-type: none"> Muscle fatigue To investigate the effect of the contraction of the biceps and triceps in moving the arm and to see the effects of resting muscles on fatigue. Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Recording data from experiments Use flow charts to present sequences. Graph drawing skills Evaluation of advantages and disadvantages Describe how a species' population changes as its predator or prey population changes Explain the effect of environmental changes on a species population 	Practical investigations <ul style="list-style-type: none"> Quadrat Use a model to investigate the impact of changes in a population of one organism on others in the ecosystem Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Use appropriate techniques, apparatus, and materials during fieldwork Recording data from experiments Calculating means Describe the main steps that take place for plants to successfully reproduce 	Practical investigations <ul style="list-style-type: none"> Seed dispersal Use models to evaluate the features of various types of seed dispersal Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Recording data from experiments Evaluation of advantages and disadvantages Describe the main steps that take place for animals to successfully reproduce 	Practical investigations <ul style="list-style-type: none"> Variation Carry out an investigation into variation within the class and use it to plot bar charts or line graphs to show discontinuous or continuous variation data Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Recording data from experiments Graph drawing skills – plot bar charts, line graphs or histograms to show variation The use of facts and opinions to inform and persuade. Use knowledge to make predictions 	Practical investigations <ul style="list-style-type: none"> Huddling Shark attack Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Recording data from experiments The use of facts and opinions to inform and persuade.
	HOW DO WE BUILD ON SKILLS AND KNOWLEDGE?	This topic acts as an introduction to KS3 Biology. Cells and movement is the core theme underpinning other ideas in Biology. The topic is used as an opportunity to work out the prior knowledge and understanding of students	Builds on work carried out in Primary school looking at living things and their habitats and addresses misconceptions that may have arisen from this.	Builds on work carried out in Primary school looking at living things and their habitats and the structure and function of parts of plants and the plant life cycle.	Builds on work carried out in Primary school looking at life processes, development and reproduction in plants and animals.	Builds on work carried out in Primary school looking at evolution and inheritance, particularly in terms of variation. It will also build upon work carried out in the cells and reproduction units.



LINKS TO THE WORLD i.e. links to careers; equality; gender, class, ethnicity, etc.; different subjects	Discussion about what scientists will use microscopes for in the laboratory in a real world setting. Link to maths – use of equations Link to careers – cell biologist	Discussion about humans effect on the food chains, including the use of chemicals. Link to careers – musculo-skeletal specialist, physio Link to PE - looking at the skeletal and muscular systems	Link to careers – Careers with human’s involvement in reducing pollution and maintaining habitats	Links to wider world – understanding how living things including humans reproduce Links to PSHE – puberty and reproduction Link to careers – midwife, fertility specialist, embryologist and obstetrician-gynecologist	Link to careers – geneticist (and discussion on discovery of DNA) Link to gender, class and ethnicity - looking at variation within humans and how characteristics are inherited	Links with genetic engineering and scientists doing genetic research and selective breeding in the agricultural industry
ASSESSMENTS Summative and Formative as applicable	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: Transition test (second week in September) – to assess student’s current abilities prior to setting	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test - Cells	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test - Interdependence	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test - Reproduction	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test – Inheritance End of Year Exam	
FEEDBACK SUPPORTS LEARNING	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 
SPECIALIST VOCABULARY	<u>Cells</u> <ul style="list-style-type: none"> • Cell • Unicellular • Multicellular • Tissue • Organ • Diffusion • Joints • Ligaments • Tendons • Cartilage • Antagonistic 	<u>Interdependence</u> <ul style="list-style-type: none"> • Food web • Food chain • Ecosystem • Environment • Population • Producer • Consumer • Decomposer 	<u>Plant Reproduction</u> <ul style="list-style-type: none"> • Pollen • Ovules • Pollination • Fertilisation • Seed • Fruit • Carpel • Stamen • Dispersal 	<u>Human Reproduction</u> <ul style="list-style-type: none"> • Gamete • Fertilisation • Ovulation • Menstruation • Zygote • Embryo • Foetus • Gestation • Placenta • Umbilical cord 	<u>Inheritance</u> <ul style="list-style-type: none"> • Variation • Continuous • Discontinuous • Species • Inheritance • Characteristics • DNA • Genes • Chromosomes 	
QUALITY FIRST TEACHING	<ul style="list-style-type: none"> ✓ Strategies to learn more, remember more (metacognition) used in lessons e.g. retrieval, elaboration, interleaving, dual coding, etc. ✓ Differentiation and reasonable adjustments for students with SEND, EAL, etc. such as scaffolding, visual aids, audio, physical resources, planned questioning, etc. ✓ Opportunities for Literacy, Numeracy and Oracy, including a focus on reading ✓ Opportunities to apply key concepts and address misconceptions 					



