

**Curriculum Map: Triple Biology Year 10 (Triple Biology only content in bold)**

	<b>Autumn 1</b>	<b>Autumn 2</b>	<b>Spring 1</b>	<b>Spring 2</b>	<b>Summer 1</b>	<b>Summer 2</b>
<p><b>Content</b> Declarative knowledge 'I Know'</p>	<p><b>Topic: B4 Bioenergetics</b> Know the raw materials and energy source for photosynthesis. Know that photosynthesis is an endothermic reaction. State the equation for photosynthesis and know the chemical formulae of all reactants and products. List the limiting factors that influence the rate of photosynthesis. Know the variables for the experiment. State the extra materials that plant cells need to produce proteins. State the word equation for aerobic respiration. Know the chemical formulae of all reactants and products of aerobic respiration and write the balanced equation. Give the word equation for anaerobic respiration in animals. State the word equation for anaerobic respiration in plants and yeast. Define the terms muscle fatigue and oxygen debt. Define the term metabolism and provide examples of metabolic reactions. Describe and explain the role of the liver in metabolism.</p>	<p><b>Topic: B5 Homeostasis &amp; Response</b> Know the definition of homeostasis including identifying stimuli, receptors, coordination centres and effectors Know that homeostatic mechanisms involve a nervous and chemical response Know the function of receptors, coordination centres and effectors in a homeostatic response. Be able to give some examples of these mechanisms Know the structures and features of the nervous system Know how the nervous system coordinates a response. Know the pathway of impulses from receptor to effector. Know what a synapse is and how a synapse works using chemical transmission. <b>Know that the eye is a sense organ containing receptors sensitive to light intensity and colour.</b> <b>Know that body temperature is monitored and controlled by the thermoregulatory centre.</b> <b>Know how the body responds when body temperature is too high or too low.</b> Know why the pituitary gland is called the "master gland" and describe the role of hormones released by endocrine glands Know the names and positions of some organs/glands/ hormones/ target tissues in the body Know that blood glucose levels are controlled by the pancreas and name the hormones involved Know how glucagon interacts with insulin to control blood glucose levels (produce flow chart/diagram) and explain the importance of maintaining blood glucose levels Know what happens when glucose levels change. Describe the difference between two types of diabetes Know the risk factors and treatments for type 1 and type 2 diabetes</p>	<p><b>Topic: B7 Ecology</b> Know definitions for key words including population, community, habitat, ecosystem, interdependence. Know the resources that organisms compete for. Know examples of biotic and abiotic factors. Know the three types of adaptations – structural, behavioural, functional. Know animal adaptations including to cold climates, camouflage and dry climates. Know the definition and an example of an extremophile. Know that materials are recycled to provide the building blocks for future organisms. Know the main process involved in the carbon cycle and the water cycle. <b>Know that gardeners and farmers try to provide optimum conditions for rapid decay of waste biological material.</b> <b>Know that anaerobic decay produces methane which can be used to fuel biogas generators.</b> <b>Know that environmental changes affect the distribution of species in an ecosystem.</b> Know the definition for biodiversity. Know that the future of the human species relies on us maintaining a good level of biodiversity. Know the impacts of a rapidly increasing human population. Know how acid rain is formed and how it affects living organisms. Know how air pollution causes global dimming and smog. Know how human activities pollute the land and the water. Know how to describe the process of deforestation. Know that levels of CO<sub>2</sub> and CH<sub>4</sub> in the atmosphere are increasing and contribute to global warming. Know why peat bogs are being destroyed. Know the causes and effects of global warming.</p>			

