	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Theme/Big Idea	**Topic 2: Genes and Health** The context for this topic is a couple trying to decide whether to have a child when there is a chance that it could inherit cystic fibrosis (CF). The topic looks at the questions they may need answered. It examines the symptoms and causes of CF. It includes details of what is happening at a molecular level with protein structure and synthesis. The screening for the disease introduces some ethical issues the couple may face	**Topic 1: Lifestyle, Health and Risk** This topic uses the context of health risk and in particular the risk of developing cardiovascular disease (CVD) to cover content on the structure and function of the cardiovascular system, atherosclerosis and blood clotting role in CVD, correlation, causation and the concept of risks to health including determining health risk and perceptions of risk. The consideration of factors that increase the risk of CVD gives coverage of blood pressure and structure and function of carbohydrates, lipids (triglycerides) and water.	**Topic 3: Voice of the genome** The context for this topic is the most fundamental biological story there is – development from a single egg into a complex multicellular organism. The biological ideas required to understand this story are studied. The context allows a wide range of biological concepts to be studied. The topic starts by looking at cell structure and ultrastructure of eukaryote and prokaryote cells. It goes on to consider gametes and the role of meiosis in their formation and the introduction of variation. The developmental story continues with fertilisation, cell specialisation through differential gene expression and the organisation of cells in multicellular organisms. The role	**Topic 4: Biodiversity and natural resources** The story of the Brazil nut tree and the interdependence of highly adapted species for survival starts this topic. This story introduces biodiversity, adaptation, evolution by natural selection, and the idea that species of value to humans are threatened by human activity and there is a need for conservation. The topic focuses on biodiversity, how it is classified and measured, and how all this diversity has come about through adaptation and natural selection. It has sections on both traditional and novel uses of plants and plant fibres and the use of chemical extracts from animals and plants, and the potential	**Topic 4: Biodiversity and natural resources** The story of the Brazil nut tree and the interdependence of highly adapted species for survival starts this topic. This story introduces biodiversity, adaptation, evolution by natural selection, and the idea that species of value to humans are threatened by human activity and there is a need for conservation. The topic focuses on biodiversity, how it is classified and measured, and how all this diversity has come about through adaptation and natural selection. It has sections on both traditional and novel uses of plants and plant fibres and the use of chemical extracts from animals and plants, and the potential	**Topic 5: On the wild side.** This topic uses the context of climate change to develop understanding of a wide range of biological ideas. The topic uses the iconic example of the polar bear and the Arctic tundra as the storyline to introduce the topic and it is returned to at various points through the topic. The topic content starts with a consideration of ecosystems, the role of biotic and abiotic factors in determining the number and distribution of organisms in a habitat, and succession with the idea of niche revisited. The reliance of ecosystems on photosynthesis and the transfer of energy between trophic levels is studied before looking in

			of the genome in the control of development is considered, in addition to how epigenetic changes, can modify the activation of certain genes and how both genotype and the environment influence phenotype. The study of stem cells and their use in medicine introduces ethical issues	contribution to sustainability by the use of plant based products. The concern for disappearing biodiversity and loss of potential natural resources is used to highlight the need for conservation of endangered species focusing on the role of zoos and seedbanks.	contribution to sustainability by the use of plant based products. The concern for disappearing biodiversity and loss of potential natural resources is used to highlight the need for conservation of endangered species focusing on the role of zoos and seedbanks.	detail at climate change.
Content What are they learning? (including keywords)	**What are they learning** DNA & Genes: DNA carries genetic information; genes code for proteins which determine characteristics. Protein Synthesis: DNA → mRNA (transcription) → protein (translation); correct sequence of bases is essential. Gene Mutations: Changes in DNA sequence can alter protein structure → may cause genetic disorders.	**What are they learning** Health & Risk Factors: Lifestyle (diet, smoking, inactivity) + genetics increase risk of diseases like CVD. Atherosclerosis: Fatty plaques narrow arteries → reduced blood flow → risk of thrombosis (clots). Cholesterol & Diet: LDL ("bad") increases plaque buildup; HDL ("good") removes cholesterol; saturated fat raises LDL.	**What are they learning** Genome & Gene Expression: The genome is the full set of DNA; genes are switched on/off to produce proteins. Transcription & Translation: DNA is transcribed into mRNA in the nucleus; mRNA is translated into a protein at ribosomes. Gene Regulation: Not all genes are active all the time; cells control gene expression to produce specific proteins.	**What are they learning** Biodiversity: Variety of life in an ecosystem (species, genetic, habitat diversity); higher biodiversity = more stable ecosystems. Measuring Biodiversity: Sampling methods (e.g. quadrats, transects) and indices (Simpson's Index of Diversity). Human Impact: Activities like deforestation, pollution, and	**What are they learning** Biodiversity: Variety of life in an ecosystem (species, genetic, habitat diversity); higher biodiversity = more stable ecosystems. Measuring Biodiversity: Sampling methods (e.g. quadrats, transects) and indices (Simpson's Index of Diversity). Human Impact: Activities like deforestation, pollution, and	**What are they learning** Pathogens & Disease: Microorganisms (bacteria, viruses, fungi) cause infectious diseases and are transmitted in different ways. Immune System: Defends the body using white blood cells, antibodies, and phagocytosis. Specific vs Non-specific Defence: Non-specific: barriers (skin) + phagocytes Specific: lymphocytes produce

