

*****H420 Module 1-Development of practical skills in Biology**
will be integrated within other modules of the specification ***

| | Big Question/ Theme | Small Questions | Assessment Opportunities and Criteria. Teacher feedback point (TFP) | Homework |
|---|---|--|---|---|
| Module 5 Communication, homeostasis and energy <i>Chapter 13</i> <i>Neural communication</i> | How do organisms respond to stimuli in their environment? | 13.1 Coordination Why do multicellular organisms need communication? How do cells communicate with each other? | Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking. Practical assessments (PAGs) Optional: Zig Zag end of topic tests are available to use | Homework: Revision of the topic's knowledge organiser. Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet. Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete any extra exam questions set by the teacher. |
| | | 13.2 Neurones What is the structure and function of the sensory, relay and motor neurones? What is multiple sclerosis and what impact does this have on sufferers? | | |
| | | 13.3 Sensory receptors What are the features of sensory receptors? What are the 4 main types of sensory receptors and what do they detect? What sequence of events happen in the Pacinian corpuscle and why do we refer to it as a 'transducer'? What is a generator potential? | | |
| | | 13.4 Nervous transmission What happens in the axon when a neurone is at rest (resting potential)? What happens in the axon when a neurone is stimulated (action potential)? What happens in the refractory period? How are action potentials propagated along an axon (salutatory conduction)? What is the 'all or nothing' principle? | | |
| | | 13.5 Synapses What is the structure and role of a synapse in neurotransmission? What is a neurotransmitter? What is the sequence of events that take place in a synapse? What is the effect of drugs on synapses? | | |
| | | 13.6 Organisation of the nervous system How is the mammalian nervous system organised structurally and functionally? | | |

13.7 Structure of the brain

What is the gross structure and function of the human brain?

What techniques are used to study the brain?

13.8 Reflexes

What is the pathway of neurones involved in the reflex arc?

What is the importance of the reflex arc?

How can we test the speed of reflex actions?

13.9 Voluntary and involuntary muscles

What are the 3 types of muscle in the body?

What is the structure of mammalian muscle?

What is the structure of a sarcomere?

What is the difference between slow twitch and fast twitch muscles?

13.10 Sliding filament model

What is the mechanism of muscle contraction?

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| Module 5 Communication homeostasis and energy <i>Chapter 14 Hormonal communication</i> | How do specific hormones bring about their effects? | <p>14.1 Hormonal communication What is a hormone? Where are the major endocrine glands and what hormones do they produce? What is the structure and function of the adrenal glands? What is the difference between steroid and non-steroid hormone? How does hormonal communication compare to neural communication?</p> <p>14.2 Structure and function of the pancreas What is the histology of the pancreas? What is the function of the pancreas?</p> <p>14.3 Regulation of blood glucose concentration What is negative feedback? How is blood glucose concentration regulated?</p> <p>14.4 Diabetes and its control What is the difference between diabetes type 1 and type 2 mellitus? How is insulin produced? What are the potential treatments for diabetes?</p> <p>14.5 Coordinated responses What happens when the nervous and endocrine system coordinate their responses? What is the action of adrenaline in the fight or flight response?</p> <p>14.6 Controlling heart rate What controls heart rate? What are chemoreceptors? What are baroreceptors?</p> | <p>Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area.</p> <p>Teacher will mark exam questions and provide a class feedback sheet.</p> <p>Students will NTG by responding to marking.</p> <p>Practical assessments (PAGs)</p> <p>Optional: Zig Zag end of topic tests are available to use</p> | <p>Homework: Revision of the topic's knowledge organiser.</p> <p>Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet.</p> <p>Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete any extra exam questions set by the teacher.</p> |

