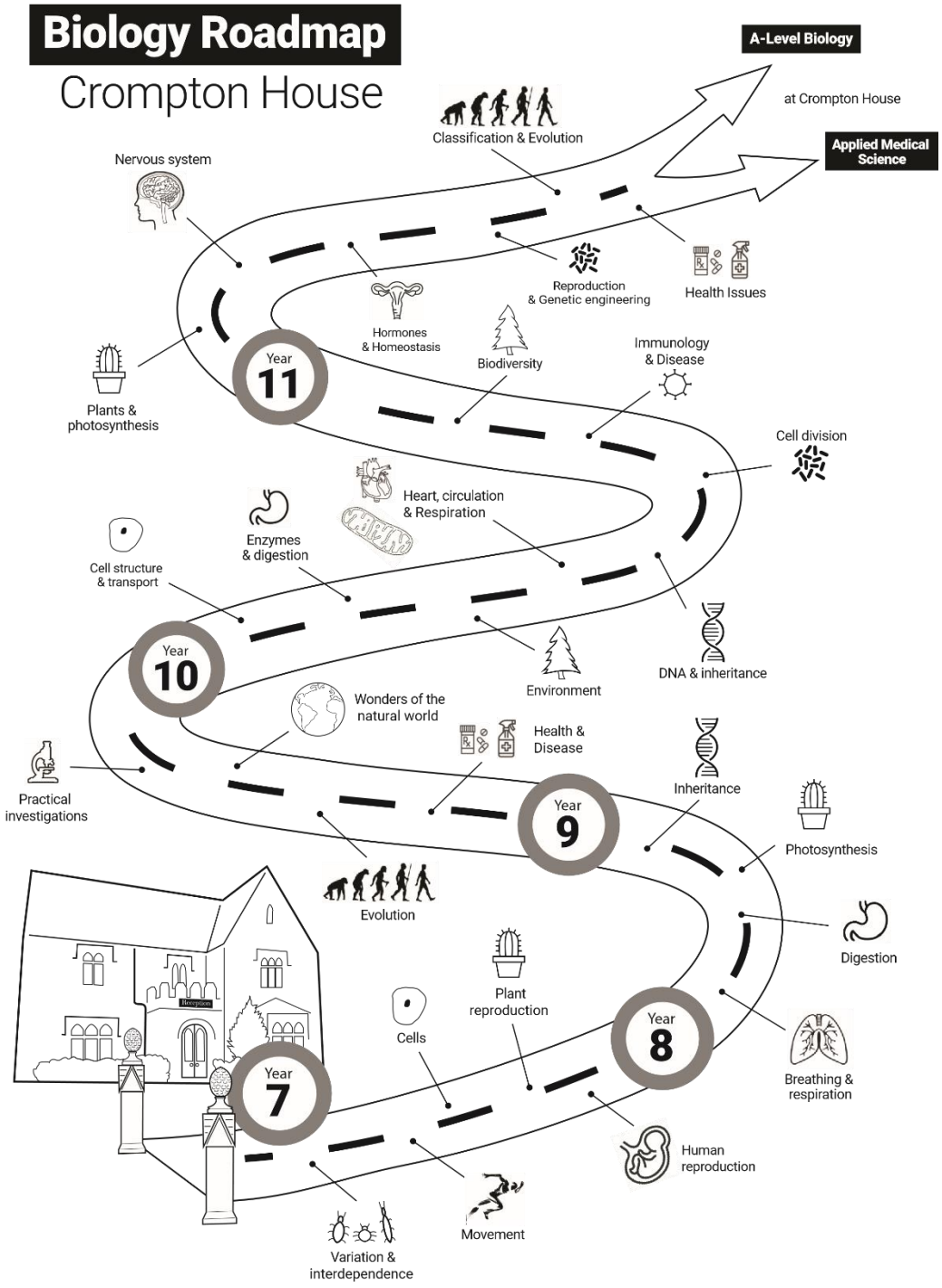
GCSE Biology & Combined Science Biology PLCs



Statements referring to the Triple Biology only are shown *in italics*.

Statements referring to Higher Tier only are marked (HT).

Key statements for each topic are shown **in bold**.

Required practicals are identified as RP then the number of the practical.