		<p>Know how lifestyle choices affect the risk of developing type 2 diabetes.</p> <p><b>Know the effect on cells of osmotic changes in body fluids.</b></p> <p><b>Know how water, ions and urea are excreted.</b></p> <p><b>Know that excess amino acids are deaminated and then converted to urea for safe excretion.</b></p> <p><b>Know that the kidneys produce urine by filtration of the blood and selective reabsorption of useful substances.</b></p> <p><b>Know that the water level in the blood is controlled by ADH.</b></p> <p><b>Know how kidney failure can be treated by dialysis.</b></p> <p>Know the role of all the hormones in the menstrual cycle.</p> <p>Know why fertility changes with age in men and women.</p> <p>Know the changes that happen to males and females during puberty (including naming all the hormones in the menstrual cycle).</p> <p>Know oestrogen and testosterone as reproductive hormones in men and women, and name some bodily responses to these hormones (including the menstrual cycle).</p> <p>Know what contraception is and list examples. Be able to categorise these as either hormonal or non-hormonal.</p> <p>Know the mechanism of action of contraceptives.</p> <p>Know how FSH and IVF can be used to help fertility.</p> <p>Know what adrenaline and thyroxine do in the body.</p> <p>Know how negative feedback systems work.</p> <p><b>Know that plants produce hormones to coordinate and control growth and responses to light and gravity.</b></p> <p><b>Know the effects of gibberellins and ethene.</b></p>	<p>Know how waste, deforestation, and global warming all have an impact on biodiversity.</p> <p><b>Know the different trophic levels in an ecosystem.</b></p> <p><b>Know the role of decomposers in an ecosystem.</b></p> <p><b>Know that pyramids of biomass can be constructed to represent the relative amount of biomass in each level of a food chain.</b></p> <p><b>Know how energy is lost between trophic levels.</b></p> <p><b>Know the biological factors which are threatening food security.</b></p> <p><b>Know the efficiency of food production can be improved by restricting energy transfer from food animals to the environment.</b></p> <p><b>Know that some animals are fed high protein foods to increase growth.</b></p> <p><b>Know that fish stocks are declining and the steps that can be taken in the conservation of fish stocks at a sustainable level.</b></p> <p><b>Know that modern biotechnology enables large quantities of microorganisms to be cultured for food e.g. Fusarium for producing mycoprotein.</b></p>
<p><b>Skills</b></p> <p>Procedural Knowledge</p> <p>'I know how to'</p>	<p>Demonstrate via graphs how limiting factors influence the rate of photosynthesis.</p> <p>Explain the shape of the limiting factors graphs.</p> <p>Explain how the experiment could be adapted to test other limiting factors.</p>	<p><b>Required Practical:</b> Plan and carry out an investigation, choosing appropriate ways to measure reaction time and considering the risks and ethics of the investigation.</p> <p>Know how to translate information about reaction times between numerical and graphical forms.</p>	<p>Know how to explain what a stable community is, using examples.</p> <p><b>Required practical:</b> Know how to use random sampling with quadrats to measure the population of a species in an area.</p>

	<p>Understand and use inverse proportion – the inverse square law and light intensity in the context of photosynthesis.</p> <p>Know how to use inverse proportion – the inverse square law and light intensity in the context.</p> <p>Safely carry out a practical to investigate the effect of changing light intensity on the rate of photosynthesis.</p> <p>Describe how plants use the glucose they make.</p> <p>Review the practical tests for starch, sugars, and protein.</p> <p>Describe how the different factors that affect the rate of photosynthesis interact.</p> <p>Describe where in the cell aerobic respiration takes place.</p> <p>Explain why living organisms need to respire (how the energy released is used).</p> <p>Describe how humans can manipulate the environment in which plants grow.</p> <p>Explain the term “oxygen debt” and how it is paid back.</p> <p>Describe the changes to heart rate and breathing rate and volume during exercise.</p>	<p><b>Know how to identify the cerebral cortex, cerebellum and medulla on a diagram of the brain and describe their functions.</b></p> <p><b>Required Practical: Investigate the effect of light or gravity on the growth of newly germinated seedlings.</b></p> <p><b>Know how to explain some of the difficulties of investigating brain function and treating brain damage and disease.</b></p> <p><b>Understand how neuroscientist have been able to map the regions of the brain to particular functions.</b></p> <p><b>Know how to relate the structures of the eye to their functions.</b></p> <p><b>Know how to describe the processes of accommodation and adaptation to dim light.</b></p> <p><b>Be able to describe the conditions of myopia and hyperopia.</b></p> <p><b>Know how to interpret ray diagrams, showing the common eye defects and how to correct them with spectacle lenses.</b></p> <p><b>Know how to explain how body temperature can be lowered or raised in a given context.</b></p> <p><b>Know how to translate tables and bar charts of glucose, ions and urea before and after filtration.</b></p> <p><b>Know how to describe the effect of ADH on the permeability of the kidney tubules.</b></p> <p><b>Know how to describe the effects of some plant hormones and the different ways people use them to control plant growth.</b></p>	<p>Know how to use systematic sampling with transects and quadrats to measure the distribution of a species across a changing environment.</p> <p>Know how to calculate and then use the mean, median and mode of sets of data.</p> <p><b>Know how to calculate rate changes in the decay of biological material.</b></p> <p><b>Know how to translate information between numerical and graphical form.</b></p> <p><b>Know how to plot and draw appropriate graphs selecting appropriate scales for the axes.</b></p> <p><b>Required practical: Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.</b></p> <p>Know how to construct a food chain for an ecosystem.</p> <p>Know how to describe and explain predator-prey relationships.</p> <p>Know how to explain the term bioaccumulation in the context of pesticides in water.</p> <p>Know how to explain the term eutrophication.</p> <p><b>Know how to construct accurate pyramids of biomass from appropriate data.</b></p> <p><b>Know how to explain how biomass is lost between the different trophic levels.</b></p> <p><b>Know how to calculate the efficiency of biomass transfer between trophic levels.</b></p> <p><b>Know how to calculate the efficiency of biomass transfers between trophic levels by percentage or fractions of mass and explain how this affects the number of organisms at each trophic level.</b></p> <p><b>Know how to interpret population and food production statistics to evaluate food security.</b></p> <p><b>Know how to describe and explain some possible biotechnical and agricultural solutions to the demands of the growing human population.</b></p>
<p><b>Strategies</b> Conditional Knowledge 'I know when to'</p>	<p>Be able to plan a practical to investigate the effect of changing light intensity on photosynthesis depending on the information presented.</p> <p>Evaluate data collected during response to exercise required practical by constructing and analysing the appropriate table and graph.</p>	<p>Evaluate data regarding measurement of response to stimuli.</p> <p>Explain the need to respond to environmental stimuli/changes.</p> <p>Know when to apply knowledge to novel situations of the nervous system.</p>	<p><b>Evaluate the impact of environmental changes on the distribution of species in an ecosystem given appropriate information.</b></p> <p>Understand how human activities can reduce biodiversity and recognise that we should try to stop this.</p>