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| Module 5 Communication homeostasis and energy <i>Chapter 15</i> <i>Homeostasis</i> | How do animals respond to their environment? | 15.1 The principles of homeostasis What are receptors and effectors? How does a negative feedback system work? How does a positive feedback system work? | Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking. Practical assessments (PAGs) Optional: Zig Zag end of topic tests are available to use | Homework: Revision of the topic's knowledge organiser. Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet. Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete any extra exam questions set by the teacher. |
| | | 15.2 Thermoregulation in ectotherms What is an ectotherm? How do ectotherms regulate their temperature? | | |
| | | 15.3 Thermoregulation in endotherms What is an endotherm? How do endotherms regulate their temperature? | | |
| | | 15.4 Excretion homeostasis and the liver What is excretion and what is its importance in homeostasis? What is the structure and function of the mammalian liver? What happens in the ornithine cycle? | | |
| | | 15.5 The structure and function of the mammalian kidney What is the structure, mechanisms of action and function of the mammalian kidney? What is the structure and function of the nephron? What is the significance of the length of the loop of Henle? | | |
| | | 15.6 The kidney and osmoregulation What is osmoregulation? How is the water potential of the blood controlled? | | |
| | | 15.7 Urine and diagnosis How can excretory products be used in medical diagnosis? How do pregnancy tests work? Why is the urine of athlete's testes? | | |
| | | 15.8 Kidney failure What causes kidney failure? | | |

What are the effects of kidney failure?
How can kidney failure be treated?

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| Module 5 Communication homeostasis and energy <i>Chapter 16</i> <i>Plant responses</i> | How do plants respond to their environment? | <p>16.1 Plant hormones and growth in plants What are the roles of plant hormones? What experimental evidence is there for the role of auxins in control of apical dominance? What experimental evidence is there for the role of gibberellin in the control of seed germination and stem elongation? What is the difference between synergism and antagonism? What practical investigations can be carried out to investigate the effect of plant hormones on growth?</p> <p>16.2 Plant responses to abiotic stress What abiotic factors cause plant stress? How do plants respond to these abiotic stresses? What are the roles of plant hormones in response to abiotic stress?</p> <p>16.3 Plant responses to herbivory What is herbivory? What physical responses do plants display to herbivory? What chemical responses do plants display to herbivory?</p> <p>16.4 Tropisms in plants What is a tropism? What are the different types of tropisms? What practical investigations can be carried out to investigate phototropism and geotropism?</p> <p>16.5 The commercial use of plant hormones What are the commercial uses of plant hormones?</p> | <p>Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking.</p> <p>Practical assessments (PAGs)</p> <p>Optional: Zig Zag end of topic tests are available to use</p> | <p>Homework: Revision of the topic's knowledge organiser.</p> <p>Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet.</p> <p>Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete any extra exam questions set by the teacher.</p> |

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| Module 5 Communication homeostasis and energy <i>Chapter 17</i> <i>Energy for biological processes</i> | Where do organisms get their energy for biological processes? | 17.1 Energy cycles Why do we need cellular respiration? What is the relationship between the processes of respiration and photosynthesis? | Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking. Practical assessments (PAGs) Optional: Zig Zag end of topic tests are available to use | Homework: Revision of the topic's knowledge organiser. Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet. Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete any extra exam questions set by the teacher. |
| | | 17.2 ATP synthesis How is ATP produced? What is the chemosynthetic theory? What happens along the electron transport chain? | | |
| | | 17.3 Photosynthesis What is the equation that summarises photosynthesis? What is the structure of a chloroplast? What are the 2 main stages of photosynthesis and where in the chloroplast do these occur? What is the importance of photosynthetic pigments in photosynthesis? What happens in the light-dependant stage of photosynthesis? What happens in the light-independent stage of photosynthesis? What are the uses of triose phosphate? How can we investigate photosynthetic pigments? | | |
| | | 17.4 Factors affecting photosynthesis What factors affect photosynthesis? How can we investigate the factors affecting photosynthesis? | | |

