Curriculum Map

Subject Group	Subject: Biology	Set:	Threshold Concepts: Cells, ecology, energy

Year 7

	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2	
Term / Unit	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2	
	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	
Unit Title	Cells	Human reproduction / Plant reproduction	Photosynthesis / Respiration	Movement	Interdependence		
Knowledge	Using a microscope to observe cells; plant and animal cells - structure and function of organelles; specialised cells and their adaptations; diffusion; unicellular organisms - amoeba and euglena	Human reproduction: Adolescence and puberty; male and female reproductive systems structure and function; human fertilisation and implantation; development of a fetus; the menstrual cycle; contraception Plant reproduction: Structure of a flower; pollination; plant fertilisation; germination; seed dispersal	Photosynthesis: Photosynthesis; how reactants enter the plant and how products leave/are used; structure and function of leaves; investigating rates of photosynthesis; factors that affect the rate of photosynthesis; plant minerals and deficiencies Respiration: Aerobic respiration; anaerobic respiration; fermentation; biotechnology using yeast - making bread and wine	Levels of organisation; structure and function of skeleton; joints and measuring muscle strength; muscle movement and antagonistic muscles	Food chains and webs; interdependence and bioaccumulation; ecosystems key terms and how organisms coexist; plant and animal competition; predator-prey relationships		
Investigative skills	Using a microscope to observe cells; plant and animal cells -scientific drawings- Using Bioviewrs to observe cells, Microscopy magnification calculations	Measuring growth of a fruit over time Dissection of carpel and stamen	Investigate how a factor affects the rate of photosynthesis; Iodine test Investigating the effect of exercise on breathing rates. Most of us notice that our breathing rate alters when we exercise. This is linked to the process of	Chicken wing dissections; measure muscle strength	Measuring distribution and sampling of organisms		
Lit / Num	**Numeracy:** Calculate magnification **Literacy:** Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words:** magnifcation, resolution, mitochondria, nucleus, cell membrane, cytoplasm, vacuole, cell wall, ribosome, diffusion, adaptations, flagella	**Numeracy**: Interpreting menstural cycle diagrams **Literacy:** Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words:** adolescence, puberty, sex hormones, sperm cell, testes, scrotum, semen, sperm duct, urethra, penis, egg cell, ovary, oviduct, uterus, cervix, vagina, gamete, fertilisation, cilia, embryo, implantation, gestation, fetus, placenta, umbilical cord, amniotic fluid. period, mentruation, menstrual cycle, ovulation, contraception **Numeracy**: Decimal places, recording data, calculating range and mean **Literacy:** Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words:** petal, sepal, stamen, anther, pollen, filament, carpel, stigma, style, ovary, ovule, pollination, fertilisation, fruit, seed, germination, seed dispersal	**Numeracy**: Calculate rate of photosynthesis; decimal places, recording data, caluclating range and mean, plotting graphs **Literacy:** Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words:** photosynthesis, carbon dioxide, water, glucose, oxygen, light energy, temperature, limiting factor, starch, iodine, minerals, nitrates, active transport, stomate, guard cells **Numeracy**: Determine rate of respiration **Literacy**: Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words**: aerobic respiration, mitochondria. anaerobic respiration, oxygen debt, fermentation, biotechnology	**Numeracy**: Calculating force (Newtons) **Literacy:** Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words:** cell, tissue, organ, organ system, bones, skeleton, bone marrow, joints, cartilage, ligament, tendons, antagonistic muscles	**Numeracy**: Calculate energy transfer between trophic levels **Literacy:** Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). Key words: food chain, food web, interdependence, producers, consumers, predator, prey, energy transfer, trophic level, bioaccumulation, food, mate, space		
Enrichment	Visit to Francis Crick lab to use electron microscopes, Nancy Rothwell Drawing Award	Cross-curricular link to SRE	Speaker from/visit to Kew gardens	Speaker from/visit to Kew gardens, Nancy Rothwell Drawing Award	Speaker from/visit to Kew gardens	Baking the perfect bread competition	Cross-curricular link with PE department
British Vals	Democracy: Students will learn to respect dispairing ideas to one's beliefs and to discuss those ideas in civilised debates (e.g. Embryonic vs Adult stem cells use in research). At certain points in the curriculum, students will also be offered the opportunity to take a democratic decision (e.g. majority rule, supermajority or consensus) on the next course of action during a (or series of) lesson(s). The rule of law: students will learn to respect everyone's rights for health and safety by following imposed rules that promote a safe environment for learning and for practical work, further developing the notion that actions are closely followed by consequences. Individual liberty: students are expected to exercise their rights and to respect those of others (e.g. the actions taken in class need to be limited so as to not stop others from learning). Mutual respect for and tolerance of those with different faiths and beliefs and for those without faith: All students will have equal rights to voice their opinions and have their doubts answered, provided these do not offend others beliefs through the promotion of a polite and constructive rather than offensive and destructive discussion (e.g. sharing answers to 6-mark questions and offering/receiving constructive feedback to/from peers).						
Character	Develop resilience, confidence and independence through the practice of 6-mark questions and other independent work, both in and out of lesson. Develop problem solving rationale by promoting students to work on challenges which reinforce links between different schema.						
Careers	Biomedical scientist	Physiotherapist, Osteopath, Chiropractor, personal trainer, occupational health therapist	Nurse, midwife, doctor	Horticulturist	Horticulturist	Ecologist, Conservationist, Environmental impact Officer	