YEAR 8

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
KNOWLEDGE	UNIT OF WORK: 5. Respiration <ul style="list-style-type: none"> Breathing and gas exchange Breathing investigation Aerobic respiration Anaerobic respiration Effect of exercise Health: drugs, smoking and alcohol Biotechnology 	UNIT OF WORK: 5. Respiration 6. Photosynthesis <ul style="list-style-type: none"> Photosynthesis Investigating photosynthesis Testing a leaf for starch Structure of the leaf Transpiration and plant adaptation to water loss 	UNIT OF WORK: 6. Photosynthesis 7. Digestion <ul style="list-style-type: none"> Stomatal investigation Plant minerals Balanced diet Food tests investigation 	UNIT OF WORK: 7. Digestion <ul style="list-style-type: none"> Deficiency diseases Digestive system Model of digestive system Enzymes Enzymes in digestion 	UNIT OF WORK: 8. Evolution <ul style="list-style-type: none"> Natural selection and Charles Darwin Bird beak investigation Extinction Preserving biodiversity 	UNIT OF WORK: 8. Evolution <ul style="list-style-type: none"> Adapting to change Competition
	KEY SKILLS	<u>Practical investigations</u> <ul style="list-style-type: none"> Breathing investigation To investigate if there is a correlation between height and lung volume. Effect of exercise To investigate the effect of exercise on breathing rate <u>Other skills</u> <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Plan an investigation Recording data from experiments Graph drawing skills Evaluation of scientific investigations Use word equations to describe key processes 	<u>Practical investigations</u> <ul style="list-style-type: none"> Testing a leaf for starch Use lab tests on variegated leaves to show that chlorophyll is essential for photosynthesis <u>Other skills</u> <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Plan an investigation Recording data from experiments Graph drawing skills Evaluation of scientific investigations Use word equations to describe key processes Suggest how particular conditions could affect plant growth Suggest reasons for particular adaptations of leaves, roots and stems 	<u>Practical investigations</u> <ul style="list-style-type: none"> Stomatal investigation To investigate how the number of stomata vary on different leaves. Food test investigation Use appropriate techniques to carry out a full range of food tests safely, interpreting the findings, and relating them to everyday situations. <u>Other skills</u> <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Plan an investigation Recording data from experiments Graph drawing skills Evaluation of scientific investigations Use word equations to describe key processes Describe possible health effects of unbalanced diets from data provided 	<u>Practical investigations</u> <ul style="list-style-type: none"> Digestive model Evaluate how well a model represents key features of the digestive system <u>Other skills</u> <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Plan an investigation Recording data from experiments Graph drawing skills Evaluation of scientific investigations Make deductions from medical symptoms showing problems with the digestive system Describe the events that take place in order to turn a meal into a simple food molecule inside a cell 	<u>Practical investigations</u> <ul style="list-style-type: none"> Bird beak investigation To investigate how the shape of a bird's beak would affect its feeding. <u>Other skills</u> <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Plan an investigation Recording data from experiments Graph drawing skills Evaluation of scientific investigations Use evidence to explain why a species has become extinct or adapted to changing conditions Predict and explain the changes in a population over time due to natural selection
HOW DO WE BUILD ON SKILLS AND KNOWLEDGE?	Builds on work carried out in Primary school looking at animals including humans and the main parts of the body and the effect of lifestyle on the way bodies function. It will also build upon work carried out in the cells and movement unit.	Builds on work carried out in Primary school looking at plants and the way in which water is transported. It will also build upon work carried out in the interdependence and plant reproduction units.	Builds on work carried out in Primary school looking at the importance of exercise and diet in humans, and how the digestive system functions. It will also link to work carried out in the cells and movement, interdependence and respiration units.	Builds on work carried out in Primary school looking at the importance of exercise and diet in humans, and how the digestive system functions. It will also link to work carried out in the cells and movement, interdependence and respiration units.	Builds on work carried out in Primary school looking at living things in their environment, evolution and inheritance. It will also link to work carried out in the cells and movement, interdependence and respiration units.	Builds on work carried out in Primary school looking at living things in their environment, evolution and inheritance. It will also link to work carried out in the cells and movement, interdependence and respiration units.









LINKS TO THE WORLD i.e. links to careers; equality; gender, class, ethnicity, etc.; different subjects	<p>Science communication about the impact of alcohol and smoking on health</p> <p>Links to PSHE – Effect of drugs on health Links to PE – Effect of exercise on breathing rate</p> <p>Links to careers – respiratory specialist, respiratory physiologist</p>	<p>Understanding of plants necessary for agriculture and gardeners</p> <p>Links to careers – botanist, horticulturist, florist, forester, plant physiologist</p>	<p>Science communication about what is and is not a healthy diet and food production</p> <p>Link to careers – dietician, nutritionist, food scientist</p>	<p>Discussion about people dealing with coeliac disease and the symptoms</p> <p>Link to careers – dietician, nutritionist, food scientist, gastroenterologist</p>	<p>Scientists discovery of evidence for evolution and how this has changed over the last century.</p> <p>Link to careers – evolutionary biologist, conservation specialist</p>	<p>Human's role in maintaining ecosystems and what industries rely on biodiversity</p> <p>Link to careers – conservation specialist</p>
ASSESSMENTS Summative and Formative as applicable	<p>Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.</p>	<p>Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.</p> <p>Summative: End of unit test - Respiration</p>	<p>Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.</p> <p>Summative: End of unit test - Photosynthesis</p>	<p>Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.</p> <p>Summative: End of unit test - Digestion</p>	<p>Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.</p> <p>Summative: End of KS3 Mock Exam</p>	<p>Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.</p> <p>Summative: End of unit test – Evolution End of KS3 Exam</p>
FEEDBACK SUPPORTS LEARNING	<p>Opportunity for students to reflect on learning, respond to feedback, improve work, etc.</p> <p>✓</p>	<p>Opportunity for students to reflect on learning, respond to feedback, improve work, etc.</p> <p>✓</p>	<p>Opportunity for students to reflect on learning, respond to feedback, improve work, etc.</p> <p>✓</p>	<p>Opportunity for students to reflect on learning, respond to feedback, improve work, etc.</p> <p>✓</p>	<p>Opportunity for students to reflect on learning, respond to feedback, improve work, etc.</p> <p>✓</p>	<p>Opportunity for students to reflect on learning, respond to feedback, improve work, etc.</p> <p>✓</p>
SPECIALIST VOCABULARY	<p>Respiration</p> <ul style="list-style-type: none"> Breathing Trachea Bronchi Bronchioles Alveoli Diaphragm Respiration Aerobic Anaerobic Fermentation 	<p>Photosynthesis</p> <ul style="list-style-type: none"> Stomata Guard cells Chloroplasts Chlorophyll Photosynthesis Limiting factor Transpiration Fertilisers 	<p>Digestion</p> <ul style="list-style-type: none"> Enzymes Dietary fibre Carbohydrates Lipids Proteins Deficiency Denature 	<p>Digestion</p> <ul style="list-style-type: none"> Enzymes Dietary fibre Carbohydrates Lipids Proteins Deficiency Denature 	<p>Evolution</p> <ul style="list-style-type: none"> Population Natural selection Extinct Biodiversity Adaptation Competition Evolution 	<p>Evolution</p> <ul style="list-style-type: none"> Population Natural selection Extinct Biodiversity Adaptation Competition Evolution
QUALITY FIRST TEACHING	<ul style="list-style-type: none"> ✓ Strategies to learn more, remember more (metacognition) used in lessons e.g. retrieval, elaboration, interleaving, dual coding, etc. ✓ Differentiation and reasonable adjustments for students with SEND, EAL, etc. such as scaffolding, visual aids, audio, physical resources, planned questioning, etc. ✓ Opportunities for Literacy, Numeracy and Oracy, including a focus on reading ✓ Opportunities to apply key concepts and address misconceptions 					