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| Module 5 Communication homeostasis and energy <i>Chapter 18 Respiration</i> | | 18.1 Glycolysis What is the site of glycolysis? What are the main steps in glycolysis? | Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking. Practical assessments (PAGs) Optional: Zig Zag end | Homework: Revision of the topic's knowledge organiser. Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet. Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete any extra exam questions set by |
| | | 18.2 Linking glycolysis and the Krebs cycle What is the structure of the mitochondrion? What happens in the link reaction? Where does the link reaction take place? | | |
| | | 18.3 The Krebs cycle Where does the Krebs cycle take place? What happens in the Krebs cycle? What is the importance of coenzymes in cellular respiration? | | |
| | | 18.4 Oxidative phosphorylation What is the process of oxidative phosphorylation? What is the site of oxidative phosphorylation? What is substrate level phosphorylation? | | |
| | | 18.5 Anaerobic respiration What is the process of anaerobic respiration in eukaryotes? What practical investigations can be undertaken to investigate the respiration of yeast under aerobic and anaerobic conditions? How are mammals adapted to low oxygen environments? | | |

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| | | <p>18.6 Respiratory substrates</p> <p>What are the respiratory substrates?</p> <p>What are the differences in energy values of carbohydrates, lipids and proteins?</p> <p>What is the respiratory quotient and how can it be used and interpreted?</p> <p>What practical investigations can be carried out to investigate the effects of factors and respiratory substrates on the rate of respiration?</p> | of topic tests are available to use | the teacher. |
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| <p>Module 6 Genetics, evolution and ecosystems</p> <p><i>Chapter 19</i> <i>Genetics of living systems</i></p> | How does the genetic control of metabolic reactions determine an organism's growth, development and function? | <p>19.1 Mutations and variation</p> <p>What is a mutation?</p> <p>What are the possible effects of mutations?</p> <p>What are the causes of mutations?</p> <p>What is the difference between gene and chromosome mutations?</p> <hr/> <p>19.2 Control of gene expression</p> <p>What are the regulatory mechanisms that control gene expression at:</p> <ul style="list-style-type: none"> -transcriptional level? -post-transcriptional level? -translational level? -post-translational level? <hr/> <p>19.3 Body plans</p> <p>What causes the growth and development of body plans in different organisms?</p> <p>What is the importance of mitosis and apoptosis mechanisms in controlling the development of body form?</p> <p>What factors can affect the expression of regulatory genes?</p> | <p>Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet.</p> <p>Students will NTG by responding to marking.</p> <p>Practical assessments (PAGs)</p> <p>Optional: Zig Zag end</p> | <p>Homework: Revision of the topic's knowledge organiser.</p> <p>Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet.</p> <p>Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete any extra exam questions set by</p> |

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| Module 6 Genetics, evolution and ecosystems <i>Chapter 20</i> <i>Patterns of inheritance and variation</i> | How do genetic and environmental factors contribute to variation within a population? | <p>20.1 Variation and inheritance What is variation? What environmental and genetic factors contribute to phenotypic variation? How does sexual reproduction lead to genetic variation within a species? What is the difference between discontinuous and continuous variation?</p> <p>20.2 Monogenic inheritance How can we perform a genetic cross? What happens in a genetic cross when alleles show codominance? What happens in a genetic cross when multiple alleles code for a characteristic? How is sex determined? What characteristics are determined by sex linked genes?</p> <p>20.3 Dihybrid inheritance What is dihybrid inheritance? What happens in a dihybrid cross?</p> <p>20.4 Phenotypic ratios How can we use phenotypic ratios to identify linkage and epistasis? How can we use the chi-squared test to determine the significance of the</p> | Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking. Practical assessments (PAGs) | Homework: Revision of the topic's knowledge organiser. Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet. Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete any extra exam |

