



Science Biology Year 10 Long Term Map

Subject Intent/Aims

Expose all students to a broad range of learning opportunities to deepen their knowledge and understanding of themselves and the world around them and to build a solid foundation of Science knowledge and skills. We believe in developing curiosity and understand that science is an active process with many questions to be answered and still to be asked. We provide an understanding of how knowledge was derived, discovered and came to be accepted by the scientific community. By focusing on thinking, interpreting and evaluating rather than simply memorising scientific fact we intend to enable our students to use the skills that they need to answer their own scientific questions.

Our focus on the scientific process as a way of thinking and working will allow our students to develop their own ideas, attitudes and interpretations.

Topic: Infection and response	Topic: Bioenergetics	Topic: Homeostasis
National Curriculum <ul style="list-style-type: none"> the relationship between health and disease communicable diseases including sexually transmitted infections in humans (including HIV/AIDs) non-communicable diseases bacteria, viruses and fungi as pathogens in animals and plants body defences against pathogens and the role of the immune system against disease reducing and preventing the spread of infectious diseases in animals and plants the process of discovery and development of new medicines the impact of lifestyle factors on the incidence of non-communicable diseases. 	National Curriculum <ul style="list-style-type: none"> the importance of cellular respiration; the processes of aerobic and anaerobic respiration. photosynthesis as the key process for food production and therefore biomass for life. the process of photosynthesis factors affecting the rate of photosynthesis. 	<ul style="list-style-type: none"> principles of nervous coordination and control in humans. the relationship between the structure and function of the human nervous system. the relationship between structure and function in a reflex arc. principles of hormonal coordination and control in humans. hormones in human reproduction, hormonal and non-hormonal methods of contraception.
Composition	Composition	Composition
Know how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens.	1 Understand how plants harness the Sun's energy in photosynthesis in order to make glucose. 2: Understand organisms use glucose to release energy required for essential life processes.	1: Understand how and why the body controls water potential, temperature and glucose levels in the body. 2: Understand how the endocrine and nervous system work to maintain the body within narrow physical and chemical limits. 3: Understand how we can use our knowledge of the endocrine system and hormones for IVF, birth control.
Components	Components	Components
Component 1: <ul style="list-style-type: none"> Know how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants. Students should be able to know how the spread of diseases can be reduced or prevented. Component 2: <ul style="list-style-type: none"> Know about different viral diseases and how they are transmitted such as Measles, HIV and Tobacco Mosaic Virus. Component 3: <ul style="list-style-type: none"> Know about different bacterial diseases and how they are transmitted such 	Component 1: <ul style="list-style-type: none"> Know what the chemical symbols: CO_2, H_2O, O_2 and $\text{C}_6\text{H}_{12}\text{O}_6$ stand for. Know photosynthesis is an endothermic reaction in which energy is transferred from the environment to the chloroplasts by light Component 2: <ul style="list-style-type: none"> Know how to explain the effects of temperature, light intensity, carbon dioxide concentration, and the amount of chlorophyll on the rate of photosynthesis. Know how to be able to: measure and calculate rates of photosynthesis, extract and interpret graphs of photosynthesis rate involving one limiting 	Component 1: <ul style="list-style-type: none"> Know that homeostasis is the regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes Component 2: <ul style="list-style-type: none"> Know the components of the nervous system and the functions. Know the structures in a reflex arc – including the sensory neurone, synapse relay neurone and motor neurone. Know the order of neurons in a reflex arc and how the message is transmitted.