	Sickle Cell Anaemia: Caused by a mutation in haemoglobin gene → red blood cells become sickle-shaped → reduced oxygen transport. Inheritance & Risk: Genetic diseases can be inherited; environment + genes together influence disease risk. **Key words** DNA Gene Allele Protein synthesis Transcription Translation Mutation Codon Haemoglobin Sickle cell anaemia	Smoking Effects: Nicotine ↑ heart rate/BP; CO ↓ oxygen transport; damages arteries → higher CVD risk. Treatment & Evidence: Lifestyle changes + Statins/stents epidemiological studies show links but not always causation. **Key words** Health Risk factor Cardiovascular disease (CVD) Atherosclerosis Thrombosis LDL cholesterol HDL cholesterol Blood pressure Epidemiology Statins	Mutations & Cancer: Mutations in genes controlling the cell cycle can lead to uncontrolled cell division → cancer. Stem Cells & Therapy: Stem cells can differentiate into different cell types → used in treating diseases. **Key words** Genome Gene expression Transcription Translation mRNA Ribosome Mutation Oncogene Tumour suppressor gene Stem cell	agriculture reduce biodiversity. Conservation Methods: In situ (protect habitats) and ex situ (zoos, seed banks) conserve species. Sustainability: Managing resources (e.g. fisheries, forests) to meet current needs without harming future generations. **Key words** Biodiversity Ecosystem Habitat Species richness Simpson's Index Quadrat Transect Conservation In situ Sustainability	agriculture reduce biodiversity. Conservation Methods: In situ (protect habitats) and ex situ (zoos, seed banks) conserve species. Sustainability: Managing resources (e.g. fisheries, forests) to meet current needs without harming future generations. **Key words** Biodiversity Ecosystem Habitat Species richness Simpson's Index Quadrat Transect Conservation In situ Sustainability	antibodies for specific antigens Vaccination: Introduces antigens to stimulate memory cells → faster secondary immune response. Antibiotics & Resistance: Antibiotics treat bacterial infections, but overuse leads to resistant strains (superbugs). **Key words** Pathogen Antigen Antibody Phagocyte Lymphocyte Immune response Vaccination Memory cells Antibiotics Resistance
Skills How are they learning it?	CORE PRACTICAL 3: Investigate membrane structure, including the effect of alcohol concentration or temperature on membrane	CORE PRACTICAL 1: Investigate the effect of caffeine on heart rate in Daphnia. (1a, 2c,4b – See appendix 1)	CORE PRACTICAL 5: Prepare and stain a root tip squash to observe the stages of mitosis. (1a, 2a,4a – See appendix 1)	CORE PRACTICAL 6: Identify sclerenchyma fibres, phloem sieve tubes and xylem vessels and their location within stems through	CORE PRACTICAL 8: Determine the tensile strength of plant fibres. (2b, 3a,4b – See appendix 1)	CORE PRACTICAL 10: Carry out a study on the ecology of a habitat, such as using quadrats and transects to determine

	permeability. (2b, 2c, 5a, 5b – See appendix 1) CORE PRACTICAL 4: Investigate the effect of enzyme and substrate concentrations on the initial rates of reactions. (2a, 2d, 4b – See appendix 1)	CORE PRACTICAL 2: Investigate the vitamin C content of food and drink. (2a, 2d, 5b – See appendix 1)		a light microscope. (2b, 3b,4a – See appendix 1) CORE PRACTICAL 7: Investigate plant mineral deficiencies. (1a, 2a, 3a – See appendix 1)	CORE PRACTICAL 9: Investigate the antimicrobial properties of plants, including aseptic techniques for the safe handling of bacteria. (2c, 3b, 4a – See appendix 1)	distribution and abundance of organisms, and measuring abiotic factors appropriate to the habitat. (2a, 3a, 3b, 5a – See appendix 1)
Key Questions	How does a gene code for a protein? What happens during transcription and translation? How can a mutation affect a protein's function? Why does sickle cell mutation change red blood cell shape? How do genetic and environmental factors interact in disease?	How do risk factors lead to CVD (mechanism)? Why is LDL harmful and HDL beneficial? How does smoking affect the cardiovascular system? What is the difference between correlation and causation? How do treatments (e.g. statins) reduce risk?	How is gene expression controlled in cells? What are the stages of transcription and translation? How can mutations lead to cancer? What is the role of oncogenes and tumor suppressor genes? How can stem cells be used in treatments?	Why is biodiversity important for ecosystem stability? How is biodiversity measured and compared? How do human activities reduce biodiversity? What is the difference between in situ and ex situ conservation? How can resources be used sustainably?	Why is biodiversity important for ecosystem stability? How is biodiversity measured and compared? How do human activities reduce biodiversity? What is the difference between in situ and ex situ conservation? How can resources be used sustainably?	How does the immune system respond to pathogens? What is the difference between specific and non-specific immunity? How do vaccines provide immunity? Why do antibiotics not work on viruses? How does antibiotic resistance develop?
Assessment (specific assessed piece(s); milestone(s))	**Peer assessment** – HWK practical question **Summative 1** – Topic 2 assessment	**Peer assessment** – HWK practical question **Summative 1** – Topic 1 assessment	**Peer assessment** – HWK practical question	**Peer assessment** – HWK practical question **Summative 1** – Topic 4 assessment	**Peer assessment** – HWK practical question **Summative 1** – Topic 4 assessment	**Peer assessment** – HWK practical question

	2 CPAC assessments – Core practicals 3 and 4	**2 CPAC assessments** – Core practicals 1 and 2	**Summative 1** – Topic 3 assessment and AS paper 1 **1 CPAC assessments** – Core practicals 5	**2 CPAC assessments** – Core practicals 6 and 7	**2 CPAC assessments** – Core practicals 8 and 9	**Summative 1** – End of year exams and AS Papers 1 and 2 **2 CPAC assessments** – Core practicals 10