Cells & Transport

Reference	Statement	Checkpoint		
		1	2	3
1.1.1.a	**I can use the terms 'eukaryotic' and 'prokaryotic' to describe types of cells.**			
1.1.1.b	I can describe the features of bacterial (prokaryotic) cells.			
1.1.1.c	I can demonstrate an understanding of the scale and size of cells and be able to make order of magnitude calculations, including the use of standard form.			
1.1.2.a	I can state the structures found in animal and plant (eukaryotic) cells.			
1.1.2.b	**I can describe the functions of the structures in animal and plant (eukaryotic) cells.**			
1.1.4.b	**I can describe what a specialised cell is, including examples.**			
1.1.5.a	I can define the terms magnification and resolution.			
1.1.5.b	I can compare electron and light microscopes in terms of their magnification and resolution, including the consequences of these differences for studying cells.			
1.1.5.c	**I can carry out calculations involving magnification, real size and image size using the formula: magnification = size of image / size of real object, expressing answers in standard form if appropriate.**			
1.3.1.a	**I can describe the process of diffusion, including examples.**			
1.3.1.b	I can explain how diffusion is affected by different factors.			
1.3.1.c	I can explain the term “surface area to volume ratio” and how this relates to single-celled and multicellular organisms.			
1.3.1.d	I can calculate and compare surface area to volume ratio.			
1.3.1.e	I can explain how effectiveness of an exchange surface can be increased, including examples of exchange surface adaptations.			
1.3.2.a	**I can describe the process of osmosis**			
1.3.3.a	**I can describe the process of active transport, including examples**			
1.3.3.b	I can explain the differences between diffusion, osmosis, and active transport.			
RP.1	I can use a light microscope to observe, draw and label a selection of plant and animal cells.			
RP.3	I can investigate the effect of salt or sugar solutions on plant tissue.			

Enzymes & Digestion

Reference	Statement	Checkpoint		
		1	2	3
2.1.1.a	I can describe the levels of organisation within living organisms.			
2.2.1.a	**I can describe basic features of enzymes.**			
2.2.1.b	I can describe the lock and key theory as a model of enzyme action.			
2.2.1.c	**I can explain the effect of temperature and pH on enzymes.**			
2.2.1.d	**I can describe the digestive enzymes, including their names, sites of production and actions.**			
2.2.1.e	I can describe how the products of digestion are used.			
2.2.1.f	I can describe the features and functions of bile.			
1.3.1.e	**I can explain how the effectiveness of an exchange surface can be increased, including examples of exchange surface adaptations.**			
RP.4	**I can use qualitative reagents to test for a range of carbohydrates, lipids, and proteins.**			
RP.5	I can investigate the effect of pH on the rate of reaction of amylase enzyme.			

Environment

Reference	Statement	Checkpoint		
		1	2	3
7.1.1.a	I can state what an ecosystem is, including different levels of organisation in ecosystems			
7.1.1.b	**I can describe which resources animals and plants compete for, and why they do this**			
7.1.1.c	I can explain the terms 'interdependence' and 'stable community'			
7.1.2.a	**I can name some abiotic and biotic factors that affect communities**			
7.1.2.b	I can explain how a change in an abiotic or biotic factor might affect a community given appropriate data or context			
7.1.4.a	I can describe structural, behavioural and functional adaptations of organisms			
7.2.1.a	**I can represent the feeding relationships within a community using a food chain, including the use of scientific terms to describe these relationships**			
7.2.1.b	**I can explain how and why ecologists use quadrats and transects**			
7.2.1.c	I can understand and interpret predator-prey cycles			
7.2.2.a	**I can describe the processes involved in the carbon cycle**			
7.2.2.b	**I can describe the processes involved in the water cycle**			
7.4.1.a	I can describe the different trophic levels and use numbers to represent them			
7.4.1.b	I can describe what decomposers are and what they do			
7.2.3.a	*(Biology only**) I can explain how temperature, water and availability of oxygen affect the rate of decay of biological material***			
7.2.3.b	*(Biology only) I can explain how the conditions for decay are optimised by farmers and gardeners, and the reasons for this*			
7.2.3.c	*(Biology only) I can describe how methane gas can be produced for use as a fuel*			
7.2.4.a	*(Biology only) I can explain how environmental changes can affect the distribution of species in an ecosystem*			
7.4.2.a	*(Biology only) I can construct a pyramid of biomass and explain what it represents*			
7.4.3.a	*(Biology only) I can state how much energy producers absorb from the Sun*			
7.4.3.b	*(Biology only) I can explain how biomass is lost between trophic levels, including the consequences of this*			
7.4.3.c	*(Biology only) I can calculate the efficiency of biomass transfers between trophic levels by percentages or fractions of mass, and explain how this affects the number of organisms at each trophic level*			
7.5.1.a	*(Biology only) I can explain the term 'food security' and factors that affect it*			
7.5.2.a	*(Biology only) I can explain how the efficiency of food production can be improved*			
7.5.3.a	*(Biology only) I can explain the importance of maintaining fish stocks at a level where breeding continues*			
7.5.3.b	*(Biology only) I can explain some methods that can help to conserve fish stocks*			
RP 10	*(Biology only) I can investigate the effect of a factor on the rate of decay of fresh milk by measuring pH change*			