Year 8

	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
Term / Unit	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage
Unit Title			Respiration / Digestion	Breathing		Inheritance / Variation / Evolution
Knowledge			Respiration: Aerobic respiration; anaerobic respiration; fermentation; biotechnology using yeast - making bread and wine Digestion: Nutrients and deficiencies; food tests; unhealthy diets; digestive system structure and function; bacteria and enzymes in digestion	Diffusion and factors affecting rates of diffusion recap to relate to alveoli and villi, Gas exchange; breathing and measuring lung volume; medicinal and recreational drugs and addiction; alcohol; smoking and disease		Inheritance: Mechanisms of inheritance; relationship between DNA, genes and chromosomes; role of DNA mutations; structure of DNA; DNA discovery; dominant and recessive alleles; genetic diagrams - punnett square; genetic modification - advantages and disadvantages Variation: Environmental and genetic variation; continuous and discontinuous variation; plant and animal adaptations Evolution: Natural selection; Charles Darwin - peer review and evaluation of evidence; factors that lead to extinction; importance of biodiversity in maintaining populations and effect on ecosystem; preventing extinction and preserving biodiversity; endangered species
Investigative skills			Investigating the effect of exercise on breathing rates. Most of us notice that our breathing rate alters when we exercise. This is linked to the process of respiration and transfer of energy. Students to plan an investigation and identify independent, dependent, and control variables; form a hypothesis using your scientific Testing food for nutrients: How do you know what is in your food? You may be able to guess some of what is in there by looking at it. Scientists can find out exactly what is in food by using chemical tests called food tests. Carry out experiments to determine which	Measuring the volume of the lungs: When humans exchange gases they breathe in a volume of air. Are all lungs the same size? How can we measure the volume of our lungs? Students to design a system for measuring the volume of lungs; make accurate measurements; find out the volume of lungs; investigate whether height and lung volume are linked.		Inheriting eye patches. Students to investigate how the allele for the eye patch is inherited through several generations of dogs. Investiage variation within the class and categorise different traits as Evolutionary family tree. Organisms gradually change over time. During evolution, one group of organisms evolves into others. Students to create a proposed family tree by arranging
Lit / Num			**Numeracy**: Determine rate of respiration **Literacy**: Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words**: aerobic respiration, mitochondria. anaerobic respiration, oxygen debt, fermentation, biotechnology **Numeracy**: Calculate rate of enzyme reaction; pie charts; decimal places; significant figures; finding the mean; plotting graphs **Literacy**: Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words**: anus; balanced diet; bile; carbohydrase; carbohydrate; catalyst; dietary fibre; digestion; digestive system; enzyme; food test; gut bacteria; large intestine; lipase; lipid; nutrient; obese; protease; protein; rectum; small intestine; starvation; stomach; villi; vitamin.	**Numeracy**: Pie charts; percentages; decimal places; significant figures; rounding; finding the mean; surface area calculation and area units, volume calculation and volume units; SA: Vol ratio calculation, calculation of the total possible air breathed per minute. **Literacy**: Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words**: addiction; alcoholic; alveolus; asthma; breathing; bronchiole; bronchus; depressant; diaphragm; ethanol; exhale; gas exchange; inhale; lung volume; medicinal drug; passive smoking; respiratory system; unit of alcohol; withdrawal symptoms.		**Numeracy**: Use Punnett squares to predict the outcome of genetic crosses; calculate results; present observations using Punnett squares; use simple statistical techniques. **Literacy**: Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words**: inherited characteristics, DNA, chromsome, gene, mutation, allele, dominant, recessive, Punnett square, genetic modification **Numeracy**: Plot variation graphs; calculate range and means; pie charts Literacy: Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). Key words: variation, species, inherited variation, environmental variation, discontinuous variation, continuous variation, adaptation **Literacy**: Extended open response questions (Explain.., Why.., Suggest reasons for...; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words**: evolution, natural selection, fossil, peer review, extinct, competition, biodiversity, population, endangered species, conservation, captive breeding, gene bank
Enrichment			Baking the perfect bread competition	Using pig's lungs to demonstrate the respiratory system.		
British Vals	Democracy: Students will learn to respect dispairing ideas to one's beliefs and to discuss those ideas in civilised debates (e.g. Embryonic vs Adult stem cells use in research). At certain points in the curriculum, students will also be offered the opportunity to take a democratic decision (e.g. majority rule, supermajority or consensus) on the next course of action during a (or series of) lesson(s). The rule of law: students will learn to respect everyone's rights for health and safety by following imposed rules that promote a safe environment for learning and for practical work, further developing the notion that actions are closely followed by consequences. Individual liberty: students are expected to exercise their rights and to respect those of others (e.g. the actions taken in class need to be limited so as to not stop others from learning). Mutual respect for and tolerance of those with different faiths and beliefs and for those without faith: All students will have equal rights to voice their opinions and have their doubts answered, provided these do not offend others beliefs through the promotion of a polite and constructive rather than offensive and destructive discussion (e.g. sharing answers to 6-mark questions and offering/receiving constructive feedback to/from peers).					
Character	Develop resilience, confidence and independence through the practice of 6-mark questions and other independent work, both in and out of lesson. Develop problem solving rationale by promoting students to work on challenges which reinforce links between different schema.					
Careers	Doctor, personal trainer, social worker	Dietician, nutritionist, doctor, chef	Personal trainer, baker, brewer, athlete	Epidemiologist	Archeologist, paleontologist, conservationist, park ranger	Geneticist, doctor, academic researcher