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| | | <p>difference between observed and expected results?</p> | <p>Optional: Zig Zag end of topic tests are available to use</p> | <p>questions set by the teacher.</p> |
| <p>20.5 Evolution What factors affect the evolution of a species? What is the difference between stabilising, directional and disruptive selection? How can we use the Hardy-Weinberg principle to calculate the allele frequencies in populations?</p> | | | | |
| <p>20.6 Speciation and artificial selection What is speciation? What is allopatric speciation? What is sympatric speciation? What are the principles of artificial selection and its uses? What are the ethical considerations surrounding the use of artificial selection? What are gene banks?</p> | | | | |

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| Module 6 Genetics, evolution and ecosystems <i>Chapter 21</i> <i>Manipulating genomes</i> | What are the benefits and implications of manipulating genomes? | 21.1 DNA profiling What is DNA profiling? How can DNA profiling be used? What is the polymerase chain reaction and its application in DNA analysis? What are the principles and uses of electrophoresis? | Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking. Practical assessments (PAGs) | Homework: Revision of the topic's knowledge organiser. Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet. Students to make Cornell notes of sections covered in class and complete summary questions in the text book. Students complete |
| | | 21.2 DNA sequencing and analysis What are the principles of DNA sequencing? What are the developments of new DNA sequencing techniques? | | |
| | | 21.3 Using DNA sequencing How has genome-wide comparisons allowed for genome-wide comparisons between individuals and between species? How has genome-wide comparisons allowed for the sequences of amino acids in polypeptides to be predicted? How has genome-wide comparisons allowed for the development of synthetic biology? | | |
| | | 21.4 Genetic engineering What are the principles of genetic engineering? | | |

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| | | What techniques are used in genetic engineering? | Optional: Zig Zag end of topic tests are available to use | any extra exam questions set by the teacher. |
| | | 21.5 Gene technology and ethics What are the ethical issues relating to the genetic modification of organisms? What are the principles of and the potential or gene therapy in medicine? | | |

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| Module 6 Genetics, evolution and ecosystems <i>Chapter 22</i> <i>Cloning and biotechnology</i> | How has cloning been useful? | 22.1 Natural cloning in plants How does natural plant cloning occur? How are natural clones used in horticulture? How is sugar cane cloned? | Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking. | Homework: Revision of the topic's knowledge organiser. Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet. |
| | | 22.2 Artificial cloning in plants How can we produce artificial clones of plants by micropropagation and tissue culture? What are the arguments for and against artificial cloning in plants? | | |
| | | 22.3 Cloning in animals What natural cloning do we see in animals (invertebrate and vertebrates)? How can artificial clones in animals be produced? What are the arguments for and against artificial cloning in animals? | | |
| | What is the use of microorganisms in biotechnology? | 22.4 Microorganisms and biotechnology What are the uses of microorganisms in biotechnological processes? What are the advantages and disadvantages of using microorganisms to make food for human consumption? | Practical assessments | Students to make Cornell notes of sections covered in class and complete summary questions in the text book. |

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| | | <p>22.5 Microorganisms, medicines and bioremediation How are microorganisms used in biotechnological processes to produce insulin and penicillin? How are microorganisms used in biotechnological processes for bioremediation?</p> | <p>(PAGs)</p> <p>Optional: Zig Zag end of topic tests are available to use</p> | <p>Students complete any extra exam questions set by the teacher.</p> |
| <p>22.6 Culturing microorganisms in the lab How can microorganisms be cultured effectively, using aseptic techniques? How do you perform a serial dilution? What does the standard growth curve of microorganisms in a closed culture look like and why? What practical investigations can be undertaken to investigate the factors affecting the growth of microorganisms?</p> | | | | |
| <p>22.7 Culturing microorganisms on an industrial scale What are primary and secondary metabolites? How are microorganisms grown in batch fermentation? How are microorganisms grown in continuous fermentation? How does a bioreactor work? How can we control bioreactors to maximise yield of product required?</p> | | | | |
| <p>22.8 Using immobilised enzymes What are the benefits of using isolated enzymes? What are the benefits of using extracellular enzymes? How are enzymes immobilised? What are the advantages and disadvantages of using immobilised enzymes? Are there any examples where immobilised enzymes are useful in continuous production to produce large quantities of product?</p> | | | | |