Heart & Circulation

Reference	Statement	Checkpoint		
		1	2	3
2.2.2.a	**I can describe the structure of the human heart and lungs**			
2.2.2.b	I can explain how the heart moves blood around the body			
2.2.2.c	I can explain how the natural resting heart rate is controlled, and how irregularities can be corrected			
2.2.2.d	**I can describe the structure and function of arteries, veins and capillaries**			
2.2.3.a	I can describe blood and identify its different components, including identifying blood cells from photographs and diagrams			
2.2.3.b	**I can describe the functions of blood components, including adaptations to function**			
2.2.4.a	I can describe what happens in coronary heart disease			
2.2.4.b	**I can describe and evaluate treatments for cardiovascular diseases**			
2.2.4.c	I know that heart valves can become faulty, and I can describe the consequences of this			
4.2.1.a	I can describe basic features of respiration			
4.2.1.b	**I can describe aerobic and anaerobic respiration using word equations**			
4.2.1.d	I can compare aerobic and anaerobic respiration			
4.2.2.a	**I can describe what happens to heart rate, breathing rate and breath volume during exercise and why these changes occur**			
4.2.2.b	I can explain what happens when muscles do not have enough oxygen			
4.2.2.c	(HT) I can explain what happens to lactic acid			
4.2.3.a	**I can explain what metabolism is, including examples**			

DNA & Inheritance

Reference	Statement	Checkpoint		
		1	2	3
6.1.4.a	**I can describe the structure of DNA and its role in storing genetic information inside the cell**			
6.1.4.b	I can explain the term 'genome' and the importance of the human genome			
6.1.6.a	I can describe how characteristics are controlled by one or more genes, including examples			
6.1.6.b	**I can explain important genetic terms: gamete, chromosome, gene, allele, dominant, recessive, homozygous, heterozygous, genotype and phenotype**			
6.1.6.c	**I can understand and use Punnett square diagrams, genetic crosses and family trees**			
6.1.6.d	(HT) I can construct a Punnett square diagram to predict the outcome of a monohybrid cross			
6.1.7.a	I can describe cystic fibrosis and polydactyly as examples of inherited disorders			
6.1.7.b	I can evaluate social, economic and ethical issues concerning embryo screening when given appropriate information			
6.1.8.a	I can describe how the chromosomes are arranged as 23 pairs in body cells, including the function of the sex chromosomes			
6.1.8.b	**I can explain how sex is determined and carry out a genetic cross to show sex inheritance**			
6.1.5.a	*(Biology only) I can describe the structure of DNA, including knowledge of nucleotide units*			
6.1.5.b	*(HT Biology only) I can explain complementary base pairing in DNA*			
6.1.5.c	*(Biology only) I can explain the relationship between DNA bases, amino acids and proteins*			
6.1.5.d	*(HT Biology only) I can describe how proteins are synthesised on ribosomes, including protein folding and its importance for protein function*			
6.1.5.e	*(HT Biology only) I can explain what mutations are, and the possible effects of mutations*			
6.1.5.f	*(HT Biology only) I can explain what non-coding parts of DNA are, and why they are important*			