<p>as salmonella and Gonorrhoea.</p> <p>Component 4:</p> <ul style="list-style-type: none"> • Know about fungal diseases and how they are transmitted such as rose black spot. <p>Component 5:</p> <ul style="list-style-type: none"> • Know about a protist disease such as Malaria and how it is transmitted. <p>Component 6:</p> <ul style="list-style-type: none"> • Students should know what non-specific defence systems of the human body against pathogen are. • Students should know how the role of the immune system in the defence against disease. <p>Component 7:</p> <ul style="list-style-type: none"> • Students should know how vaccination will prevent illness in an individual, and how the spread of pathogens can be reduced by immunising a large proportion of the population. <p>Component 8:</p> <ul style="list-style-type: none"> • Students should be able to know uses of antibiotics and other medicines in treating disease. <p>Component 9:</p> <ul style="list-style-type: none"> • Students should be able to know the process of discovery and development of potential new medicines, including preclinical and clinical testing. 	<p>factor, plot and draw appropriate graphs selecting appropriate scale for axes, translate information between graphical and numeric form.</p> <ul style="list-style-type: none"> • Know how to explain graphs of photosynthesis rate involving two or three factors and decide which is the limiting factor. <p>Component 3:</p> <ul style="list-style-type: none"> • Know the uses of glucose from photosynthesis <p>Component 4:</p> <ul style="list-style-type: none"> • Know how to describe cellular respiration as an exothermic reaction which is continuously occurring in living cells • Know how to compare the processes of aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred. <p>Component 5:</p> <ul style="list-style-type: none"> • Know the effect of exercise on the body. <p>Component 6:</p> <ul style="list-style-type: none"> • Know the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, lipids and proteins <p>Component 7:</p> <ul style="list-style-type: none"> • Know the equation for anaerobic respiration in yeast. • Know the economic benefits of the products of anaerobic respiration in yeast. <p>Component 8:</p> <ul style="list-style-type: none"> • Know that metabolism is the summary of chemical process in an organism including breakdown and synthesis reactions. 	<ul style="list-style-type: none"> • Know why reflex actions are important • Know how to translate information about reaction times between numerical and graphical forms. <p>Component 3:</p> <ul style="list-style-type: none"> • Know the principles of hormonal coordination and control by the human endocrine system. • Know where different glands are situated in the human body and what hormone is secreted. <p>Component 4:</p> <ul style="list-style-type: none"> • Know how insulin controls blood glucose (sugar) levels in the body • Know the differences between Type 1 and Type 2 diabetes. • Know the function of glucagon and how it interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body. <p>Component 5:</p> <ul style="list-style-type: none"> • Know the roles of hormones in human reproduction, including the menstrual cycle. • Know how FSH, oestrogen, LH and progesterone, control of the menstrual cycle and their interactions. <p>Component 6:</p> <ul style="list-style-type: none"> • Know the different methods of contraception and give both positives and negatives of each. <p>Component 7:</p> <ul style="list-style-type: none"> • Know the role of hormones in modern reproductive technologies to treat infertility. • Know the developments of microscopy techniques have enabled IVF treatments to develop. • Know the social and ethical issues associated with IVF treatments to make informed opinions.
Composite	Composite	Composite
<p>Composite 1: Describe the non-specific defence systems of the human body against pathogens.</p> <p>Composite 2: Students should explain the role of the immune system in the defence against disease.</p> <p>Composite 3: Explain how the spread of malaria can be reduced.</p> <p>Composite 4: Link new knowledge to prior learning.</p> <p>Composite 5: Analyse information and data on diseases.</p> <p>Composite 6: Form valid informed opinions in vaccinations.</p> <p>Composite 7: Form valid informed opinions on the discovery of new medicines, preclinical and clinical testing.</p>	<p>Composite 1:</p> <ul style="list-style-type: none"> • Design an investigation into the effect of exercise on the body. <p>Composite 2:</p> <ul style="list-style-type: none"> • Know the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, lipids and proteins <p>Composite 3:</p> <ul style="list-style-type: none"> • Discuss the economic benefits of the products of anaerobic respiration in yeast. <p>Composite 4: Know how to set up and undertake a practical looking at photosynthesis and collect valid results.</p> <p>Composite 5: Know how to apply and apply the inverse square law in relation to photosynthesis.</p>	<p>Composite 1: Describe the structure of the nervous system and explain how it is adapted to its functions.</p> <p>Composite 2: Label the structures in a reflex arc.</p> <p>Composite 3: Know how to conduct an experiment looking into human reaction time.</p> <p>Composite 4: Extract and interpret data from graphs, charts and tables, about the functioning of the nervous system.</p> <p>Composite 5: Translate information about reaction times between numerical and graphical forms.</p> <p>Composite 6: Students should be able to extract information and interpret data from graphs that show the effect of insulin in blood glucose levels in both people with diabetes and people without diabetes.</p> <p>Composite 7: Explain how diabetes can be treated.</p>