YEAR 9

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
KNOWLEDGE	UNIT OF WORK: 1. Cell Biology <ul style="list-style-type: none"> Animal and plant cells Eukaryotes and prokaryotes Microscopy Specialised cells and cell differentiation Stem cells Mitosis and cell cycle Binary fission 	UNIT OF WORK: 1. Cell Biology <ul style="list-style-type: none"> Culturing microorganisms Cancer Diffusion Osmosis Active transport 	UNIT OF WORK: 2. Organisation <ul style="list-style-type: none"> Organisational hierarchy Human digestive system Food tests Digestive enzymes Factors affecting enzymes Breathing and gas exchange 	UNIT OF WORK: 2. Organisation <ul style="list-style-type: none"> The heart Blood and blood vessels CHD Lifestyle effects on non-communicable diseases Plant tissues in the leaf Plant organ systems 	UNIT OF WORK: 4. Bioenergetics <ul style="list-style-type: none"> Photosynthesis Rate of photosynthesis 	UNIT OF WORK: 4. Bioenergetics <ul style="list-style-type: none"> Photosynthesis practical Uses of glucose Aerobic respiration Anaerobic respiration Response to exercise Metabolism
	KEY SKILLS	Required practical: <ul style="list-style-type: none"> Microscopy Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included. <p>Working scientifically is divided into the areas of:</p> <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes 	Required practical: <ul style="list-style-type: none"> Microbiology Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition. <ul style="list-style-type: none"> Osmosis Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue. <p>Working scientifically is divided into the areas of:</p> <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes 	Required practical: <ul style="list-style-type: none"> Food tests. Use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein. <ul style="list-style-type: none"> Enzymes Investigate the effect of pH on the rate of reaction of amylase enzyme. <p>Working scientifically is divided into the areas of:</p> <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes 	Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes 	Required practical: <ul style="list-style-type: none"> Photosynthesis Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed. <p>Working scientifically is divided into the areas of:</p> <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes









HOW DO WE BUILD ON SKILLS AND KNOWLEDGE?	Building on following ideas from KS3: <ul style="list-style-type: none"> • Microscopy • Animal and plant cells • Specialised cells • Unicellular organisms • Movement of substances 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Microscopy • Animal and plant cells • Specialised cells • Unicellular organisms • Movement of substances 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Balanced diets • Food test investigations • Digestive system • Enzymes • Enzymes in digestion • Breathing and gas exchange 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Balanced diets • Food test investigations • Digestive system • Enzymes • Enzymes in digestion • Breathing and gas exchange 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Aerobic respiration • Anaerobic respiration • Effect of exercise • Health: Drugs, alcohol and smoking • Photosynthesis • Testing a leaf for starch • Structure of leaf • Transpiration 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Aerobic respiration • Anaerobic respiration • Effect of exercise • Health: Drugs, alcohol and smoking • Photosynthesis • Testing a leaf for starch • Structure of leaf • Transpiration
LINKS	Different avenues of medicine explored including the role of stem cells in producing new tissues and organs.	Different avenues of medicine explored including cancer treatments	Links to careers in gastroenterology, nutrition and dietetics	Science communication regarding lifestyle links with disease. Compare and contrast current medical treatments for CHD.	Links with the use of commercial greenhouses	How science understanding is essential to the sporting industry. Links with food production in the baking and alcohol sectors.
ASSESSMENTS Summative and Formative as applicable	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test – Cell Biology	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: Year 9 Exams End of unit test - Organisation	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test - Bioenergetics
FEEDBACK SUPPORTS LEARNING	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 
SPECIALIST VOCABULARY	<u>Cell Biology</u> <ul style="list-style-type: none"> • Eukaryotic • Prokaryotic • Cell membrane • Cell wall • Chlorophyll • Chloroplast • Cytoplasm • Mitochondria • Nucleus • Ribosomes • Stem cells • Differentiate • Cell cycle • Mitosis 	<u>Cell Biology</u> <ul style="list-style-type: none"> • Diffusion • Osmosis • Active transport • Hypertonic • Hypotonic • Isotonic • Plasmolysis • Turgid • Flaccid • Cancer • Carcinogen • Benign • Malignant 	<u>Organisation</u> <ul style="list-style-type: none"> • Amino acids • Proteins • Glucose • Starch • Lipids • Fatty acid • Glycerol • Enzymes • Catalyst • Active site • Denatured • Amylase • Protease • Lipase • Bile 	<u>Organisation</u> <ul style="list-style-type: none"> • Aorta • Vena cava • Atria • Ventricles • Arteries • Veins • Capillaries • Plasma • Red blood cells • Haemoglobin • White blood cells • Platelets • Translocation • Transpiration • Xylem • Phloem 	<u>Bioenergetics</u> <ul style="list-style-type: none"> • Photosynthesis • Endothermic • Glucose • Oxygen • Carbon dioxide • Energy • Sunlight • Chlorophyll • Limiting factors • Palisade mesophyll • Spongy mesophyll • Guard cells • Stomata • Epidermis • Transpiration 	<u>Bioenergetics</u> <ul style="list-style-type: none"> • Respiration • Exothermic • Aerobic • Mitochondria • Anaerobic • Glycogen • Lactic acid • Oxygen debt • Metabolism
QUALITY FIRST TEACHING	<ul style="list-style-type: none"> ✓ Strategies to learn more, remember more (metacognition) used in lessons e.g. retrieval, elaboration, interleaving, dual coding, etc. ✓ Differentiation and reasonable adjustments for students with SEND, EAL, etc. such as scaffolding, visual aids, audio, physical resources, planned questioning, etc. ✓ Opportunities for Literacy, Numeracy and Oracy, including a focus on reading ✓ Opportunities to apply key concepts and address misconceptions 					