Cell Division

Reference	Statement	Checkpoint		
		1	2	3
1.2.1.a	I can describe how genetic information is stored in the nucleus of a cell			
1.2.2.a	I can describe the processes that happen during the cell cycle, including an understanding of mitosis			
1.2.2.b	I can describe that genetic material is doubled and numbers of subcellular structures are increased before the cell divides.			
1.2.2.c	I can describe that during mitosis one set of chromosomes is pulled to each end of the cell and the nucleus divides.			
1.2.2.d	I can describe the three stages of the cell cycle.			
1.2.2.e	I can describe how cell division by mitosis is important in the growth and development of multicellular organisms.			
1.2.3.a	I can describe stem cells, including sources of stem cells in plants and animals and their role in an organism			
1.2.3.b	I can describe the use of stem cells in the production of plant clones and therapeutic cloning			
1.2.3.c	I can discuss the potential risks, benefits and issues associated with using stem cells in medical research and treatments			

Immunology & Disease

Reference	Statement	Checkpoint		
		1	2	3
3.1.1.a	**I can describe what a pathogen is and how pathogens are spread.**			
3.1.1.b	I can explain how pathogenic bacteria and viruses cause damage in the body.			
3.1.1.c	I can explain how the spread of diseases can be reduced or prevented.			
3.1.2.a	**I can describe measles, HIV and tobacco mosaic virus as examples of viral pathogens (to include pathology, treatment and disease control where appropriate).**			
3.1.3.a	**I can describe salmonella food poisoning and gonorrhoea as examples of bacterial pathogens (to include pathology, treatment and disease control where appropriate).**			
3.1.4.a	**I can describe the signs, transmission and treatment of rose black spot infection in plants.**			
3.1.5.a	**I can describe the symptoms, transmission and control of malaria, including knowledge of the mosquito vector.**			
3.1.6.a	I can describe defences that stop pathogens entering the human body.			
3.1.6.b	I can state the role of the immune system.			
3.1.6.c	**I can describe how white blood cells attack pathogens.**			
3.1.7.a	**I can describe how vaccination works, including at the population level.**			
3.1.8.a	I can explain how antibiotics and painkillers are used to treat diseases, including their limitations.			
3.1.9.a	**I can describe how sources for drugs have changed over time and give some examples.**			
3.1.9.b	I can describe how new drugs are tested, including pre-clinical testing and clinical trials.			
3.2.1.a	*(Biology only) I can describe what monoclonal antibodies are and why they are useful.*			
3.2.1.b	*(Biology only) I can describe how monoclonal antibodies are produced.*			
3.2.2.a	*(Biology only) I can explain how monoclonal antibodies are used for diagnosis, research, chemical testing, and disease treatments.*			
3.2.2.b	*(Biology only) I can evaluate the advantages and disadvantages of monoclonal antibodies.*			

Biodiversity

Reference	Statement	Checkpoint		
		1	2	3
7.3.1.a	**I can describe what biodiversity is, why it is important, and how human activities affect it**			
7.3.2.a	I can describe the impact of human population growth and increased living standards on resource use and waste production			
7.3.2.b	I can explain how pollution can occur, and the impacts of pollution			
7.3.3.a	I can describe how humans reduce the amount of land available for other animals and plants			
7.2.1.b	**I can explain how and why ecologists use quadrats and transects**			
7.3.3.b	I can explain the consequences of peat bog destruction			
7.3.4.a	I can describe what deforestation is and why it has occurred in tropical areas			
7.3.4.b	I can explain the consequences of deforestation			
7.3.5.a	**I can describe how the composition of the atmosphere is changing, and the impact of this on global warming**			
7.3.5.b	I can describe some biological consequences of global warming			
7.3.6.a	I can describe programmes that aim to reduce the negative effects on ecosystems and biodiversity			
RP 9	**I can investigate the population size of a common species in a habitat**			

Plant Transport

Reference	Statement	Checkpoint		
		1	2	3
2.3.1.a	I can name some plant tissues and describe their functions			
2.3.1.b	**I can explain how the structure of plant tissues are related to their function within the leaf, which is a plant organ**			
2.3.2.a	I know that the roots, stem and leaves form a plant organ system that transports substances around the plant			
2.3.2.b	**I can explain how root hair cells, xylem and phloem are adapted to their functions**			
2.3.2.d	I can describe the process of transpiration			
2.3.2.e	**I can explain how the rate of transpiration can be affected by different factors**			
2.3.2.c	I can describe the process of translocation			
1.3.1.e	I can explain how effectiveness of an exchange surface can be increased, including examples of exchange surface adaptations.			