	Composite 6: Read data from a graph to produce a valid conclusion backed up by their scientific knowledge.	Composite 8: Students should be able to extract and interpret data from graphs showing hormone levels during the menstrual cycle. Composites 9: Discuss the positives and negatives of each type of contraception. Composite 10: Make informed opinions on the use IVF treatments. Composite 11: Evaluate the use of kidney transplants vs dialysis.
Higher Order Knowledge	Higher Order Knowledge	Higher Order Knowledge
Component 10: <ul style="list-style-type: none"> Know the uses and creation of monoclonal antibodies. Component 11: <ul style="list-style-type: none"> Know the ethics behind the use of monoclonal antibodies. 	<ul style="list-style-type: none"> Know the inverse square law and how it applies to light intensity in the context of photosynthesis. 	<ul style="list-style-type: none"> Know how FSH, oestrogen, LH and progesterone, control of the menstrual cycle and their interactions. Know the roles of thyroxine and adrenaline in the body. Know how a negative feedback cycle works and examples of hormones regulated this way. Know how plants grow using geo and phototropism. Know the commercial uses of plant hormones. Know the main components of the human eye. Know some common defects of the human eye and evaluate how they are treated. Know the basic structure and junction of the kidney. <ul style="list-style-type: none"> Evaluate the use of kidney transplants vs dialysis.
Key terms	Key terms	Key terms
Antibody Antitoxin Blind Trial Microorganism Phagocytosis Placebo Toxin Vaccination Vector	Photosynthesis Respiration Limiting factors Metabolism Fermentation Lactic Acid Oxygen Debt Aerobic Anaerobic	Homeostasis Synapse Receptor Effector Reflex Arc Endocrine Pituitary Gland Contraceptive Glucagon Glycogen Insulin Diabetes
Final Composition/Deliberate Practice	Final Composition/Deliberate Practice	Final Composition/Deliberate Practice
Planning, carrying out and analysing an investigation Application of new information in new circumstances.	Planning, carrying out and analysing an investigation Learners Checks End of unit tests In class assessments Required Practical- Effects of light on photosynthesis.	Planning, carrying out and analysing an investigation End of unit tests In class assessments Required Practical- Measuring your own reaction time.



Summative/Formative assessment		Summative/Formative assessment		Summative/Formative assessment	
Learners Check RRR Direct questioning Low stakes quizzes End of unit test comprising of questions on spread of disease; symptoms of bacterial, viral and fungal diseases and those spread by protists and how they spread; first, second and third line of body defences; vaccinations; antibiotics and clinical testing.		RRR, quick quizzes and Century nuggets. End of unit assessment and end of term assessment Photosynthesis Respiration Metabolism		RRR, quick quizzes and Century nuggets. End of unit assessment and end of term assessment on: The nervous system The endocrine system Hormones in human reproduction	
Numeracy	Literacy	Numeracy	Literacy	Numeracy	Literacy
Maths skills – graphs, calculations	focusing on keywords, tier 3 vocabulary, connectives, SPAG, synonyms,	Plot two variables from experimental or other data. Give data to appropriate significant figures. Recognise and use expressions in standard form. Use of correct units.	focusing on keywords, tier 3 vocabulary, connectives, SPAG, synonyms, Tier 3 vocabulary Introduction to new keywords Using correct grammar and spelling in long answer questions. Reading and understanding long texts highlighting key knowledge.	Plot two variables from experimental or other data. Give data to appropriate significant figures. Recognise and use expressions in standard form. Use of correct units.	focusing on keywords, tier 3 vocabulary, connectives, SPAG, synonyms, Using correct grammar and spelling in long answer questions. Reading and understanding long texts highlighting key knowledge.
Cross curricular links		Cross curricular links		Cross curricular links	
Chemistry Physics PE Food technology PSHE Sexual health		Maths- Substituting equations, interpretation of graphs. English- Using correct grammar and spelling in long answer questions. Reading and understanding long texts highlighting key knowledge. Chemistry- Chemical reactions and formulae, working out rate of reaction. Physics- Inverse square law. BTEC P.E.- Respiration and the effect of exercise on the body.		Health and social- The impacts of diabetes and leading a healthy life. Contraception. Maths- Substituting equations, interpretation of graphs. English- Using correct grammar and spelling in long answer questions. Reading and understanding long texts highlighting key knowledge. P.E.- Reaction time. PSHE- Contraception and IVF	
SMSC		British Value		RSHE	
<p><i>There will be multiple opportunities for students develop spiritually; being creative in their learning and a range of activities.</i></p> <p><i>The high expectations placed on the student from the school and department mean that pupils will regularly be made aware of the right and wrong morally.</i></p> <p><i>Pupils are expected to share the views morally on the different topics but also show respect and appreciate others in the classroom.</i></p> <p><i>The majority of topics will give the students opportunity to develop their social skills, from giving presentations to working in group tasks.</i></p>		<p><i>Democracy: Students work together practically in groups which encourages them to share views and opinions and take instructions from others. Practical's include, measuring the effects of light on photosynthesis and testing their reactions times. Students can share their opinions and listen to the views of others on the issues surrounding the use of IVF technique and contraception.</i></p> <p><i>The rule of law: Students follow laboratory rules for the safety of all. Opportunities to discuss laws and legislation relating to use of contraceptives and IVF and development of new medicines including preclinical and clinical testing.</i></p>		<p><i>The students will be taught about how to be safe online and the dangers.</i></p> <p><i>The students will be made aware of online relationships and the sexual issues that may arise.</i></p> <p><i>The students will be regularly conversed on their physical and mental health when issues arise within topics.</i></p> <p><i>They will be taught about the need for tolerance of other people's viewpoints.</i></p> <p><i>Students will be taught about diseases including sexually transmitted diseases and how to reduce their transmission.</i></p>	