Year 9

	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
Term / Unit	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage
Unit Title			Cell structure and transport / Cell division	Organising animals and plants		
Knowledge / Skills			Cell structure; Cell specialisation; Microscopy; Diffusion; Osmosis; Active transport Cell division and differentiation; stem cells; cell cycle	Blood and blood vessels; the heart and heart health; breathing and gas exchange; tissues in organs and plants; transport systems in plants; evaporation and transpiration		
Investigative Skills			RP1: Microscopy, Preparing plant and animal cells to observe under the microscope; RP2: Osmosis, Investigate the effect of solution concentrations on osmosis of plant cell (measuring and recording mass, volume and length). Researching the techniques used in stem cell medical research and related treatments.	Drawing blood cells observed under the microscope and identifying their adaptations to carry out specific functions. **OR** Drawing a transverse section of a leaf observed under the microscope and identifying the different cell types that constitute this organ. Observing the lower side of a leaf under the microscope and calculating the distribution of stomata.		
Literacy / Numeracy			**Numeracy:** Using prefix centi, milli, micro, nano. Calculating magnification; calculating % change in mass/length; Calculating rate of reaction using mass change; Calculating Surface Area to Volume ratio; Using the standard form. **Literacy:** Describe how to observe the structure of a plant/animal cell; compare methods of transport across the membrane **Keywords:** magnification, resolving power, nucleus, cytoplasm, cell membrane, mitochondria, ribosomes, cell wall, algae, cloroplasts, vacuole, cellulose, bacteria, prokaryotic cells, eukaryotic cells, xylem, phloem, diffusion, osmosis, turgor, plasmolysis, active transport, surface area to volume ratio, alveoli **Numeracy:** Calculate cell growth; interpret cell cycle diagrams **Literacy:** Differentiating opinion from fact in order to evaluate the risks and benefits of medical research and treatments. **Keywords:** cell cycle, mitosis, differentiation, stem cell, cloning, zygote, embryonic stem cell, therapuetic cloning	**Numeracy:** Calculating diameter of blood vessels, calculating rate of blood flow; calculating averages; calculating transpiration rate; calculating area and stomata distribution (#stomata/area). **Literacy:** Using comparative language to contrast the adaptations of different blood cells. Differentiating opinion from fact in order to evaluate the risks and benefits of medical research and treatments. **Keywords:** plamsa, platelets, red blood cells, white blood cells, haemoglobin, arteries, veins, capillaries, double circulatory system, coronary arteries, vena cava, atria, ventricles, pulmonary vein, pulmonary artery, stent, statins, epidermal tissue, palisade mesophyll, spongy mesophyll, xylem, phloem, translocation, transpiration, guard cells, stomata **Numeracy:** Calculating diameter of blood vessels, calculating rate of blood flow; calculating averages; calculating transpiration rate; calculating area and stomata distribution (#stomata/area). **Literacy:** Using comparative language to contrast the adaptations of different blood cells. Differentiating opinion from fact in order to evaluate the risks and benefits of medical research and treatments. **Keywords:** plamsa, platelets, red blood cells, white blood cells, haemoglobin, arteries, veins, capillaries, double circulatory system, coronary arteries, vena cava, atria, ventricles, pulmonary vein, pulmonary artery, stent, statins, epidermal tissue, palisade mesophyll, spongy mesophyll, xylem, phloem, translocation, transpiration, guard cells, stomata		
Enrichment	STEM Ambassadors (STEMNET, "Meet a role model"), Drop Down Day (Museum visits, In-school Forensic Experiments), Talks by Academics, Imperiall College's Summer School, CREST Awards., Nancy Rothwell Observational Drawing Award in July					
British Vals	Democracy: Students will learn to respect dispairing ideas to one's beliefs and to discuss those ideas in civilised debates (e.g. Embryonic vs Adult stem cells use in research). At certain points in the curriculum, students will also be offered the opportunity to take a democratic decision (e.g. majority rule, supermajority or consensus) on the next course of action during a (or series of) lesson(s). The rule of law: students will learn to respect everyone's rights for health and safety by following imposed rules that promote a safe environment for learning and for practical work, further developing the notion that actions are closely followed by consequences. Individual liberty: students are expected to exercise their rights and to respect those of others (e.g. the actions taken in class need to be limited so as to not stop others from learning). Mutual respect for and tolerance of those with different faiths and beliefs and for those without faith: All students will have equal rights to voice their opinions and have their doubts answered, provided these do not offend others beliefs through the promotion of a polite and constructive rather than offensive and destructive discussion (e.g. sharing answers to 6-mark questions and offering/receiving constructive feedback to/from peers).					
Character	Develop resilience, confidence and independence through the practice of 6-mark questions and other independent work, both in and out of lesson. Develop problem solving rationale by promoting students to work on challenges which reinforce links between different schema.					
Careers	Biomedical scientist, Scientific Researcher (e.g. Neurobiology, Neurodegeneration, Regeneration). Scientific Researcher (e.g. Cancer, Developmental Biologist), Astrobiologist, Marine Biologist, Medicine (Doctor, Nurse, Radiologist, etc.), Beauty Product Developer.					

	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
Term / Unit	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage
Unit Title	Organising animals and plants / Preventing and treating disease	Communicable disease	Photosynthesis	Respiration	Homeostasis - key elements of control system; structure and function of nervous system; reflex actions; *studying the brain*; structure and function of the human eye*; common problems of the eye**	Hormonal communication

Year 10	Organising animals and plants	Preventing and treating disease	Communicable disease	Photosynthesis	Respiration	Homeostasis	Hormonal communication
Knowledge	Blood and blood vessels; the heart and heart health; breathing and gas exchange; tissues in organs and plants; transport systems in plants; evaporation and transpiration	Vaccination; antibiotics and painkillers; Discovering and developing drugs; *monoclonal antibodies**	Pathogens and disease; growing bacteria in the lab and preventing growth*; viral, bacterial, fungal and protist diseases; human defence responses; plant disease and responses*;	Photosynthesis; rate of photosynthesis; how plants use glucose; greenhouse economics.	Aerobic respiration; anaerobic respiration; fermentation; biotechnology using yeast - making bread and wine	Homeostasis - key elements of control system; structure and function of nervous system; reflex actions; RP7: Reaction times; *studying the brain*; structure and function of the human eye*; common problems of the eye**	Principles of hormonal control; control of blood glucose levels and diabetes; treating diabetes; the role of negative feedback - thyroxine and adrenaline; human reproduction; the menstrual cycle; contraception; infertility treatments; *plant hormones and responses*; using plant hormones in agriculture and horticulture**
Investigative skills	Drawing blood cells observed under the microscope and identifying their adaptations to carry out specific functions. **OR** Drawing a transverse section of a leaf observed under the microscope and identifying the different cell types that constitute this organ. Observing the lower side of a leaf under the microscope and calculating the distribution of stomata.	Planning tests and clinical trials to test new medicinal drugs - Techniques to avoid bias; Techniques to test safety; Techniques to test effectiveness; Critical assessment by peer review.	RP2: Study the effect of disinfectants, antiseptics and/or antibiotics on bacterial growth - Safe use of Bunsen's burner, Creating and working in aseptic environtments, Safe manipulation and disposal of biological hazards.	RP6: Studying the effect of light intensity on the rate of photosynthesis - Measuring time, volume of liquid; Measuring the number of gas bubles/ volume of gas as a proxy of rate of photosynthesis; Ethical use of living organisms; Register and plot data, Interpret results.	Investigating the effect of exercise on breathing rates. Most of us notice that our breathing rate alters when we exercise. This is linked to the process of respiration and transfer of energy. Students to plan an investigation and identify independent, dependent, and control variables; form a hypothesis using your scientific knowledge; use appropriate methods in your practical work; interpret data to draw conclusions; present reasoned explanations in relation to prediction and hypothesis.	RP7: Reaction times; Dissection of eye to investigate structures	*RP8: Germination**
Lit / Num	**Numeracy:** Calculating diameter of blood vessels, calculating rate of blood flow; calculating averages; calculating transpiration rate; calculating area and stomata distribution (#stomata/area). **Literacy:** Using comparative language to contrast the adaptations of different blood cells. Differentiating opinion from fact in order to evaluate the risks and benefits of medical research and treatments. **Keywords:** plamsa, platelets, red blood cells, white blood cells, haemoglobin, arteries, veins, capillaries, double circulatory system, coronary arteries, vena cava, atria, ventricles, pulmonary vein, pulmonary artery, stent, statins, epidermal tissue, palisade mesophyll, spongy mesophyll, xylem, phloem, translocation, transpiration, guard cells, stomata	**Numeracy:** Interpreting graphs on the impact of disease prevention and treatment on the incidence of the disease. **Literacy:** Evaluating vaccination in the prevention of global disease; Comparing the treatments of bacterial diseases with treatments of viral diseases. **Keywords:** vaccine, antibiotics, preclinical testing, clincal trials, placebo Literacy: Describing a graph or a table. Advise a non-scientist on how to profit the most from greenhouse agriculture when given data on limiting factors of the rate of photosynthesis. Keywords: glucose, endothermic reaction, limting factors, starch, cellulose	**Numeracy:** Calculating diameter of clear zone; Calculating rate of bacteria growth; Calculating bacterial population size. **Literacy:** Writing a safety and health document for working with potential pathogenic bacteria. **Keywords:** pathogens, microorganisms, viruses, vaccines, sexually transmitted diseases, protits, white blood cells, antigens, antibodies, antitoxins	**Numeracy:** Calculating rate of photosynthesis; Interpret graphs of the effect of limiting factors on the rate of photosynthesis. Literacy: Describing a graph or a table. Advise a non-scientist on how to profit the most from greenhouse agriculture when given data on limiting factors of the rate of photosynthesis. **Keywords:** glucose, endothermic reaction, limting factors, starch, cellulose	**Numeracy:** Determine rate of respiration **Literacy:** Extended open response questions (Explain..., Why..., Suggest reasons for..., ; Evaluate; Discuss; Describe; To what extent...; Compare). **Key words:** aerobic respiration, mitochondria. anaerobic respiration, oxygen debt, fermentation, biotechnology	**Numeracy:** Calculating speed of reaction (link with physics) **Literacy:** Write a method to investigate the effect of different factors on reaction times **Keywords**: homeostasis, receptors, stimuli, coordination centres, effectors, neurones, nerves, central nervous system, sensory neurones, motor neurones, reflexes, reflex arc	**Numeracy:** Analysis of menstrual cycle graphs and data **Literacy:** Extended response on glucose regulation; compare types of contraception **Keywords:** endocrine system, adrenaline, hormones, insulin, pituitary gland, ADH FSH, ovaries, oestrogen, glucagon, diabetes, ovulation, testosterone
Enrichment	Biology Challenge-RSB in March, STEM Ambassadors (STEMNET, "Meet a role model"), Drop Down Day (Museum visits, In-school Forensic Experiments), Talks by Academics, Imperiall College's Summer School, CREST Awards., Nancy Rothwell Drawing award in July						
British Vals	Democracy: Students will learn to respect dispairing ideas to one's beliefs and to discuss those ideas in civilised debates (e.g. Embryonic vs Adult stem cells use in research). At certain points in the curriculum, students will also be offered the opportunity to take a democratic decision (e.g. majority rule, supermajority or consensus) on the next course of action during a (or series of) lesson(s). The rule of law: students will learn to respect everyone's rights for health and safety by following imposed rules that promote a safe environment for learning and for practical work, further developing the notion that actions are closely followed by consequences. Individual liberty: students are expected to exercise their rights and to respect those of others (e.g. the actions taken in class need to be limited so as to not stop others from learning). Mutual respect for and tolerance of those with different faiths and beliefs and for those without faith: All students will have equal rights to voice their opinions and have their doubts answered, provided these do not offend others beliefs through the promotion of a polite and constructive rather than offensive and destructive discussion (e.g. sharing answers to 6-mark questions and offering/receiving constructive feedback to/from peers).						
Character	Develop resilience, confidence and independence through the practice of 6-mark questions and other independent work, both in and out of lesson. Develop problem solving rationale by promoting students to work on challenges which reinforce links between different schema.						
Careers							

