HGS Curriculum Map Biology

Year Group: 11 (triple in red)

Overall Intent	Our aim is that all our Science learners at HGS are inspired to develop their understanding of the world around them through the subjects of Biology, Chemistry and Physics. Science has changed our lives for the better. A good understanding of Science is vital to the world's future prosperity and to ensuring that our planet is able to support life for many generations to come. Our vision, is that students develop a sense of excitement and curiosity about natural phenomena and understand how Science can be used to explain what is happening in the world around us and to predict how things will behave. The faculty is committed to developing students' practical, mathematical, analytical skills as well as their understanding of the uses and implications of science today and for the future. Through the study of Science, we want our students to become thoughtful and responsible citizens who are able to make informed decisions about how their choices impact on the world around them.					
Time period	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topics/sub-topics	Ecology Inheritance	Evolution	Homeostasis Nerves Plant hormones	Environment		
Crucial Learning **Content** (What are the key themes, knowledge, skills, terms, vocabulary they need to know and remember from this unit?	Communities and their interaction with abiotic factors and biotic factors Adaptations of organisms in different environments and feeding relationships, including tropic levels Pyramids of biomass and transfer of biomass	Variation and the process of evolution and selective breeding and the development of antibiotic resistant bacteria. Genetic engineering, Cloning, Theory of evolution and speciation, Evidence for evolution, including	Homeostasis and the control of blood glucose concentration, maintaining water and nitrogen balance and the principle of negative feed back Human nervous system, including the brain, eye, control of body	Global warming and the impact of environment change Biodiversity, deforestation and the management of diversity. Land use and waste, management. Farming techniques, including	Review of work covered in KS4 curriculum	.

	DNA and the genome, DNA structure and protein synthesis, monohybrid inheritance and, inherited disorders, determination of sex, and history of genetics.	fossils Extinction Classification of living organisms	temperature, The endocrine system Plant hormones in coordination and their uses	sustainable fisheries, and the role of biotechnology Food security,		
Sequence (Where does this fit – what have they done before which supports it, where does it link with future units?)	KS3: Variation, Interdependence, Genetics, Plant reproduction, Reproduction	KS3: Variation, Evolution Photosynthesis	KS3: Cells, gas exchange,	KS3: Environmental chemistry	KS3:	
	Y10: Photosynthesis, Respiration, Cell division, Reproduction	Y10: Cell division, Reproduction	Y10: Respiration, Heart lungs and circulation,	Y10: Respiration, Photosynthesis,	Y10:	
	Y11:	Y11:	Y11: Nervous system	Y11:	Y11:	
Skills Acquired	WS 1.1,1.2, 1.3, 1.4, 2.6 MS 1c,2b, 2c. 2e, 2f, 3a, 4a, 4c AT 1, 3, 4, 5	WS 1.1, 1.2, 1.3, 1.4 MS 2c, 4a AT	WS 1.2,1.3,1.4, 1.5 MS 2c, 4a AT 1,3,4, 7	WS 1.3, 1.4, 1.5, 1.6 MS AT	WS MS AT	
End Point (What do we want them to know, do and remember at the end of this unit?)	Ecology topic work builds on the KS3 Interdependence SOW work in Year 8.	Builds on the KS3 unit evolution.	Understand how the nervous and hormonal system maintain a constant internal environment.	Builds on the KS4 topic ecology	Revision and exam technique	

	Inheritance topic builds on knowledge gained in Year 9 genetics unit.		Builds on knowledge in year 10 reproduction unit			
Assessment: **Formative & summative** How will we know what they have learnt and can remember?	Teacher and peer marked tasks. Interim test	Teacher and peer marked tasks. CAT test	Teacher and peer marked tasks. Interim test	Teacher and peer marked tasks. CAT test	Teacher and peer marked tasks. Interim test	

Working scientifically

Development of scientific thinking	
1.1	Understand how scientific methods and theories develop over time.
1.2	Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.
1.3	Appreciate the power and limitations of science and consider any ethical issues which may arise.
1.4	Explain every day and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.
1.5	Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.
1.6	Recognise the importance of peer review of results and of communicating results to a range of audiences.

Experimental skills and strategies	
2.1	Use scientific theories and explanations to develop hypotheses.
2.2	Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena.
2.3	Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment.
2.4	Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations.
2.5	Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative.
2.6	Make and record observations and measurements using a range of apparatus and methods.
2.7	Evaluate methods and suggest possible improvements and further investigations.

Analysis and evaluation	
3.1	Presenting observations and other data using appropriate methods.
3.2	Translating data from one form to another.
3.3	Carrying out and represent mathematical and statistical analysis.
3.4	Representing distributions of results and make estimations of uncertainty.
3.5	Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions.
3.6	Presenting reasoned explanations including relating data to hypotheses.
3.7	Being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error.
3.8	Communicating the scientific rationale for investigations, methods used, findings and reasoned conclusions through paper-based and electronic reports and presentations using verbal, diagrammatic, graphical, numerical and symbolic forms.

Scientific vocabulary, quantities, units, symbols and nomenclature	
4.1	Use scientific vocabulary, terminology and definitions.
4.2	Recognise the importance of scientific quantities and understand how they are determined.
4.3	Use SI units (e.g. kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate.
4.4	Use prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano).
4.5	Interconvert units.
4.6	Use an appropriate number of significant figures in calculation.

Apparatus and Technique

AT8 is triple biology only

AT 1	Use of appropriate apparatus to make and record a range of measurements accurately, Including length, area, mass, time, temperature, and volume of liquids and gases and pH (links to A-level AT a).
AT 2	Safe use of appropriate heating devices and techniques including use of a Bunsen burner and a water bath or electric heater (links to A-level AT b).
AT 3	Use of appropriate apparatus and techniques for the observation and measurement of biological changes and/or processes.
AT 4	Safe and ethical use of living organisms (plants or animals) to measure physiological functions and responses to the environment (links to AT h)
AT 5	Measurement of rates of reaction by a variety of methods including production of gas, uptake of water and colour change of indicator.
AT 6	Application of appropriate sampling techniques to investigate the distribution and abundance of organisms in an ecosystem via direct use in the field (links to A level AT k)
AT 7	Use of appropriate apparatus, techniques and magnification, including microscopes, to make observations of biological specimens and produce labelled scientific drawings (links to A level AT k)
AT 8	Use of appropriate techniques and qualitative reagents to identify biological molecules and processes in more complex and problem solving contexts including continuous sampling in an investigation (links to A level AT f)

Mathematical Skills

Arithmetic and numerical computation	
1a	Recognise and use expressions in decimal form
1b	Recognise and use expressions in standard form
1c	Use ratios, fractions and percentages
1d	Make estimates of the results of simple calculations

Handling Data	
2a	Use an appropriate number of significant figures
2b	Find arithmetic means
2c	Construct and interpret frequency tables and diagrams, bar charts and histograms
2d	Understand the principles of sampling as applied to scientific data
2e	Understand simple probability
2f	Understand the terms mean, mode and median
2g	Use a scatter diagram to identify a correlation between two variables.
2h	Make order of magnitude calculations

Algebra	
3a	Understand and use the symbols: =, <, <<, >>, >, $\propto$, ~
3d	Solve simple algebraic equations

Graphs	
4a	Translate information between graphical and numeric form
4b	Understand that y = mx + c represents a linear relationship
4c	Plot two variables from experimental or other data
4d	Determine the slope and intercept of a linear graph