Individual liberty;
There are opportunities for students to work independently and make choices in a safe environment when carrying out investigations.
Pupils will develop a better understanding of their choices in terms of reproduction.
Mutual respect and tolerance: Students work together practically in groups which encourages teamwork and respect for others. Students will have the opportunity to explore different viewpoints of medicine testing and IVF.
Students will be taught the importance of selecting valid information from reliable sources for any presentation tasks that they do.
Students are taught how to contribute to life in modern Britain by learning about the history of scientific discovery.
Students will be taught the legal implications of using the internet
Students will be taught to fully appreciate other students viewpoints and the importance of being respectful when dealing with sensitive topics about fertility treatment.
Students will be taught the importance of selecting valid information from reliable sources for any presentation tasks that they do.
Students are taught how to contribute to life in modern Britain by learning about the history of scientific discovery and how new medicines are developed.
Students will learn how the advancement of scientific technologies have led to the development of IVF techniques.
Students will learn how to display British Values to use the internet

Adapted Curriculum Content
Monoclonal Antibodies
Uses of monoclonal antibodies
Identifying plant disease **all Higher only**

Adapted Curriculum Content:
Interaction of limiting factors of photosynthesis
Students should be able to explain graphs of photosynthesis rate involving two or three factors and decide which is the limiting factor.
Inverse square law
Use of greenhouses to reduce limiting factors
Conversion of lactic acid back to glucose or reacted with oxygen in the liver. **all Higher and Triple only**

Adapted Curriculum content:
The main areas of the brain and their functions
Know ways that we study the brain giving advantages and disadvantages of each.
The eye structures
Accommodation
Pupil reflex
Control of body temperature
Blood sugar control when it is too low as a negative feedback cycle
Maintaining water potential
Deamination
The effect of ADH on maintaining water levels.
Kidney failure and treatments
Interactions of hormones in the menstrual cycle
Interpret menstrual cycle graphs.
IVF treatment
Negative feedback cycles
Plant hormones
Specific plant hormones and their uses
Auxins RP
ALL TRIPLE ONLY



<p><u>Adaptive Implementation Practices:</u></p> <p>Coloured paper/pens Differentiated worksheets Differentiated tasks Seating plans to maximise concentration allowing for visual/hearing impairments etc Appropriate use of IWB Dual coding Spare equipment Modelling experimental detail Pre drawn tables/graphs/diagrams to be labelled</p>	<p><u>Adaptive Implementation Practices:</u></p> <p>Coloured paper/pens Differentiated worksheets Differentiated tasks Seating plans to maximise concentration allowing for visual/hearing impairments etc Appropriate use of IWB Dual coding Spare equipment Modelling experimental detail Pre drawn tables/graphs/diagrams to be labelled</p>	<p><u>Adaptive Implementation Practices:</u></p> <p>Coloured paper/pens Differentiated worksheets Differentiated tasks Seating plans to maximise concentration allowing for visual/hearing impairments etc Appropriate use of IWB Dual coding Spare equipment Modelling experimental detail Pre drawn tables/graphs/diagrams to be labelled</p>
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Department Planning 2024





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