Year 10 Separate	Term: Aut 1		Term: Aut 2		Term: Spr 1		Term: Spr 2	Term: Sum 1	Term: Sum 2
	Curriculum/Syllabus Coverage		Curriculum/Syllabus Coverage		Curriculum/Syllabus Coverage		Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage
Unit Title	**Organising animals and plants**	**Non-communicable disease**	**Communicable disease**	**Preventing and treating disease**	**Photosynthesis**	**Respiration**	Homeostasis - key elements of control system; structure and function of nervous system; reflex actions; *studying the brain*; structure and function of the human eye*; common problems of the eye**	Hormonal communication	Reproduction
Knowledge	Blood and blood vessels; the heart and heart health; breathing and gas exchange; tissues in organs and plants; transport systems in plants; evaporation and transpiration	Cancer; epidemiology; smoking; diet and exercise; alcohol	Pathogens and disease; growing bacteria in the lab and preventing growth*; viral, bacterial, fungal and protist diseases; human defence responses; plant disease and responses*;	Vaccination; antibiotics and painkillers; Discovering and developing drugs; *monoclonal antibodies**	Photosynthesis; rate of photosynthesis; how plants use glucose; greenhouse economics.	Aerobic respiration; anaerobic respiration and oxygen debt; how the body responds to increased energy demands during exercise; metabolism and the role of the liver in oxygen debt	Homeostasis - key elements of control system; structure and function of nervous system; reflex actions; RP7: Reaction times; *studying the brain*; structure and function of the human eye*; common problems of the eye**	Principles of hormonal control; control of blood glucose levels and diabetes; treating diabetes; the role of negative feedback - thyroxine and adrenaline; human reproduction; the menstrual cycle; contraception; infertility treatments; *plant hormones and responses*; using plant hormones in agriculture and horticulture**	Asexual and sexual reproduction; Meiosis and fertilisation; *reproduction in fungi, plants and malaria parasites**; DNA and the genome; *DNA structure and protein synthesis**; gene expression and mutation*; how inheritance works and genetic diagrams; sex determination; inherited diseases; screening for genetic disorders
Investigative skills	Drawing blood cells observed under the microscope and identifying their adaptations to carry out specific functions. **OR** Drawing a transverse section of a leaf observed under the microscope and identifying the different cell types that constitute this organ. Observing the lower side of a leaf under the microscope and calculating the distribution of stomata.	Apply the principles of sampling to scientific data in a study at a populational scale.	RP2: Study the effect of disinfectants, antiseptics and/or antibiotics on bacterial growth - Safe use of Bunsen's burner, Creating and working in aseptic environtments, Safe manipulation and disposal of biological hazards.	Planning tests and clinical trials to test new medicinal drugs - Techniques to avoid bias; Techniques to test safety; Techniques to test effectiveness; Critical assessment by peer review.	RP6: Studying the effect of light intensity on the rate of photosynthesis - Measuring time, volume of liquid; Measuring the number of gas bubles/ volume of gas as a proxy of rate of photosynthesis; Ethical use of living organisms; Register and plot data, Interpret results.	Planning a study on the effect of temperature on the respiration rate of organisms - Identify dependent, independent and control variables; Devise techniques to keep control variables stable; Develop scientific language and protocol writing.	RP7: Reaction times; Dissection of eye to investigate structures	*RP8: Germination**	Use of runners/tubers to demonstrate asexual reproduction; research ethical/moral/ecomonic issues around screening for genetic disorders
Lit / Num	**Numeracy:** Calculating diameter of blood vessels, calculating rate of blood flow; calculating averages; calculating transpiration rate; calculating area and stomata distribution (#stomata/area). **Literacy:** Using comparative language to contrast the adaptations of different blood cells. Differentiating opinion from fact in order to evaluate the risks and benefits of medical research and treatments. **Keywords:** plamsa, platelets, red blood cells, white blood cells, haemoglobin, arteries, veins, capillaries, double circulatory system, coronary arteries, vena cava, atria, ventricles, pulmonary vein, pulmonary artery, stent, statins, epidermal tissue, palisade mesophyll, spongy mesophyll, xylem, phloem, translocation, transpiration, guard cells, stomata	**Numeracy:** Interpreting data in the form of tables and graphs on the effect of risk factors on disease incidence; Identifying correlation between two variables, Calculating % change of disease incidence. **Literacy:** Writing and preparing an explanation of how life factors affect non-communicable disease incidence that is appropriate for different audiences (scientist vs population). **Keywords:** carcinogens, ionising radiation, correlation, causal mechanism, benign tumours, malignant tumours, cancer	**Numeracy:** Calculating diameter of clear zone; Calculating rate of bacteria growth; Calculating bacterial population size. **Literacy:** Writing a safety and health document for working with potential pathogenic bacteria. **Keywords:** pathogens, microorganisms, viruses, vaccines, sexually transmitted diseases, protits, white blood cells, antigens, antibodies, antitoxins	**Numeracy:** Interpreting graphs on the impact of disease prevention and treatment on the incidence of the disease. **Literacy:** Evaluating vaccination in the prevention of global disease; Comparing the treatments of bacterial diseases with treatments of viral diseases. **Keywords:** vaccine, antibiotics, preclinical testing, clincal trials, placebo	**Numeracy:** Calculating rate of photosynthesis; Interpret graphs of the effect of limiting factors on the rate of photosynthesis. Literacy: Describing a graph or a table. Advise a non-scientist on how to profit the most from greenhouse agriculture when given data on limiting factors of the rate of photosynthesis. **Keywords:** glucose, endothermic reaction, limting factors, starch, cellulose	**Numeracy:** Calculating rate of respiration, Interpreting data from tables and graphs. Literacy: Comparing photosynthesis and respiration. Writing a scientific protocol that is precise and independent of further input. **Keywords:** anaerobic respiration, aerobic respiration, mitochondria, energy, glycogen, exothermic reaction, oxygen debt	**Numeracy:** Calculating speed of reaction (link with physics) **Literacy:** Write a method to investigate the effect of different factors on reaction times **Keywords**: homeostasis, receptors, stimuli, coordination centres, effectors, neurones, nerves, central nervous system, sensory neurones, motor neurones, reflexes, reflex arc	**Numeracy:** Analysis of menstrual cycle graphs and data **Literacy:** Extended response on glucose regulation; compare types of contraception **Keywords:** endocrine system, adrenaline, hormones, insulin, pituitary gland, ADH FSH, ovaries, oestrogen, glucagon, diabetes, ovulation, testosterone	**Numeracy:** Direct proportion and simple ratios **Literacy:** Evaulation of pros vs. cons for genetic screening; compare mitosis and meiosis **Keywords:** asexual reproduction, sexual reproduction, meiosis, natural selection, homozygote, heterozygote, genotype, phenotype, alleles, dominant, recessive, sex chromosomes, polydactyly, cystic fibrosis, carriers, genetic engineering
Enrichment	Biology Challenge-RSB in March, STEM Ambassadors (STEMNET, "Meet a role model"), Drop Down Day (Museum visits, In-school Forensic Experiments), Talks by Academics, Imperiall College's Summer School, CREST Awards., Nancy Rothwell Drawing award in July								
British Vals	Democracy: Students will learn to respect dispairing ideas to one's beliefs and to discuss those ideas in civilised debates (e.g. Embryonic vs Adult stem cells use in research). At certain points in the curriculum, students will also be offered the opportunity to take a democratic decision (e.g. majority rule, supermajority or consensus) on the next course of action during a (or series of) lesson(s). The rule of law: students will learn to respect everyone's rights for health and safety by following imposed rules that promote a safe environment for learning and for practical work, further developing the notion that actions are closely followed by consequences. Individual liberty: students are expected to exercise their rights and to respect those of others (e.g. the actions taken in class need to be limited so as to not stop others from learning). Mutual respect for and tolerance of those with different faiths and beliefs and for those without faith: All students will have equal rights to voice their opinions and have their doubts answered, provided these do not offend others beliefs through the promotion of a polite and constructive rather than offensive and destructive discussion (e.g. sharing answers to 6-mark questions and offering/receiving constructive feedback to/from peers).								
Character	Develop resilience, confidence and independence through the practice of 6-mark questions and other independent work, both in and out of lesson. Develop problem solving rationale by promoting students to work on challenges which reinforce links between different schema.								
Careers									