Photosynthesis

Reference	Statement	Checkpoint		
		1	2	3
2.3.1.b	**I can explain how the structure of plant tissues are related to their function within the leaf, which is a plant organ**			
3.3.1.c	*(Biology only) I can give examples of plant ion deficiencies and their effects*			
3.3.2.a	*(Biology only) I can describe physical, chemical, and mechanical defence responses of plants*			
4.1.1.a	**I can describe what happens in photosynthesis, including using a word equation**			
4.1.1.b	I can describe photosynthesis using a chemical equation			
4.1.2.a	**I can state the limiting factors of photosynthesis**			
4.1.2.b	I can explain how limiting factors affect the rate of photosynthesis, including graphical interpretation (limited to one factor)			
4.1.2.c	I can explain how the limiting factors of photosynthesis interact, including graphical interpretation involving two or three factors			
4.1.2.d	**I can explain how limiting factors are important to the economics of greenhouses, including data interpretation**			
4.1.2.e	I can explain and use inverse proportion in the context of photosynthesis			
4.1.3.a	**I can describe how the glucose produced in photosynthesis is used by plants**			
5.4.1.a	*(Biology only) I can describe hormone-linked plant responses, to include phototropism and gravitropism, and the role of auxin in controlling these*			
5.4.1.b	*(Biology only) I can describe the functions of gibberellins and ethene in plants, and the uses of plant hormones in agriculture, horticulture, and the food industry*			
RP 6	**I can investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed**			
RP 8	*(Biology only) I can investigate the effect of light or gravity on the growth of newly germinated seedlings*			

Nervous System

Reference	Statement	Checkpoint		
		1	2	3
RP 7	**I can investigate the effect of a factor on human reaction time**			
5.2.1.a	**I can state the function of the nervous system and name its important components**			
5.2.1.b	I can describe how information passes through the nervous system			
5.2.1.c	**I can describe what happens in a reflex action and why reflex actions are important**			
5.2.1.d	I can explain how features of the nervous system are adapted to their function, including a reflex arc			
5.2.2.a	*(Biology only) I can state the function of the brain and how it is structured, including naming specific regions and identifying these on a diagram*			
5.2.2.b	*(Biology only) I can describe the functions of different regions of the brain*			
5.2.2.c	*(Biology only) I can explain some of the difficulties of investigating brain function and treating brain damage and disease*			
5.2.2.d	*(Biology only) I can explain how neuroscientists have been able to map regions of the brain to particular functions*			
5.2.3.a	*(Biology only) I can state the function of the eye and how it is structured, including names of specific parts*			
5.2.3.b	*(Biology only) I can describe the functions of different parts of the eye, including relating structure to function*			
5.2.3.c	*(Biology only) I can describe what accommodation is, and how it is carried out*			
5.2.3.d	*(Biology only) I can explain what myopia and hyperopia are and how they are treated, including interpreting ray diagrams*			

Hormones & Homeostasis

Reference	Statement	Checkpoint		
		1	2	3
5.1.1.a	I can describe what homeostasis is and why it is important, and I can give examples of conditions controlled by homeostasis			
5.1.1.b	I can describe the common features of all control systems			
5.3.1.a	I can describe the principles of hormonal coordination and control by the human endocrine system			
5.3.2.a	I can state that blood glucose concentration is monitored and controlled by the pancreas, and describe the body's response when blood glucose is too high			
5.3.2.b	I can explain what type 1 and type 2 diabetes are and how they are treated			
5.3.2.c	(Higher) I can describe the body's response when blood glucose concentration is too low			
5.3.2.d	(Higher) I can explain how glucagon interacts with insulin to control blood glucose levels in the body			
5.3.4.a	I can describe what happens at puberty in males and females, including knowledge of male and female reproductive hormones			
5.3.4.b	I can name and describe the roles of the hormones involved in the menstrual cycle			
5.3.4.c	(Higher) I can explain how different hormones interact to control the menstrual cycle and ovulation			
5.3.5.a	I can describe how fertility can be controlled by hormonal and nonhormonal methods of contraception			
5.3.6.a	(Higher) I can explain how hormones are used to treat infertility, including the steps involved in In Vitro Fertilisation (IVF) treatment			
5.3.6.b	(Higher) I can evaluate the risks and benefits of fertility treatments			
5.3.7.a	(Higher) I can explain the roles of thyroxine and adrenaline in the body			
5.3.7.b	(Higher) I can explain the control of thyroxine as a negative feedback system			
5.3.3.a	*(Biology only) I can describe how water, ions and urea are lost from the body, and the consequences of losing or gaining too much water for body cells*			
5.3.3.b	*(Biology only HT) I know that protein digestion leads to excess amino acids inside the body, and I can describe what happens to these*			
5.3.3.c	*(Biology only) I can describe how the kidneys produce urine*			
5.3.3.d	*(Biology only) I can explain how the water level in the body is controlled by ADH*			
5.3.3.e	*(Biology only) I can describe how kidney failure can be treated*			