YEAR 10

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
KNOWLEDGE	UNIT OF WORK: 3. Infection and response <ul style="list-style-type: none"> Infectious diseases Viral diseases Bacterial diseases Fungal diseases Protist diseases Human health defence systems Vaccinations Antibiotics and painkillers Discovery and development of drugs Monoclonal antibodies (triple only) Uses of monoclonal antibodies (triple only) 	UNIT OF WORK: 3. Infection and response (Triple only) 5. Homeostasis <ul style="list-style-type: none"> Plant diseases (triple only) Plant defences (triple only) Homeostasis Human nervous system Reaction times practical The brain (triple only) The eye (triple only) Accommodation, myopia and hyperopia (triple only) 	UNIT OF WORK: 5. Homeostasis <ul style="list-style-type: none"> Control body temperature (triple only) Endocrine system Control of blood sugar Menstrual cycle Contraception Hormones in fertility Negative feedback Kidneys (triple only) Kidney problems (triple only) 	UNIT OF WORK: 5. Homeostasis <ul style="list-style-type: none"> Plant hormones (triple only) Plant tropisms practical (triple only) Uses of plant hormones Skills lessons (combined science only) – variables, graphs, analysis and evaluation 	UNIT OF WORK: 6. Reproduction and Inheritance <ul style="list-style-type: none"> Asexual and sexual reproduction Meiosis DNA and genome DNA structure (triple only) Protein synthesis (triple only) Genetic inheritance Inherited disorders Variation Selective breeding 	UNIT OF WORK: 6. Reproduction and Inheritance <ul style="list-style-type: none"> Genetic engineering Cloning (triple only) Understanding genetics Theories of evolution Fossils Evidence of evolution Speciation (triple only) Extinction Resistant bacteria
	KEY SKILLS	Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes 	Required practical: <ul style="list-style-type: none"> Reaction times Plan and carry out an investigation into the effect of a factor on human reaction time. Working scientifically is divided into the areas of: <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Graph drawing skills Use word equations to describe key processes 	Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes 	Required practical: <ul style="list-style-type: none"> Plant tropisms (Triple only) Investigate the effect of light or gravity on the growth of newly germinated seeds Working scientifically is divided into the areas of: <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature 	Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes









HOW DO WE BUILD ON SKILLS AND KNOWLEDGE?	Building on following ideas from KS3: <ul style="list-style-type: none"> • Unicellular organisms • Pollination, fertilisation and germination • Health: Drugs, alcohol and smoking • Deficiency diseases 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Unicellular organisms • Pollination, fertilisation and germination • Health: Drugs, alcohol and smoking • Deficiency diseases 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Puberty • Menstrual cycle • Fertilisation • Plant minerals 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Puberty • Menstrual cycle • Fertilisation • Plant minerals 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Continuous and discontinuous variation • Genes, chromosomes and inheritance • DNA • Genetics • Selective breeding • Genetic engineering • Evolution • Natural selection • Extinction 	Building on following ideas from KS3: <ul style="list-style-type: none"> • Continuous and discontinuous variation • Genes, chromosomes and inheritance • DNA • Genetics • Selective breeding • Genetic engineering • Evolution • Natural selection • Extinction
LINKS	Areas of scientific research that are very relevant to the current climate – discovery and development of new drugs and vaccines including clinical trials. Discussion about ethical reporting of trials.	Different avenues of medicine explored including examining the workings of the brain. Links to ophthalmology when studying the eye (looking at myopia and hyperopia)	Ethical issues surrounding the accessibility of contraception and IVF as well as the pros and cons of each.	Understanding of plants necessary for agriculture and gardeners Links to careers in botany, horticulture, florist, forester, plant physiologist	Career links with areas of genetic research, genetic counselling and selective breeding in agriculture. Ethical issue about cloning discussed and students gain a better understanding of inherited disorders found commonly in the population.	Career links with areas of genetic research, selective breeding, genetic engineering and cloning in agriculture.
ASSESSMENTS Summative and Formative as applicable	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test – Infection and response	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test – Homeostasis Year 10 Exams	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test – Reproduction and inheritance
FEEDBACK SUPPORTS LEARNING	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 
SPECIALIST VOCABULARY	Infection & response <ul style="list-style-type: none"> • Communicable disease • Microorganism • Pathogens • Bacteria • Virus • Fungi • Protist • Malaria • Vaccination • Antibiotics • Monoclonal • Hybridoma 	Infection & response <ul style="list-style-type: none"> • Mineral deficiency • Chlorosis • Aphids • Physical defence • Chemical defence • Mechanical defence Homeostasis <ul style="list-style-type: none"> • Stimulus • Receptors • Neurones • Effector • Reflex • Myopia • Hyperopia 	Homeostasis <ul style="list-style-type: none"> • Thermoregulation • Hypothalamus • Vasoconstriction • Vasodilation • Dialysis • Selective reabsorption • Pituitary gland • Endocrine • Hormones • Diabetes • Insulin • Glucagon • Contraception • Fertility • Ovulation 	Homeostasis <ul style="list-style-type: none"> • Tropisms • Auxins • Gibberellins • Phototropism • Gravitropism • Cell elongation 	Reproduction & inheritance <ul style="list-style-type: none"> • Asexual reproduction • Sexual reproduction • Meiosis • Chromosome • Gene • Allele • Genotype • Phenotype • Homozygous • Heterozygous • Mutation • DNA • Nucleotide • Variation 	Reproduction & inheritance <ul style="list-style-type: none"> • Genetic engineering • Cloning • Tissue culture • Cuttings • Somatic cell • Embryo transfer • Evolution • Natural selection • Species • Speciation • Extinction • Resistance
QUALITY FIRST TEACHING	<ul style="list-style-type: none"> ✓ Strategies to learn more, remember more (metacognition) used in lessons e.g. retrieval, elaboration, interleaving, dual coding, etc. ✓ Differentiation and reasonable adjustments for students with SEND, EAL, etc. such as scaffolding, visual aids, audio, physical resources, planned questioning, etc. ✓ Opportunities for Literacy, Numeracy and Oracy, including a focus on reading ✓ Opportunities to apply key concepts and address misconceptions 					