		<p>Compare and contrast the nervous and endocrine system. Apply knowledge to suggest and explain how hormones change the body.</p> <p><b>Evaluate the advantages and disadvantages of treating organ failure by mechanical device or transplant.</b></p> <p><b>Understand how everyday use of hormones as weed killers has an effect on biodiversity.</b></p> <p>Understand how to apply my knowledge of hormones and the menstrual cycle to suggest how hormone-based contraceptives work.</p> <p>Evaluate the different methods of contraception in detail.</p>	<p>Evaluate why deforestation and peat bog destruction occurs and explain their impact on CO<sub>2</sub> levels and biodiversity.</p> <p>Understand key strategies to reduce the impact of human activities on ecosystems and maintain biodiversity.</p> <p><b>Understand that some people have ethical objections to some modern intensive farming methods.</b></p> <p><b>Evaluate the advantages and disadvantages of modern farming techniques.</b></p>
Key Questions	<p>How do plants use the glucose they produce during photosynthesis?</p> <p>What are the limiting factors that affect the rate of photosynthesis?</p> <p>What is the difference between aerobic and anaerobic respiration?</p> <p>How does the human body respond to exercise?</p>	<p>What is homeostasis and why is it so important?</p> <p>What are reflex actions and why are they so important for survival?</p> <p><b>What are the major parts of the brain and how do we know their functions?</b></p> <p><b>How do we see and how can long and short sightedness be corrected?</b></p> <p><b>How does the body regulate its temperature?</b></p> <p><b>How is nitrogenous waste excreted from the body?</b></p> <p>How do hormones control responses such as the release of a mature egg in the human menstrual cycle?</p> <p><b>How can plant hormones be used commercially?</b></p>	<p>What is adaptation and why is it so important?</p> <p>Why is the cycling of materials in nature so vital to life on Earth?</p> <p>What is global warming and why does it matter?</p> <p>How can we make food production more efficient?</p> <p><b>How can food security be guaranteed for a growing human population?</b></p>
Assessment topics	<p>Mid topic test (20 minutes) after 8 lessons.</p> <p>End of topic test (25 minutes).</p>	<p>Mid topic test (22 minutes) after 14 lessons.</p> <p>End of topic test (43 minutes)</p>	<p>Mid topic test (21 minutes) after 13 lessons.</p> <p>End of topic test (46 minutes)</p>
Cross curricular links/Character Education	<p>Maths – drawing of graphs, calculations</p> <p>PE – exercise and the body’s response, including production of lactic acid and oxygen debt</p> <p>Geography – manipulation of environmental conditions for plants (farming)</p>	<p>Maths – Graph skills and calculations</p> <p>PSHCE – Ethics around contraception, IVF etc</p> <p>Physics/PE – Reaction Time</p>	<p>Geography – environment and climate change</p> <p>Character education – moral responsibility to preserve and protect the Earth, how to ensure food security for all.</p> <p>Maths – calculations to estimate the abundance of a species</p>