Subject	Y11 Core Knowledge – Autumn/Spring/Summer term	How to support students' learning
Science - Chemistry	**Autumn Term** **Organic Chemistry -** 1. Describe crude oil as a mixture of hydrocarbons. 2. Recall the names, structural formulae and molecular formulae of the first 4 alkanes. 3. Describe fractional distillation as the separation of hydrocarbons in crude oil based on differences in boiling point. 4. Recall the names of and the location of different fractions in the fractionating column. 5. Identify patterns in properties with relation to; chain length, boiling point, viscosity, flammability relating to the position in the fractionating column. 6. Recall the reasons why cracking takes place. 7. Describe cracking including conditions required to crack a hydrocarbon. 8. Determine the products of cracking a long chain hydrocarbon to include the alkane and alkene formed. Complete balanced cracking equations. 9. Recall the colour change of bromine water when added to an alkene. 10. Describe the differences between complete and incomplete combustion of hydrocarbons. 11. Recall the test and result for carbon dioxide gas. 12. Describe the structure and formula of alkenes. 13. Describe the reactions of alkenes (hydrogenation, halogenation and hydration). (Triple only) 14. Describe alcohols to include the functional groups, methods of synthesis (hydration of alkene and fermentation) and the use of sodium and acidified potassium dichromate to test for alcohols. (Triple only) 15. Describe carboxylic acids and their synthesis by oxidation of alcohols. (Triple only) 16. Describe the formation of esters by the reaction of alcohols and carboxylic acids and name the esters formed. (Triple only) 17. Describe addition polymerisation. (Triple only) 18. Describe condensation polymerisation. (Triple only) 19. Describe amino acids. (Triple only) 20. Describe DNA and other naturally occurring polymers. (Triple only)	• Students follow the AQA specification. If students are studying for 'Combined Science' we follow AQA trilogy. Students can set themselves questions on Educake using the revision wizard. They can also use their science revision guide which can be purchased on the school shop. In addition, the appropriate BBC bitesize links for topics are included below: • **Autumn -Triple -** https://www.bbc.co.uk/bitesize/topics/ztsyh39 • **Combined -** https://www.bbc.co.uk/bitesize/topics/z9488mn

	Spring Term **Chemical Analysis -** 21. Define pure substances. 22. Describe formulations as mixtures designed for a useful purpose/product. 23. Define stationary phase and mobile phase in chromatography. 24. Describe the method for chromatography to include reasons for each step. 25. Demonstrate how to calculate Rf and explain what Rf means. 26. Describe the test for hydrogen. 27. Describe the test for oxygen. 28. Describe the test for carbon dioxide. 29. Describe the test for chlorine. 30. Describe how to carry out flame tests. (Triple only). 31. Describe the use of hydroxides to determine metal cations, recalling the colours of precipitate. (Triple only). 32. Describe the test for Carbonate ions using dilute acid and limewater to confirm CO_2 is produced. (Triple only). 33. Describe how acidified silver nitrate can be used to detect halide ions, recalling the colour of precipitates. (Triple only). 34. Describe the use of barium chloride solution to determine the presence of sulfate ions, recalling the colour of precipitate produced. (Triple only). 35. Describe flame emissions spectroscopy and interpret emission spectra using given reference spectra. (Triple only). **Summer Term** **Using Resources -** 36. Recall the definition of finite and renewable 37. State examples of natural products that are supplemented or replaced by agricultural and synthetic products. 38. Distinguish between potable water and pure water. 39. Describe the differences in the treatment of groundwater and salty water to obtain potable water. 40. Recall that sterilising agents used for potable water include chlorine, ozone or ultraviolet light. 41. Comment on the relative ease of obtaining potable water from waste, ground and salt water.	

	42. Describe a method to determine the pH and mass of dissolved solids in distilled, sea and rainwater. 43. Describe and explain (including ideas relating to intermolecular forces) how simple distillation takes place. 44. Describe and explain how sewage and industrial waste is treated. 45. Describe and explain how low-grade metal ores can be used for metal extraction using phytomining and bioleaching (HT ONLY) 46. Define the term Life Cycle Assessment and carry out simple comparative LCAs for shopping bags made from plastic and paper. 47. Metals, glass, building materials, clay ceramics and most plastics are produced from limited raw materials. Evaluate the use of limited resources. 48. Describe experiments and interpret results to show that both air and water are necessary for rusting. (TRIPLE) 49. Explain sacrificial protection in terms of relative reactivity. (TRIPLE) 50. Recall uses and composition of named alloys (TRIPLE) 51. Compare quantitatively the physical properties of glass and clay ceramics, polymers, composites and metals (TRIPLE) 52. Recall a source for the nitrogen and a source for the hydrogen used in the Haber process. 53. Interpret graphs of reaction conditions versus rate. (TRIPLE) 54. Apply the principles of dynamic equilibrium to the Haber process. (TRIPLE) 55. Explain the compromise between the rate of production and the position of equilibrium. (TRIPLE) 56. Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate. (TRIPLE) 57. Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid. (TRIPLE) 58. Compare the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information. (TRIPLE)	