

Subject	Year 12 Core Knowledge – Autumn/Spring/Summer term	How to support students' learning
Science – Forensics	<p>Autumn Term Biology –</p> <ol style="list-style-type: none"> 1. Understand cell theory states that cells are the fundamental unit for structure, function and organisation in all living organisms. 2. State and describe the structure and function of the organelles in prokaryotic and eukaryotic cells. 3. Understand detailed similarities and differences between animal and plant cells. 4. Calculate magnification and size of cells and organelles. 5. Understand cell specialisation in terms of structure and function in examples such as palisade cells, red and white blood cells and gamete cells. 6. Understand the structure and function in epithelial tissue including squamous and columnar. 7. Understand the structure and function of endothelial tissue by blood vessels and the risk factors associated with the damage of these. 8. Understand the structure and function of muscular tissue including fast and slow twitch muscle fibres. 9. Understand the structure and function of nervous tissue including conduction of nerve impulses and the effects of drugs on these. 10. Understand the role and effect of neurotransmitters and how imbalances can effect the body. 11. Interpret graphical displays of a nerve impulse and electrocardiogram recordings. <p>Chemistry –</p> <ol style="list-style-type: none"> 12. Understand the electronic structure of atoms (spdf). 	<ul style="list-style-type: none"> • Pearson BTEC National Applied Science student book (2016). Author – Joanne Hartley. • Seneca: https://senecalearning.com/en-GB/ • Free revision resource.

13. Define ionic bonding and describe the factors that affect the strength of an ionic bond.
14. Define covalent bonding and draw dot and cross diagrams accurately.
15. Explain the relationship between covalent bond lengths and bond strength.
16. Define metallic bonding, draw metallic compounds accurately and compare metallic bond strengths.
17. Describe and compare the three types of intermolecular forces and how they arise.
18. Calculate moles and concentrations to work out different quantities of substances.
19. Understand how to carry out a titration experiment and complete titration calculations.
20. Understand what a yield is and apply knowledge to calculate percentage yield.
21. Demonstrate an understanding of The Periodic Table trends and how it is ordered.
22. Demonstrate an understanding of electronic arrangements.
23. Define first ionisation energy and describe the trends in ionisation across periods and groups.
24. Define electronegativity and explain the factors that effect it.
25. Define electron affinity and explain the factors that effect it.
26. Describe and explain the physical properties of metals.
27. Describe the reactivity of group 2 and 3 elements with oxygen.
28. Describe the reactivity of metals with oxygen, water and acids.
29. State what oxidation and reduction are and explain how these happen during a displacement reaction.

Physics –

30. Understand the features common to all waves such as wavelength, amplitude and oscillation.
31. Calculate wavelength and speed of waves.

32. Interpret graphical representations of wave features.
33. Understand the difference between transverse and longitudinal waves.
34. Understand concepts of displacement, coherence, path difference, phase difference and superposition as applied to diffraction gratings.
35. Understand the industrial application of diffraction gratings including emission spectra and identifying gases.
36. Understand the concept and applications of stationary waves resonance.
37. Understand principles of fibre optics.
38. Understand the applications of fibre optics in medicine and communication.
39. Understand that all electromagnetic waves travel with the same speed in a vacuum.
40. Use the inverse wave law in relation to the intensity of waves.
41. Understand how regions of the electromagnetic spectrum are grouped according to frequency including satellite communication, mobile phones, infrared and wifi.

Spring Term

Biology –

42. Understand the theory, equipment used and procedures for carrying out chromatography.
43. Demonstrate an understanding of paper chromatography.
44. Demonstrate an understanding of thin layer chromatography.
45. Describe how to accurately prepare a sample.
46. Identify unknown mixtures and pure substances using chromatography, to include amino acids (paper chromatography).
47. Interpret chromatograms to understand the polarity of molecules/intermolecular forces in

relation to solubility in the mobile and stationary phase.

48. Interpret chromatograms to understand the size of molecules in relation to solubility and mobility.
49. Accurately calculate of Rf values from chromatograms and data.
50. Understand how to interpret chromatograms in terms of the number of substances present and the Rf values of components.

Chemistry –

51. Understand how to use pH meters and probes.
52. Demonstrate an understanding of the use of electronic balances and how to calibrate them.
53. Demonstrate the safe and accurate use of volumetric glassware.
54. Accurately carry out titration experiments and determine the end point with precision.
55. Calculate the unknown concentration of a substance from titration results.
56. Understand how a colorimeter is used and how to select the correct filter needed.
57. Understand and apply colorimetry techniques to produce absorption readings.
58. Understand how to produce a calibration graph for a colorimeter and use it to find unknown concentrations.
59. Understand Beer-Lambert's law to determine the concentration of a transition metal ion solution.

Physics –

60. Understand the use of different types of thermometers and how they are used to gain accurate readings.
61. Demonstrate an understanding of calibrating thermometers and the importance of doing so.
62. Create and interpret cooling curves to determine the melting point

from the shape of a curve for a substance freezing.

63. Explain how the rate of cooling is related to intermolecular forces and the state of the substance.
64. Understand and reflect on the personal responsibilities that must be accepted for successful work in science.
65. Understand and develop skills for effective and efficient working with others.
66. Demonstrate personal development of standard practices applicable to working as a professional scientist.

Summer Term

Biology –

67. Understand how to develop a hypothesis.
68. Demonstrate an ability to select appropriate equipment, techniques and standard procedures.
69. Show an awareness of health and safety during practical work.
70. Demonstrate an ability to accurately collect and analyse data.
71. Demonstrate an understanding of how to process data and carrying out statistical analysis.
72. Interpret data and identify trends to draw valid conclusions.
73. Evaluate data to suggest improvements and evaluate reliability of the procedures used.
74. Understand protein structure.
75. Explain the importance of enzymes and how they speed up reactions.
76. Describe and explains the factors that effect enzyme activity.
77. Describe and explain the factors effecting rate of diffusion.
78. Explain the arrangement and movement of molecules in relation to diffusion.
79. Describe and explain factors that can effect plant growth and distribution.
80. Describe the sampling techniques to sample plant populations.

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