Subject	Year 13 Core Knowledge – Autumn/Spring/Summer term	How to support students' learning
Science - Biology	**Autumn Term** **Genetics, populations, evolution and ecosystems –** 1. Explain why individuals within a population of a species may show a wide range of variation in phenotype. 2. Explain why genetic drift is important only in small populations. 3. Explain how natural selection and isolation may result in a change in the allele and phenotype frequency and lead to the formation of a new species. 4. Explain how evolutionary change over a long period of time has resulted in a great diversity of species. 5. Show understanding of the need to manage the conflict between human needs and conservation in order to maintain the 6. sustainability of natural resources." 7. Evaluate evidence and data concerning issues relating to the conservation of species and habitats and consider conflicting evidence. **Energy transfers in and between organisms -** 8. Use given data to calculate the size of a population estimated using the mark-release-recapture method. 9. Describe the light dependent reaction of photosynthesis. 10. Describe the light independent reaction of photosynthesis. 11. Identify environmental factors that limit the rate of photosynthesis. 12. Evaluate data relating to common agricultural practices used to overcome the effect of these limiting factors. 13. Use chromatography to investigate the pigments isolated from leaves of different plants e.g., leaves from	• CGP AQA A level Biology year 1 and 2 revision guide (can be bought through the school). • CGP AQA A level Biology year 1 and 2 textbook (can be bought through the school). • Seneca: https://senecalearning.com/en-GB/ Free revision resource.

	shade-tolerant and shade-intolerant plants or leaves of different colours. 14. Investigate the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts. 15. Devise and carry out experiments to investigate the effect of named environmental variables on the rate of photosynthesis using aquatic plants, algae or immobilised algal beads. 16. Describe the stages of aerobic respiration to include glycolysis, the link reaction, Kreb's cycle and the electron transport chain. 17. Describe the stages of anaerobic respiration to include glycolysis. 18. Investigate the effect of a named variable on the rate of respiration of cultures of single-celled organisms. 19. Describe how plants synthesise organic compounds from atmospheric, or aquatic, carbon dioxide. 20. Understand that most of the sugars synthesised by plants are used by the plant as respiratory substrates. The rest are used to make other groups of biological molecules. These biological molecules form the biomass of the plants. 21. Describe how biomass can be measured in terms of mass of carbon or dry mass of tissue per given area. The chemical energy store in dry biomass can be estimated using calorimetry. 22. Define gross primary production (GPP) as the chemical energy store in plant biomass, in a given area or volume. 23. Define net primary production (NPP) as the chemical energy store in plant biomass after respiratory losses to the environment have been taken into account.	

	24. Calculate GPP and NPP using the following formulae: NPP =GPP – R or NPP =I – (F+R) 25. Describe primary and secondary productivity as the rate of primary or secondary production, respectively. They are measured as biomass in a given area in a given time e.g., kJ ha–1 year–1. 26. Explain the ways in which production is affected by farming practices designed to increase the efficiency of energy transfer. 27. Describe how Nitrogen can be cycled in an ecosystem. 28. Explain the role of microorganisms in the recycling of Nitrogen to include saprobionts, mycorrhizae and bacteria. 29. Describe how Phosphorus can be cycled in an ecosystem. 30. Describe the use of natural and artificial fertilisers to replace the nitrates and phosphates lost by harvesting plants and removing livestock. 31. Explain the environmental issues arising from the use of fertilisers including leaching and eutrophication. **Spring Term** **The control of gene expression –** 32. Relate the nature of a gene mutation to its effect on the encoded polypeptide. 33. Evaluate the use of stem cells in treating human disorders. 34. Interpret data provided from investigations into gene expression. 35. Evaluate appropriate data for the relative influences of genetic and environmental factors on phenotype. 36. Evaluate evidence showing correlations between genetic and environmental factors and various forms of cancer. 37. Interpret information relating to the way in which an understanding of the roles of oncogenes and	

	tumour suppressor genes could be used in the prevention, treatment and cure of cancer. 38. Interpret information relating to the use of recombinant DNA technology. 39. Evaluate the ethical, financial and social issues associated with the use and ownership of recombinant DNA technology in agriculture, in industry and in medicine. 40. Balance the humanitarian aspects of recombinant DNA technology with the opposition from environmentalists and antiglobalisation activists. 41. Relate recombinant DNA technology to gene therapy 42. Evaluate information relating to screening individuals for genetically determined conditions and drug responses. 43. Explain the biological principles that underpin genetic fingerprinting techniques. 44. Interpret data showing the results of gel electrophoresis to separate DNA fragments." 45. Explain why scientists might use genetic fingerprinting in the fields of forensic science, medical diagnosis, animal and plant breeding.	