Subject	Y12 Core Knowledge – Autumn/Spring/Summer term	How to support students' learning
Science – Applied Science	**Autumn Term** **Biology -** 1. State and describe the structure and function of the organelles in prokaryotic and eukaryotic cells. 2. Calculate magnification and size of cells and organelles from images. 3. Understand cell specialisation in terms of structure and function in examples such as palisade cells, red and white blood cells and gamete cells. 4. Understand the structure and function in epithelial tissue including squamous and columnar. 5. Understand the structure and function of endothelial tissue by blood vessels and the risk factors associated with the damage of these. 6. Understand the structure and function of muscular tissue including fast and slow twitch muscle fibres. 7. Understand the structure and function of nervous tissue including conduction of nerve impulses and neurotransmitters. **Chemistry -** 8. Describe features of the periodic table and their relationship with atomic structure. 9. Understand and apply knowledge of electronic structure. 10. Describe ionisation energy and explain factors affecting ionisation energy trends. 11. Describe and represent metallic bonding and giant metallic structures, ionic bonding and giant ionic structures, and covalent bonding and structures. 12. Explain typical physical properties of substances with different types of bonding and structure, including melting point and electrical conductivity. 13. Apply the electron pair repulsion theory to determine shapes of molecules. 14. Understand electronegativity and use this knowledge to determine bond polarity. 15. Understand intermolecular forces including induced dipole forces, permanent dipole forces and hydrogen bonding.	• BTEC National (2025) Applied Science: Student Book • Seneca: https://senecalearning.com/en-GB/ Free revision resource.

	Physics - 16. Describe features common to waves and explain similarities and differences between transverse and longitudinal waves. 17. Understand displacement, coherence, path difference, phase difference and superposition of waves as applied to diffraction gratings. 18. Calculate the speed of a wave with both the equations given. 19. Understand concepts and applications of stationary waves and resonance in strings and pipes. 20. Understand refraction and total internal refraction (TIR). 21. Understand applications of optical fibres. 22. Understand differences of analogue and digital signals. 23. Understand the uses of electromagnetic waves in communication. 24. Use the inverse square law. **Spring Term** **Biology -** 25. Understand the structure and function of water. 26. Understand the structure and function of carbohydrates, including monosaccharides, disaccharides and polysaccharides. 27. Understand the structure and function of proteins. 28. Understand the structure and function of nucleic acids. 29. Understand the structure and function of lipids. **Chemistry -** 30. Understand oxidation and reduction, including constructing half equations and redox reactions. 31. Describe properties of Period 3 elements and understand their reactions with oxygen, water and chlorine. 32. Predict the physical and chemical properties of elements across the periods based upon trends in physical and chemical properties. 33. Understand the mole and use it in calculations. 34. Understand factors affecting the rate of reaction, including collision theory and activation energy. 35. Understand chemical energetics, including enthalpy change, energy level diagrams and Hess's Law. 36. Describe the applications of chemical kinetics, energetics, equilibrium and green chemistry to the chemical industry.	

	Physics - 37. Calculate speed and average speed using standard SI units. 38. Use vector and scalar quantities to describe motion. 39. Use equations of motion (suvats) to solve problems. 40. Understand the applications of accelerometers. 41. Understand and apply Newton's laws of motion. 42. Calculate coefficient of friction. 43. Calculate momentum and rate of change of momentum and link this to applications. 44. Understand terminal velocity. **Summer Term** **Biology -** 45. Describe cell transport mechanisms including transport through cell membranes and bulk transport. 46. Understand the structure and function of enzymes and explain how factors affect enzyme activity. 47. Explain the purpose of homeostasis including negative feedback loops and positive feedback loops. 48. Describe and explain interrelationships between nervous and endocrine system responses. 49. Describe and explain the effects of a disturbance of homeostasis. **Chemistry -** 50. Understand structure representations of organic compounds. 51. Name alkanes, alkenes, halogenoalkanes and alcohols, using Internation Union of Pure and Applied Chemistry (IUPAC) nomenclature rules. 52. Predict and explain the occurrence of structural isomerism and stereoisomerism. 53. Understand reactions of organic compounds, including addition reactions, substitution reactions, elimination reactions, oxidation and condensation. 54. Understand reactions of commercial importance, including combustion of hydrocarbons and alcohols and cracking of large chain alkanes. **Physics -** 55. Define key words involved with circuits and identify circuit symbols. 56. Use equations for electrical calculations including calculating power, p.d. (voltage) and energy.	

	57. Use electrical components in circuits for investigations. 58. Understand energy transfers. 59. Understand specific heat capacity. 60. Understand specific latent heat.	