YEAR 11						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
KNOWLEDGE	UNIT OF WORK: 7. Ecology	UNIT OF WORK: 7. Ecology	UNIT OF WORK: 7. Ecology (Triple only) Skills and Revision	UNIT OF WORK: Skills and Revision	UNIT OF WORK: Skills and Revision GCSE Exams	UNIT OF WORK: GCSE Exams
	<ul style="list-style-type: none"> Classification Evolutionary trees Adaptations Communities Abiotic and biotic factors Competition Sampling techniques Ecology investigation Ecosystems/Levels of organisation Carbon cycle Decomposition (triple only) Decay practical (triple only) 	<ul style="list-style-type: none"> Water cycle Biodiversity Waste management Land Use / Peat bogs Global warming and deforestation Maintaining biodiversity Impact of environmental change (triple only) 	Triple only: <ul style="list-style-type: none"> Trophic levels Pyramids of biomass Transfer of biomass Food security Farming techniques Sustainable fisheries Role of biotechnology 	Required practicals review <ol style="list-style-type: none"> Microscopy Microbiology (triple only) Osmosis Food tests Enzymes Photosynthesis Reaction times Plant tropisms (triple only) Ecology Decay (triple only) 	Revision of all content covered	Revision of all content covered
KEY SKILLS	Required practical: <ul style="list-style-type: none"> Field investigation Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species. <p>Working scientifically is divided into the areas of:</p> <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature 	Required practical: <ul style="list-style-type: none"> Decay Working scientifically is divided into the areas of: <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature 	Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes 	Working scientifically is divided into the areas of: <ul style="list-style-type: none"> Development of scientific thinking Experimental skills and strategies Analysis and evaluation Scientific vocabulary, quantities, units symbols and nomenclature 	Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes 	Other skills <ul style="list-style-type: none"> Literacy & Communication skills Writing using scientific knowledge Using a variety of concepts and models to develop scientific explanations and understanding Graph drawing skills Use word equations to describe key processes
	HOW DO WE BUILD ON SKILLS AND KNOWLEDGE?	Building on following ideas from KS3: <ul style="list-style-type: none"> Food chains and food webs Ecosystems Quadrat investigation Biotechnology Preserving biodiversity Adapting to change Competition 	Building on following ideas from KS3: <ul style="list-style-type: none"> Food chains and food webs Ecosystems Quadrat investigation Biotechnology Preserving biodiversity Adapting to change Competition 	Building on following ideas from KS3: <ul style="list-style-type: none"> Food chains and food webs Ecosystems Quadrat investigation Biotechnology Preserving biodiversity Adapting to change Competition 		



LINKS TO THE WORLD i.e. links to careers; equality; gender, class, ethnicity, etc.; different subjects	_Career links with the renewable energy and conservation industries. Discussion about human's contribution to climate change and efforts to reduce the rate of global warming. G7 summit targets explained and the methods by which they can be achieved.	Career links with the renewable energy and conservation industries. Discussion about human's contribution to climate change and efforts to reduce the rate of global warming. G7 summit targets explained and the methods by which they can be achieved.	Career links with the renewable energy and conservation industries. Discussion about human's contribution to climate change and efforts to reduce the rate of global warming. G7 summit targets explained and the methods by which they can be achieved.			
ASSESSMENTS Summative and Formative as applicable	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: End of unit test – Ecology Year 11 Mock Exams (1)	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons.	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Summative: Year 11 Mock Exams (2)	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Public exams: GCSE	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular book marking with specific targets (EBI) every 6 lessons. Public exams: GCSE
FEEDBACK SUPPORTS LEARNING	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 
SPECIALIST VOCABULARY	<u>Ecology</u> <ul style="list-style-type: none"> Adaptation Extremophile Competition Community Population Ecosystem Interdependence Abundance Distribution Biodiversity Quadrat Random sampling Systematic sampling Transect 	<u>Ecology</u> <ul style="list-style-type: none"> Carbon cycle Fossilisation Decomposers Decomposition Detritivores Trophic level Producer Consumer Pollution Deforestation Acid rain Bioaccumulation Eutrophication 	<u>Ecology</u> <ul style="list-style-type: none"> Trophic levels Biomass Efficiency Sustainability Genetic modification Organic Free range Intensive farming Conservation Biotechnology Mycoprotein 	<u>Practical skills</u> <ul style="list-style-type: none"> Variables Independent Dependent Control variable Fair test Accurate Precise Resolution Valid Errors Repeatable Reproducible Anomaly Hazard 		
QUALITY FIRST TEACHING	<ul style="list-style-type: none"> ✓ Strategies to learn more, remember more (metacognition) used in lessons e.g. retrieval, elaboration, interleaving, dual coding, etc. ✓ Differentiation and reasonable adjustments for students with SEND, EAL, etc. such as scaffolding, visual aids, audio, physical resources, planned questioning, etc. ✓ Opportunities for Literacy, Numeracy and Oracy, including a focus on reading ✓ Opportunities to apply key concepts and address misconceptions 					