Year 11	Term: Aut 1		Term: Aut 2	Term: Spr 1		Term: Spr 2		Term: Sum 1	Term: Sum 2
	Curriculum/Syllabus Coverage		Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage		Curriculum/Syllabus Coverage		Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage
Unit Title	Hormonal communication	Reproduction	Genetics and evolution	Variation and evolution	Organising an ecosystem	Adaptations, interdependence and competition	Biodiversity and ecosystems		
Knowledge / Skills	Principles of hormonal control; control of blood glucose levels and diabetes; treating diabetes; the role of negative feedback - thyroxine and adrenaline; human reproduction; the menstrual cycle; contraception; infertility treatments; *plant hormones and responses*; using plant hormones in agriculture and horticulture**	Asexual and sexual reproduction; Meiosis and fertilisation; *reproduction in fungi, plants and malaria parasites**; DNA and the genome; *DNA structure and protein synthesis**; gene expression and mutation*; how inheritance works and genetic diagrams; sex determination; inherited diseases; screening for genetic disorders	History of genetics - Mendel*; Lamarck and Darwin's theory of evolution*; accepting Darwin's ideas*; Evolution and speciation*; fossils as evidence for evolution; extinction; how extinction can happen; antibiotic resistant bacteria; classification; evolutionary trees	Causes of variation; evolution by natural selection; selective breeding; genetic engineering; *cloning*; adult cell cloning**; ethics of genetic technologies	Feeding relationships; predator-prey relationships; *trophic levels and biomass*; Biomass transfers**; carbon cycle; water cycle; *rates of decomposition**	Communities and ecosystems; abiotic and biotic factors; investigating distribution and abundance; competition in plants and animals; adaptations in plants and animals	Biodiversity and human impact; land and water pollution; air pollution; deforestation and peat destruction; global warming; *impact of environmental change on distribution of organisms**; reducing human impact on biodiversity; *factors affecting food security*; making food production efficient*; sustainable food production**		Exams
	*RP8: Germination**	Use of runners/tubers to demonstrate asexual reproduction; research ethical/moral/ecomonic issues around screening for genetic disorders	Analyse differnent fossils to establish evolutionary links; investigate effect of different antibiotics on bacterial growth	Investigate variation that exists within class; research ethical/moral/ecomonic issues associated with genetic technologies	*RP10: Decay**	RP9: Quadrats - sampling techniques in practice			
Lit / Num	**Numeracy:** Analysis of menstrual cycle graphs and data **Literacy:** Extended response on glucose regulation; compare types of contraception **Keywords:** endocrine system, adrenaline, hormones, insulin, pituitary gland, ADH FSH, ovaries, oestrogen, glucagon, diabetes, ovulation, testosterone	**Numeracy:** Direct proportion and simple ratios **Literacy:** Evaulation of pros vs. cons for genetic screening; compare mitosis and meiosis **Keywords:** asexual reproduction, sexual reproduction, meiosis, natural selection, homozygote, heterozygote, genotype, phenotype, alleles, dominant, recessive, sex chromosomes, polydactyly, cystic fibrosis, carriers, genetic engineering	**Numeracy:** Calculating bacterial growth; interpretation of phylogenic tress **Literacy:** Explain how natural selection/speciation leads to the evolution of a new species; compare Lamarck and Darwin's theory of evolution **Keywords:** extinction, classification, domain, evolutionary trees	**Numeracy:** Interpret frequncy tables and diagrams, bar charts and histograms **Literacy:** extended response on variation and evolution, genetic engineering, ethics of genetic technologies **Keywords:** mutation, selective breeding	**Numeracy:** Calculate % energy efficiency between different trophic levels; calculate energy lost vs energy gained; rates of decomposition; analyse predator-prey population graphs **Literacy:** Explain how to investigate theeffect of a named factor on the rate of decay **Keywords:** primary consumers, biomass, producers, secondary consumers, decomposers	**Numeracy:** Calculate % coverage/representation **Literacy:** Describe adaptations and explain how they increase survival; describe how to estimate population size and investigate the effect of an abiotic/biotic factor on the distribution of a species **Keywords:** communities, interdependence, abundance, distribution, quadrat, sample size, mean, quantitative sampling, range, median, mode, transect, competition, adaptations, extremophiles, predators	**Numeracy:** Calculate % energy efficiency between different trophic levels; intepret different types of graphical information **Literacy:** Evaluate effect of environmental changes on the distribution of organisms **Keywords:** biodiversity, acid rain, deforestation, trophic levels		
Enrichment	Talks by Academics, Imperial College's Summer School								
British Vals	Democracy: Students will learn to respect dispairing ideas to one's beliefs and to discuss those ideas in civilised debates (e.g. Embryonic vs Adult stem cells use in research). At certain points in the curriculum, students will also be offered the opportunity to take a democratic decision (e.g. majority rule, supermajority or consensus) on the next course of action during a (or series of) lesson(s). The rule of law: students will learn to respect everyone's rights for health and safety by following imposed rules that promote a safe environment for learning and for practical work, further developing the notion that actions are closely followed by consequences. Individual liberty: students are expected to exercise their rights and to respect those of others (e.g. the actions taken in class need to be limited so as to not stop others from learning). Mutual respect for and tolerance of those with different faiths and beliefs and for those without faith: All students will have equal rights to voice their opinions and have their doubts answered, provided these do not offend others beliefs through the promotion of a polite and constructive rather than offensive and destructive discussion (e.g. sharing answers to 6-mark questions and offering/receiving constructive feedback to/from peers).								
Character	Develop resilience, confidence and independence through the practice of 6-mark questions and other independent work, both in and out of lesson. Develop problem solving rationale by promoting students to work on challenges which reinforce links between different schema.								
Careers	Agriculture, Horticulture, Politician/Lawyer for the Department for Environment, Food and Rural Affairs, Science Researcher, Astrobiologist, Pharmacologist.		Agriculture, Horticulture, Politician/Lawyer for the Department for Environment, Food and Rural Affairs, Science Researcher, Astrobiologist, Pharmacologist.						