Reproduction & Genetic Engineering

Reference	Statement	Checkpoint		
		1	2	3
6.1.1.a	I can describe features of sexual and asexual reproduction			
6.1.2.a	**I can describe what happens during meiosis**			
6.1.2.b	**I can describe what happens at fertilisation**			
6.2.4.a	**I can describe what genetic engineering is, including examples, and how it is carried out**			
6.2.4.b	I can explain some benefits, risks and concerns related to genetic engineering			
6.2.4.c	(Higher) I can explain the process of genetic engineering, to include knowledge of enzymes and vectors			
7.5.4.a	I can describe and explain some possible biotechnical and agricultural solutions, including genetic modification, to the demands of the growing human population			
1.1.6.a	***(Biology only) I can describe how bacteria reproduce and the conditions required***			
1.1.6.b	*(Biology only) I can describe how to prepare an uncontaminated culture*			
1.1.6.c	*(Biology only) I can calculate cross-sectional areas of colonies or clear areas around colonies using πr^2, and the number of bacteria in a population after a certain time if given the mean division time*			
6.1.3.a	*(Biology only) I can explain advantages of sexual and asexual reproduction*			
6.1.3.b	*(Biology only) I can describe examples of organisms that reproduce both sexually and asexually*			
6.2.5.a	*(Biology only) I can describe different cloning techniques, to include: tissue culture, cuttings, embryo transplants and adult cell cloning*			
RP 2	*(Biology only) I can investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition*			

Classification & Evolution

Reference	Statement	Checkpoint		
		1	2	3
6.2.1.a	**I can describe what variation is and how it can be caused**			
6.2.1.b	I can describe mutations and explain their influence on phenotype and changes in a species			
6.2.2.a	**I can explain the theory of evolution by natural selection**			
6.2.3.a	I can describe what selective breeding is			
6.2.3.b	**I can explain the process of selective breeding, including examples of desired characteristics and risks associated with selective breeding**			
6.3.4.a	I can describe some sources of evidence for evolution			
6.3.5.a	**I can describe what fossils are, how they are formed and what we can learn from them**			
6.3.5.b	I can explain why there are few traces of the early life forms, and the consequences of this in terms of our understanding of how life began			
6.3.6.a	I can describe some of the causes of extinction			
6.3.7.a	I can describe how antibiotic-resistant strains of bacteria can arise and spread			
6.3.7.b	I can describe how the emergence of antibiotic-resistant bacteria can be reduced and controlled, to include the limitations of antibiotic development			
6.4.1.a	**I can describe how organisms are named and classified in the Linnaean system**			
6.4.1.b	I can explain how scientific advances have led to the proposal of new models of classification, including knowledge of the three-domain system			
6.4.1.c	I can describe and interpret evolutionary trees			
6.3.1.b	*(Biology only) I can describe other inheritance-based theories that existed (apart from the theory of natural selection), and the problems with these theories*			
6.3.2.a	*(Biology only) I can describe the work of Alfred Russel Wallace*			
6.3.2.b	*(Biology only) I can explain how new species can be formed*			
6.3.3.a	*(Biology only) I can describe how our understanding of genetics has developed over time, to include knowledge of Mendel*			

Health Issues

Reference	Statement	Checkpoint		
		1	2	3
2.2.5.a	**I can describe health and the causes of ill-health**			
2.2.5.b	I can describe how different types of diseases may interact			
2.2.6.a	I can explain the effect of lifestyle factors, including diet, alcohol and smoking on the incidence of non-communicable diseases at local, national and global levels and discuss the human and financial cost of these diseases			
2.2.6.b	**I can describe what risk factors are and I can give examples**			
2.2.7.a	**I can describe benign and malignant tumours**			
2.2.7.b	I can describe the known risk factors for cancer, including genetic and lifestyle risk factors			