YEAR 12

	Module 2 – Foundations in Biology	Module 3 – Exchange and Transport	Module 4 – Biodiversity, Evolution and Disease
KNOWLEDGE	<p>Chapter 2 Basic components of living systems</p> <ul style="list-style-type: none"> • Microscopy • Magnification and calibration • More microscopy • Eukaryotic cell structure • The ultrastructure of plant cells • Prokaryotic and eukaryotic cells <p>Chapter 3 Biological molecules</p> <ul style="list-style-type: none"> • Biological molecules • Water • Carbohydrates • Testing for carbohydrates • Lipids • Structure of proteins • Types of proteins • Nucleic acids • DNA replication and the genetic code • Protein synthesis • ATP <p>Chapter 4 Enzymes</p> <ul style="list-style-type: none"> • Enzyme action • Factors affecting enzyme activity • Enzyme inhibitors • Cofactors, coenzymes and prosthetic groups <p>Chapter 5 Plasma membranes</p> <ul style="list-style-type: none"> • The structure and function of membranes • Factors affecting membrane structure • Diffusion • Active transport • Osmosis <p>Chapter 6 Cell divisions</p> <ul style="list-style-type: none"> • Cell cycle • Mitosis • Meiosis • The organisation and specialisation of cells • Stem cells 	<p>Chapter 7 Exchange surfaces and breathing</p> <ul style="list-style-type: none"> • Specialised exchange surfaces • Mammalian gaseous exchange systems • Measuring the process • Ventilation and gas exchange in other organisms <p>Chapter 8 Transport in animals</p> <ul style="list-style-type: none"> • Transport systems in multicellular animals • The blood vessels • Blood, tissue fluid and lymph • Transport of oxygen and carbon dioxide in the blood • The heart <p>Chapter 9 Transport in plants</p> <ul style="list-style-type: none"> • Transport systems in dicotyledonous plants • Water transport in multicellular plants • Transpiration • Translocation • Plant adaptations to water availability 	<p>Chapter 10 Classification and evolution</p> <ul style="list-style-type: none"> • Classification • The five kingdoms • Phylogeny • Evidence for evolution • Types of variation • Representing variation graphically • Adaptations • Changing population characteristics <p>Chapter 11 Biodiversity</p> <ul style="list-style-type: none"> • Biodiversity • Sampling • Sampling techniques • Calculating biodiversity • Calculating genetic biodiversity • Factors affecting biodiversity • Reasons for maintaining biodiversity • Methods for maintaining biodiversity <p>Chapter 12 Communicable diseases</p> <ul style="list-style-type: none"> • Animal and plant pathogens • Animal and plant diseases • The transmission of communicable diseases • Plant defences against pathogens • Non-specific animal defences against pathogens • The specific immune system • Preventing and treating disease
KEY SKILLS	<ul style="list-style-type: none"> • HSW1 Use theories, models and ideas to develop scientific explanations • HSW2 Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas • HSW3 Use appropriate methodology, including information and communication technology (ICT), to answer scientific questions and solve scientific problems • HSW4 Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts • HSW5 Analyse and interpret data to provide evidence, recognising correlations and causal relationships • HSW6 Evaluate methodology, evidence and data, and resolve conflicting evidence • HSW7 Know that scientific knowledge and understanding develops over time • HSW8 Communicate information and ideas in appropriate ways using appropriate terminology • HSW9 Consider applications and implications of science and evaluate their associated benefits and risks • HSW10 Consider ethical issues in the treatment of humans, other organisms and the environment • HSW11 Evaluate the role of the scientific community in validating new knowledge and ensuring integrity • HSW12 Evaluate the ways in which society uses science to inform decision making. 		



<p>Required practical (PAGs): PAG 1 – Microscopy (onion skin and calibration)</p> <ul style="list-style-type: none"> • Use of a light microscope at high power and low power, use of a graticule • Production of scientific drawings from observations with annotations <p>PAG 4 – Enzyme substrate concentration</p> <ul style="list-style-type: none"> • Use of appropriate apparatus to record a range of quantitative measurements (to include mass, time, volume, temperature, length and pH) • Use of laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions <p>PAG 5 – Unknown glucose concentration</p> <ul style="list-style-type: none"> • Use of appropriate instrumentation to record quantitative measurements, such as a colorimeter • Use of laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions <p>PAG 5 – Membrane permeability</p> <ul style="list-style-type: none"> • Use of appropriate instrumentation to record quantitative measurements, such as a colorimeter • Use of laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions <p>PAG 6 – Plant pigment chromatography</p> <ul style="list-style-type: none"> • Separation of biological compounds using thin layer / paper chromatography or electrophoresis <p>PAG 8 – Osmosis in potatoes</p> <ul style="list-style-type: none"> • Use of appropriate apparatus to record a range of quantitative measurements (to include mass, time, volume, temperature, length and pH) • Use of laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions • Use of ICT such as computer modelling, or data logger to collect data, or use of software to process data <p>PAG 9 – Testing carbohydrates, proteins and lipids</p> <ul style="list-style-type: none"> • Use of laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions • Use of qualitative reagents to identify biological molecules 	<p>Required practical (PAGs): PAG 1 – Microscopy (stomata)</p> <ul style="list-style-type: none"> • Use of a light microscope at high power and low power, use of a graticule • Production of scientific drawings from observations with annotations <p>PAG 2 – Fish dissection</p> <ul style="list-style-type: none"> • Safe use of instruments for dissection of an animal or plant organ • Production of scientific drawings from observations with annotations <p>PAG 2 – Heart dissection</p> <ul style="list-style-type: none"> • Safe use of instruments for dissection of an animal or plant organ • Production of scientific drawings from observations with annotations <p>PAG 5 – Potometer</p> <ul style="list-style-type: none"> • Use of appropriate instrumentation to record quantitative measurements, such as a colorimeter • Use of laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions 	<p>Required practical (PAGs): PAG 3 - Ecology</p> <ul style="list-style-type: none"> • Use of sampling techniques in fieldwork • Production of scientific drawings from observations with annotations
<p>Other skills AO1 - Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures. AO2 - Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:</p> <ul style="list-style-type: none"> • in a theoretical context • in a practical context • when handling qualitative data • when handling quantitative data. <p>AO3 - Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:</p> <ul style="list-style-type: none"> • make judgements and reach conclusions • develop and refine practical design and procedures 	<p>Other skills AO1 - Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures. AO2 - Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:</p> <ul style="list-style-type: none"> • in a theoretical context • in a practical context • when handling qualitative data • when handling quantitative data. <p>AO3 - Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:</p> <ul style="list-style-type: none"> • make judgements and reach conclusions • develop and refine practical design and procedures 	<p>Other skills AO1 - Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures. AO2 - Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:</p> <ul style="list-style-type: none"> • in a theoretical context • in a practical context • when handling qualitative data • when handling quantitative data. <p>AO3 - Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:</p> <ul style="list-style-type: none"> • make judgements and reach conclusions • develop and refine practical design and procedures