	Term: Aut 1		Term: Aut 2		Term: Spr 1	Term: Spr 2	Term: Sum 1	Term: Sum 2
	Curriculum/Syllabus Coverage		Curriculum/Syllabus Coverage		Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage	Curriculum/Syllabus Coverage
Unit Title	Reproduction	Genetics and evolution	Adaptations, interdependence and competition	Variation and evolution	Organising an ecosystem	Biodiversity and ecosystems		
Knowledge / Skills	Asexual and sexual reproduction; Meiosis and fertilisation; *reproduction in fungi, plants and malaria parasites**; DNA and the genome; *DNA structure and protein synthesis**; gene expression and mutation*; how inheritance works and genetic diagrams; sex determination; inherited diseases; screening for genetic disorders	History of genetics - Mendel*; Lamarck and Darwin's theory of evolution*; accepting Darwin's ideas*; Evolution and speciation*; fossils as evidence for evolution; extinction; how extinction can happen; antibiotic resistant bacteria; classification; evolutionary trees	Communities and ecosystems; abiotic and biotic factors; investigating distribution and abundance; competition in plants and animals; adaptations in plants and animals	Causes of variation; evolution by natural selection; selective breeding; genetic engineering; *cloning*; adult cell cloning**; ethics of genetic technologies	Feeding relationships; predator-prey relationships; *trophic levels and biomass*; Biomass transfers**; carbon cycle; water cycle; *rates of decomposition**	Biodiversity and human impact; land and water pollution; air pollution; deforestation and peat destruction; global warming; *impact of environmental change on distribution of organisms**; reducing human impact on biodiversity; *factors affecting food security*; making food production efficient*; sustainable food production**		
	Use of runners/tubers to demonstrate asexual reproduction; research ethical/moral/ecomonic issues around screening for genetic disorders	Analyse differnent fossils to establish evolutionary links; investigate effect of different antibiotics on bacterial growth	RP9: Quadrats - sampling techniques in practice	Investigate variation that exists within class; research ethical/moral/ecomonic issues associated with genetic technologies	*RP10: Decay**			