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| Module 6 Genetics, evolution and ecosystems <i>Chapter 23</i> <i>Ecosystems</i> | What are the complex interactions that occur between organisms and their environment? | <p>23.1 Ecosystems What is an ecosystem? What factors affect ecosystems?</p> <p>23.2 Biomass transfer through an ecosystem What are consumers, producers, food chains, trophic levels and food webs? How can food chains be represented diagrammatically? How can we measure biomass? What happens to the efficiency of biomass and energy transfer between trophic levels? How can we calculate the efficiency of biomass and energy transfer between trophic levels? How does human activity manipulate biomass through ecosystems?</p> <p>23.3 Recycling within ecosystems What are the roles of decomposers in ecosystems? How is nitrogen recycled through an ecosystem? How is carbon recycled through an ecosystem?</p> | Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking. Practical assessments | Homework: Revision of the topic's knowledge organiser. Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet. Students to make Cornell notes of sections covered in class and complete summary questions in the text book. |

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| | <p>23.4 Succession What is succession? What are the stages of succession and are there any differences between communities? What is a climax community? What are the processes of primary and secondary succession? What is deflected succession?</p> | (PAGs) | Students complete any extra exam questions set by the teacher. |
| | <p>23.5 Measuring the distribution and abundance of organisms How can we measure the distribution and abundance of organisms in an ecosystem? What are the different sampling and recording methods to determine the distribution and abundance of organisms in a variety of ecosystems? How do we calculate biodiversity using Simpson diversity index?</p> | Optional: Zig Zag end of topic tests are available to use | |

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| <p>Module 6 Genetics, evolution and ecosystems</p> <p><i>Chapter 24</i> <i>Populations and sustainability</i></p> | <p>What factors determine population size and why do ecosystems need be managed?</p> | <p>24.1 Population size What does the growth curve of most natural populations look like? What factors determine the size of a population? What is the impact of limiting factors on carrying capacity and final population size?</p> <p>24.2 Competition Why do animal compete? What are the different types of competition? Can you provide examples of interspecific and intraspecific competition?</p> <p>24.3 Predator-prey relationships What is predation? What is the relationship between population numbers of predators and prey? What does a predator-prey graph look like and why?</p> <p>24.4 Conservation and preservation What is conservation? What is preservation?</p> | <p>Topic tests these are from OCR and include short answer questions that test student misconceptions in the topic area. Teacher will mark exam questions and provide a class feedback sheet. Students will NTG by responding to marking.</p> <p>Practical assessments</p> | <p>Homework: Revision of the topic's knowledge organiser.</p> <p>Students will be quizzed weekly /10 Student results will be recorded on a tracking sheet.</p> <p>Students to make Cornell notes of sections covered in class and complete summary questions in the text book.</p> |

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| | | <p>What are the reasons for and differences between conservation and predation?</p> | <p>(PAGs)</p> <p>Optional: Zig Zag end of topic tests are available to use</p> | <p>Students complete any extra exam questions set by the teacher.</p> |
| <p>24.5 Sustainability How can the management of an ecosystem provide resources in a sustainable way? How is timber produced sustainably? What is sustainable fishing?</p> | | | | |
| <p>24.6 Ecosystem management-Masai Mara How can an ecosystem be managed to balance the conflict between conservation, preservation and human needs?</p> | | | | |
| <p>24.7 Ecosystem management-Terai region of Nepal How can an ecosystem be managed to balance the conflict between conservation, preservation and human needs?</p> | | | | |
| <p>24.8 Ecosystem management- peat bogs How can an ecosystem be managed to balance the conflict between conservation, preservation and human needs?</p> | | | | |
| <p>24.9 Environmentally sensitive ecosystems What are the effects of human activities on animal and plant populations in environmentally sensitive ecosystems? How can human activities be controlled?</p> | | | | |