HOW DO WE BUILD ON SKILLS AND KNOWLEDGE?	Students will need to build on their knowledge and skills, from Key Stage 4 Science and Mathematics, including KS4 Cell Biology and Organisation topics.		Students will need to build on their knowledge and skills, from Key Stage 4 Science and Mathematics, including KS4 Organisation topics. They will also need to build on their knowledge of Module 2 – Foundations in Biology		Students will need to build on their knowledge and skills, from Key Stage 4 Science and Mathematics including KS4 infection and response, Reproduction and inheritance and Ecology topics. They will also need to build on their knowledge of Module 2 – Foundations in Biology	
LINKS TO THE WORLD i.e. links to careers; equality; gender, class, ethnicity, etc.; different subjects	Links to A-level Chemistry (including bonding in biological molecules and chromatography) Links to A-level Maths		Links to A-level Chemistry Links to A-level Maths		Links to A-level Chemistry Links to A-level Maths (including statistical analysis)	
ASSESSMENTS Summative and Formative as applicable	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular marking with specific targets (EBI). Assessment of practical booklet. Summative: End of chapter and end of module assessments		Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular marking with specific targets (EBI). Assessment of practical booklet. Summative: End of chapter and end of module assessments		Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular marking with specific targets (EBI). Assessment of practical booklet. Summative: End of chapter and end of module assessments	
FEEDBACK SUPPORTS LEARNING	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 		Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 		Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	
SPECIALIST VOCABULARY	<ul style="list-style-type: none"> • Magnification • Resolution • Artefacts • Condensation • Hydrolysis • Glycosidic • Peptide • Ester • Pyrimidines • Purines • Degenerate 	<ul style="list-style-type: none"> • Transcription • Translation • Prophase • Metaphase • Anaphase • Telophase • Cytokinesis • Totipotent • Pluripotent • Multipotent 	<ul style="list-style-type: none"> • Tidal volume • Vital capacity • Inspiratory reserve volume • Expiratory reserve volume • Residual volume • Oncotic pressure • Hydrostatic pressure • Oxygen dissociation • Bohr effect • Diastole 	<ul style="list-style-type: none"> • Systole • Electrocardiogram • Tachycardia • Bradycardia • Apoplast • Symplast • Mass flow • Assimilates • Xerophytes • Hydrophytes 	<ul style="list-style-type: none"> • Taxonomic • Binomial nomenclature • Archaeobacteria • Eubacteria • Phylogeny • Palaeontology • Homologous • Analogous • Converging evolution • Diverging evolution 	<ul style="list-style-type: none"> • Species richness • Species evenness • Simpsons index of diversity • Genetic bottleneck • Founder effect • In situ conservation • Ex situ conservation • Cell mediated immunity • Humoral immunity
QUALITY FIRST TEACHING	<ul style="list-style-type: none"> ✓ Strategies to learn more, remember more (metacognition) used in lessons e.g. retrieval, elaboration, interleaving, dual coding, etc. ✓ Differentiation and reasonable adjustments for students with SEND, EAL, etc. such as scaffolding, visual aids, audio, physical resources, planned questioning, etc. ✓ Opportunities for Literacy, Numeracy and Oracy, including a focus on reading ✓ Opportunities to apply key concepts and address misconceptions 					



YEAR 13

Module 5 – Communication, Homeostasis and Energy

Module 6 – Genetics, Evolution and Ecosystems

KNOWLEDGE

Chapter 13 Neuronal communication

- Coordination
- Neurones
- Sensory receptors
- Nervous transmission
- Synapses
- Organisation of the nervous system
- Structure and function of the brain
- Reflexes
- Voluntary and involuntary muscles
- Sliding filament model

Chapter 14 Hormonal communication

- Hormonal communication
- Structure and function of the pancreas
- Regulation of blood glucose concentration
- Diabetes and its control
- Coordinated responses
- Controlling heart rate

Chapter 15 Homeostasis

- The principles of homeostasis
- Thermoregulation in ectotherms
- Thermoregulation in endotherms
- Excretion, homeostasis and the liver
- The structure and function of the mammalian kidney
- The kidney and osmoregulation
- Urine and diagnosis
- Kidney failure

Chapter 16 Plant responses

- Plant hormones and growth in plants
- Plant responses to abiotic stress
- Plant response to herbivory
- Tropisms in plants
- The commercial use of plant hormones

Chapter 17 Energy for biological processes

- Energy cycles
- ATP synthesis
- Photosynthesis
- Factors affecting photosynthesis

Chapter 18 Respiration

- Glycolysis
- Linking glycolysis and Krebs cycle
- The Krebs cycle
- Oxidative phosphorylation
- Anaerobic respiration
- Respiratory substrates

Chapter 19 Genetics of living systems

- Mutations and variation
- Control of gene expression
- Body plans

Chapter 20 Patterns of inheritance

- Variation and inheritance
- Monogenic inheritance
- Dihybrid inheritance
- Phenotypic ratios
- Evolution
- Speciation and artificial selection

Chapter 21 Manipulating genomes

- DNA profiling
- DNA sequencing and analysis
- Using DNA sequencing
- Genetic engineering
- Gene technology and ethics

Chapter 22 Cloning and biotechnology

- Natural cloning in plants
- Artificial cloning in plants
- Cloning in animals
- Microorganisms and biotechnology
- Microorganisms, medicines and bioremediation
- Culturing microorganisms in the laboratory
- Culturing microorganisms on an industrial scale
- Using immobilised enzymes

Chapter 23 Ecosystems

- Ecosystems
- Biomass transfer through an ecosystem
- Recycling within ecosystems
- Succession
- Measuring the distribution and abundance of organisms