Year 11 Separate

Lit / Num											
Numeracy: Direct proportion and simple ratios	**Literacy:** Evaulation of pros vs. cons for genetic screening; compare mitosis and meiosis **Keywords:** asexual reproduction, sexual reproduction, meiosis, natural selection, homozygote, heterozygote, genotype, phenotype, alleles, dominant, recessive, sex chromosomes, polydactyly, cystic fibrosis, carriers, genetic engineering	**Numeracy:** Calculating bacterial growth; interpretation of phylogenic tress	**Literacy:** Explain how natural selection/speciation leads to the evolution of a new species; compare Lamarck and Darwin's theory of evolution **Keywords:** extinction, classification, domain, evolutionary trees	**Numeracy:** Calculate % coverage/representation	**Literacy:** Describe adaptations and explain how they increase survival; describe how to estimate population size and investigate the effect of an abiotic/biotic factor on the distribution of a species **Keywords:** communities, interdependence, abundance, distribution, quadrat, sample size, mean, quantitative sampling, range, median, mode, transect, competition, adaptations, extremophiles, predators	**Numeracy:** Interpret frequncy tables and diagrams, bar charts and histograms	**Literacy:** extended response on variation and evolution, genetic engineering, ethics of genetic technologies **Keywords:** mutation, selective breeding	**Numeracy:** Calculate % energy efficiency between different trophic levels; calculate energy lost vs energy gained; rates of decomposition; analyse predator-prey population graphs	**Literacy:** Explain how to investigate theeffect of a named factor on the rate of decay **Keywords:** primary consumers, biomass, producers, secondary consumers, decomposers	**Numeracy:** Calculate % energy efficiency between different trophic levels; intepret different types of graphical information	**Literacy:** Evaluate effect of environmental changes on the distribution of organisms **Keywords:** biodiversity, acid rain, deforestation, trophic levels

MOCKS

Exams

Enrichment

British Vals

Character

Careers

Year 12

Term	Unit	Knowledge / Skills	Lit / Num
Aut 1	Biological molecules	Bonding in biological molecules; Monosaccharides structure; Benedict's test; Disaccharide structure and glycosidic bond; testing for starch; starch, glycogen and cellulose structure and function; Triglyceride and phospholipid structure and function; test for lipids; Structure of amino acid and peptide bonds; structure of proteins from primary to quaternary; test for proteins; enzyme models of action; factors that affect enzyme activity; enzyme inhibition; measuring the rate of enzyme-controlled reactions	Calculating rate of reactions Percetage decrease Interpret data from graphs showing enzyme action and factors that affect enzyme activity Bonding Names - Glycosidic, Ester, Peptide
Aut 2	Nucleic acids	Nucleotide structure; structure of RNA and DNA; DNA replication; semi-conservative replication; ATP structure; ATP synthesis; roles of ATP; Structure and properties of water; inorganic ions are their roles	Calculating % DNA bases Calculating No. of amino acids Caculating energy availability from ATP Ribose, deoxyribose
Aut 2	Cell Structure	Methods of studying cells, including centrifugation; Electron microscope; microscope measurements and calculations; eukaryotic cell organelles structure and function; cell specialisation and organisation; structure of bacterial cell; structure of viruses; process of mitosis; the cell cycle; cancer mechanism and treatment	Calculating magnification; converting units; Calculating number of cells after cell division - binary fission Organelle names; eukaryotes vs prokaryotes; mitosis stage names
Spr 1	DNA, genes and protein synthesis	Genes and the genetic code; chromosome structure; homologous chromosomes; alleles; tRNA and mRNA structure; process of synthesising polypeptides - transcription, splicing and translation	Calculating % of bases Introduce synoptic linking between topics; Homologous, homozygous, heterozygous, differences between tRNA and mRNA, polypeptides, splicing, transcription, translation
Spr 1	Transport across cell membranes	Structure of cell surface membrane; simple diffusion; facilitated diffusion; osmosis and water potential; active transport; co-transport and absorption of glucose in the ileum; oral rehydration therapy	Calculating rate of transport, % change in mass
Spr 2	Cell recognition and the immune system	Main defence mechanisms in body; phagocytosis; ; t-lymphocytes and cell-mediated immunity; B lymphocytes and humoral immunity; antibodies; monoclonal antibodies; ELISA; vaccination; herd immunity; ethics of vaccination; MMR vaccine; HIV and AIDS, including treatment	Interpreting immune response and epidemiological graphs; Writing paragraphs that link synoptic topics; Phagocytosis, lymphocytes, monoclonal
Spr 2	Exchange between organisms and their environments	Surface area to volume ratio; features of specialised exchange surfaces; gas-exchange in insects; gas exchange in single-celled organisms; gas exchange in fish - countercurrent exchange principle; gas exchange in leaf; limiting water loss in insects and plants; structure of human gas exchange system; mechanism of breathing; exchange of gases in the lungs; risk factors for lung disease; enzymes and digestion; absorption of products of digestion	Calculate surface area to volume ratio; pulmonary ventilation = tidal volume x breathing rate Refining paragraphs and making sure depth of knowledge is incorporated; Lamellae, spiracles, tracheoles
Sum 1	Mass transport	Haemoglobin; oxygen dissociation curves; effect of carbon dioxide on oxygen transport; transport systems; circulatory systems in mammals; structure of the human heart; risk factors associated with cardiovascular disease; cardiac cycle; cardiac output; interpreting ECG; blood vessels and their function; tissue fluid formation; transport of water in the xylem; measurement of water uptake using a potometer; transport of organic substances in the phloem; investigating transport in plants	cardiac output = heart rate x stroke volume; calculating blood flow; $\pi r^2 l$ Planning out full essays Model and mark exemplars; dissociation, affinity, semilunar, tricuspid, bicuspid, SAN, AVN, Purkyne tissue, potometer
Sum 1	Genetic diversity	Gene mutations; chromosome mutations; hybridisation and polyploidy; meiosis - independent segregation and homologous chromosomes and genetic recombination by crossing over; genetic diversity and adaptations; directional selection; stabilising selection	Planning out full essays and peer assess effectiveness Write introductory paragraph; hybridisation, polyploidy, segregation, recombination.
Sum 2	Inherited change	Studying inheritance; representing genetic crosses; probability and genetic crosses; dihybrid inheritance; codominance and multiple alleles; sex inheritance in humans; sex-linkage and sex-linked diseases; pedigree charts; autosomal linkage; epistasis; chi-squared test	Chi-squared test Attempt full essay - open book and model live marking; dihybrid, codominance, sex-linkage, autosomal linkage
Sum 2	Populations and evolution	Population genetics; Hardy-Weinberg principle; variation in phenotype; natural selection; stabilising, directional and disruptive selection; isolation and allopatric & sympatric speciation	Hardy-Weinberg principle Ratio of phenotypes Percentage growth calculations Making synoptic links between topics; Planning out essays; Writing full essays allopatric vs sympatric speciation
Sum 2	Biodiversity	Species and taxonomy; courtship behaviour; organising species; diversity within a community; impact of agriculture; conservation and farming; investigating diversity; immunological comparisons of proteins; quantitative investigations of variation	Measuring index of diversity; calculating mean, mode, median and standard deviation Attempt full essay - deep dive marking and pupils make corrections. Give Summer holiday HL - 2 essays - one to mark in class, one to be marked by teacher and fedback species diversity, species richness