Chapter 24 Populations and sustainability

- Population size
- Competition
- Predator-Prey relationships
- Conservation and preservation
- Sustainability
- Ecosystem management – Masai Mara
- Ecosystem management – Terai region of Nepal
- Ecosystem management – peat bogs
- Environmentally sensitive ecosystems



KEY SKILLS	<ul style="list-style-type: none"> • HSW1 Use theories, models and ideas to develop scientific explanations • HSW2 Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas • HSW3 Use appropriate methodology, including information and communication technology (ICT), to answer scientific questions and solve scientific problems • HSW4 Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts • HSW5 Analyse and interpret data to provide evidence, recognising correlations and causal relationships • HSW6 Evaluate methodology, evidence and data, and resolve conflicting evidence • HSW7 Know that scientific knowledge and understanding develops over time • HSW8 Communicate information and ideas in appropriate ways using appropriate terminology • HSW9 Consider applications and implications of science and evaluate their associated benefits and risks • HSW10 Consider ethical issues in the treatment of humans, other organisms and the environment • HSW11 Evaluate the role of the scientific community in validating new knowledge and ensuring integrity • HSW12 Evaluate the ways in which society uses science to inform decision making. 	
	<p>Required practical (PAGs): PAG 11 – Effect of exercise on heart rate</p> <ul style="list-style-type: none"> • Safe and ethical use of organisms to measure plant or animal responses and physiological functions <p>PAG 11 – Plant tropisms: Phototropism</p> <ul style="list-style-type: none"> • Safe and ethical use of organisms to measure plant or animal responses and physiological functions <p>PAG 12 – Respiration in yeast</p> <ul style="list-style-type: none"> • Apply investigative approaches • Use online and offline research skills • Correctly cite sources of information 	<p>Required practical (PAGs): PAG 7 – Effect of antibiotics on microbial growth</p> <ul style="list-style-type: none"> • Use of microbiological aseptic techniques, including the use of agar plates and broth <p>PAG 10 – Measuring pH change during yogurt production</p> <ul style="list-style-type: none"> • Use of ICT such as computer modelling, or data logger to collect data, or use of software to process data
	<p>Other skills AO1 - Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures. AO2 - Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:</p> <ul style="list-style-type: none"> • in a theoretical context • in a practical context • when handling qualitative data • when handling quantitative data. <p>AO3 - Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:</p> <ul style="list-style-type: none"> • make judgements and reach conclusions • develop and refine practical design and procedures 	<p>Other skills AO1 - Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures. AO2 - Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:</p> <ul style="list-style-type: none"> • in a theoretical context • in a practical context • when handling qualitative data • when handling quantitative data. <p>AO3 - Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:</p> <ul style="list-style-type: none"> • make judgements and reach conclusions • develop and refine practical design and procedures
HOW DO WE BUILD ON SKILLS AND KNOWLEDGE?	<p>Students will need to build on their knowledge and skills, from Key Stage 4 Science and Mathematics, including KS4 Bioenergetics and Homeostasis topics.</p> <p>They will also need to build on their knowledge of Module 2 – Foundations in Biology and Module 3 – Exchange and transport</p>	<p>Students will need to build on their knowledge and skills, from Key Stage 4 Science and Mathematics, including KS4 Reproduction and inheritance and Ecology topics.</p> <p>They will also need to build on their knowledge of Module 2 – Foundations in Biology and Module 4 –Biodiversity, Evolution and Disease</p>
	LINKS TO THE WORLD i.e. links to careers; equality; gender, class, ethnicity, etc.; different subjects	<p>Links to A-level Chemistry Links to A-level Maths</p>



ASSESSMENTS Summative and Formative as applicable	Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular marking with specific targets (EBI). Assessment of practical booklet. Summative: End of chapter and end of module assessments		Formative: constant AFL using a range of techniques, including self and peer assessment, verbal feedback, questioning, quizzes and regular marking with specific targets (EBI). Assessment of practical booklet. Summative: End of chapter and end of module assessments	
FEEDBACK SUPPORTS LEARNING	Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 		Opportunity for students to reflect on learning, respond to feedback, improve work, etc. 	
SPECIALIST VOCABULARY	<ul style="list-style-type: none"> • Neurotransmitters • Dendrons • Axons • Action potential • Myelinated • Transducer • Saltatory conduction • Spatial summation • Temporal summation • Myofibrils • Neuromuscular junction • Glycogenolysis • Gluconeogenesis • Glycogenesis • Chemoreceptors • Baroreceptors 	<ul style="list-style-type: none"> • Endotherm • Ectotherm • Deamination • Detoxification • Ultrafiltration • Osmoregulation • Abcission • Herbivory • Chemiosmosis • Substrate phosphorylation • Oxidative phosphorylation • Photophosphorylation • Decarboxylation • Fermentation • Respiratory quotient 	<ul style="list-style-type: none"> • Mutation • Mutagens • Heterochromatin • Euchromatin • Acetylation • Methylation • Apoptosis • Monogenic inheritance • Codominance • Dihybrid inheritance • Autosomal linkage • Epistasis • Allopatric speciation • Sympatric speciation • Intron • Bioinformatics • Genomics • Proteomics 	<ul style="list-style-type: none"> • Electroporation • Electrofusion • Micropropagation • Bioremediation • Metabolite • Batch fermentation • Continuous fermentation • Asepsis • Immobilised enzyme • Nitrification • Denitrification • Ammonification • Succession • Conservation • Preservation • Ecotourism
QUALITY FIRST TEACHING	<ul style="list-style-type: none"> ✓ Strategies to learn more, remember more (metacognition) used in lessons e.g. retrieval, elaboration, interleaving, dual coding, etc. ✓ Differentiation and reasonable adjustments for students with SEND, EAL, etc. such as scaffolding, visual aids, audio, physical resources, planned questioning, etc. ✓ Opportunities for Literacy, Numeracy and Oracy, including a focus on reading ✓ Opportunities to apply key concepts and address misconceptions 			