Enrichment: STEM - Biology in action - Gene Coding, Nikon Imaging Centre Visit at KCL Guy's ca | STEM - Biology in action - Microbiome, Nancy Rothwell Drawing award in July | STEM - Biology in action - Gene Coding | STEM - Biology in action - Microbiome | Nancy Rothwell Drawing award | STEM - Biology in action - Gene Coding | RP 12 Field Trip to Hyde Park , STEM - Biology in action - Gene Coding | STEM - Biology in action - future of food , Intermediate Biology Olympiad-RSB in June

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Character: Develop resilience, confidence and independence through the practice of 6-mark questions and other independent work, both in and out of lesson. Develop problem solving rationale by promoting students to work on challenges which reinforce links between different schema.

Careers: Laboratory Technicians, Research specialist, molecular biologist, celluar biologist, biochemist | Cellular Biologist, Research Biologist, Physiologist | Cancer researcher, Genetic engineering, Genetic Councellor, Biochem Diabetic care Nurse, Renal consultant, Vascular surgeo | Epidemiologist, Veternarian, Haematologist, Nat | Vet, microbiologist, exercise pathologist, gastroenter | Cardiac surgeon, cardiologist, cardiovascular | Cancer researcher, Genetic engineering, Genetic C | Conservation scientists, foresters, zoologist, wildlife biologist, biological technician

Year 13

Term	Unit	Knowledge / Skills	Lit / Num
Aut 1	Populations and ecosystems	Populations and ecosystems; plotting population growth curves; abiotic and biotic factors; intraspecific and interspecific competition; predation and predator-prey relationships; investigating populations - quadrats, random sampling, belt transects, mark-release-recapture; succession; conservation of habitats	Calculating population growth and % population growth rate Mark-release-recapture to estimate population size Population growth curves Statistical tests Species diversity index Graphical analysis Dissect essay written over holidays Use exemplars for students to mark as examiners intra vs interspecific competitions
Aut 1	Photosynthesis	Plant adaptations for photosynthesis; oxidation and reduction; making ATP; light-dependent reaction; photolysis of water; light-independent reaction; Calvin cycle; using a lollipop to work out the light-independent reaction; measuring photosynthesis	Calculating yields Percentage efficiency Graphical analysis oxidstion vs reduction photolysis
Aut 2	Respiration	Glycolysis; link's reaction Krebs cycle and its significance; coenzymes; oxidative phosphorylation and mitochondria; electron transfer chain and ATP synthesis; alternative respiratory substrates; anaerobic respiration; investigating where respiratory pathways take place in cells	Calculating yields Graphical analysis Percentage increase RQ calculations Oxidative phosphorylation
Aut 2	Energy and ecosystems	Food chains and energy transfer; biomass; energy transfer and productivity; productivity and farming practices; nitrogen cycles; phosphorus cycle; use of natural and artificial fertilisers; environmental issues concerning the use of nitrogen-containing fertilisers	net primary production = gross primary production - respiratory losses; calculating % efficiency Ratios Perentage difference
Spr 1	Response to stimuli	Survival and response; taxes, kinesis and tropism behaviour; plant growth factors - phototropism and gravitropism; role of IAA in tropisms; simple reflex arc - structure and function; main features of sensory reception; structure and function of Pacinian corpuscle; rod and cone cells in the eye; autonomic nervous system; control of heart rate; chemoreceptors and pressure receptors	Interpretation of IAA graphs Graphical analysis Percentage change Ratios Calculating heart rate and stroke volume
Spr 1	Nervous coordination and muscles	Principles of coordination; neurones; resting potential; action potential; passage of action potential along an unmyelinated axon and myelinated axon; speed of the nerve impulse; refractory period; structure and function of synapses; transmission across a synapse; effects of drugs on synapses; structure of skeletal muscle; neuromuscular junctions; contraction of skeletal muscle; sliding filament mechanism of muscle contraction	Calculating action potentials Graphical Analysis
Spr 1	Homeostasis	Importance of homeostasis; coordination of control mechanisms; thermoregulation in ectotherms and endotherms; negative feedback; positive feedback; negative feedback in temperature control; hormones and the regulation of blood glucose concentration; diabetes and its control; effects of diabetes on substance concentrations in the blood; control of water potential - structure of the nephron; role of the nephron in osmoregulation; role of hormones in osmoregulation; significance of glucose in urine	Rate of blood flow through the kidneys Filtration rate Interpret Graph - glucose conc, urea in blood
Spr 2	Gene expression	Types of gene mutations; causes of gene mutations - mutagenic agents; stem cells and totipotency; human embryonic stem cells and treatment of disease; growth of plant tissue cultures; regulation of transcription and translation; gene expression in haemoglobin; epigenetic control of gene expression; treating disease with epigenetic therapy; RNA interference and gene expression; gene expression and cancer; risk factors and cancer; sequencing genomes; proteome	Evaluate the use of embryonic stem cells in the treatment of disease; Interpret gene expression graphs
Spr 2	Recombinant DNA technology	Complementay DNA using reverse transcriptase; restriction endonuclease use; use of vectors in in vivo gene cloning; in vitro gene cloning; polymerase chain reaction; locating genes using DNA probes; genetic screening and counselling; geneti fingerprinting; gel electrophoresis	Evaluate DNA technology; Interpretation of genetic profiles - identifying patterns
Sum 1	Exams		
Sum 2	Exams		

Enrichment: Nancy Rothwell Drawing Award
STEM - Biology in action - Evolution | KCL - Genetic engineering taster day | Biology Olympiad -RSB End Jan, Nancy Rothwell Drawing award | STEM - Biology in action - Gene Coding

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Careers: Conservation scientists, foresters, zoologist, wildlife biologist, biological technician | Agricultural and Food Scientist, horticulturist, arborist, plant geneticist, forestry, bi | Neurosurgeon, Acupunturist (Traditional Chinese Medicine), Psychiatrist
Physical Therapist, diagnostic therapist, chiropractor, neurologist, psychologist. | Cancer researcher, Genetic engineering, Genetic Councellor, Biochemists, Forensic Science Technician