Oasis Academy Lister Park Science Curriculum: Long Term Plan

Year 9

Secure Substantive Knowledge:

- Students build on their Chemistry knowledge of elements and compounds, looking at compounds and formulae used to represent these substances. They also begin to look at how our concept of an atom has changed over time. They look at patterns and how different groups in the periodic table react and bond together and how this can be modelled using different types of diagram. This unit also builds on the knowledge of common reactions in Year 8 so that students are able to predict which substances will be produced in different reactions and how they would prove that these substances have been made. Students are introduced to electrolysis and how this can be used to separate more reactive elements from their ore and create substances like hydrogen and oxygen.
- Within Physics, students take a deeper look at waves and energy transfers, in particular looking at efficiency of these transfers and the GPE, kinetic energy and elastic potential energy store and how calculations allow us to predict the amount of energy that should be held in that store (should a closed system with no energy loss be used!). Students also start to observe and measure physical properties of waves, representing these using diagrams. Students will be introduced to the different types of quantity within science (scalar and vector). They will look at the quantitative effect of different forces on an objects motion and shape and begin to complete more complex calculations and graphical representations of data.
- Building on the use of the microscope in Year 7, students will look in more details at the types of cells. They will begin to discuss how humans use replication of cells to their advantage and how our concept of the human genome has had an impact on our knowledge of inheritance. They will also look more closely at specific types of communicable disease and how new drugs are developed. They will begin to analyse more complex data sets, using this to draw conclusions. Finally, students will go on to look at the brain and eye and how these complex organs in our body function and are susceptive to damage and how our knowledge of science has once again, allowed us to intervene and in lots of cases, identify the issue and put in place solutions.

Secure Disciplinary Knowledge:

- Within this unit, students are given plenty of opportunities to practice representing elements, compounds and general reactions using symbols. They begin to evaluate the limitations of using particular types of model to represent substances. They write their own scientific hypotheses and test these using the evidence to support their conclusions. They begin to identify anomalies and describe how to deal with them. They start to look at more complete relationships on a graph and use lines of best fit to extract data. They develop their bank of scientific diagrams to include wave diagrams and free body diagrams. They build on their use of the microscope in year 7 to discuss the use of one type of microscope over another.
- They continue to complete calculations of increasing difficulty, calculating means, rounding to a given number of decimal places and significant figures and converting a wider range of units without being prompted. There are opportunities to revisit the concept of an evolving scientific knowledge base with discussions around the structure of the atom, developments in microscopes and how these have supported our understanding of scientific concepts. Students also begin to apply their knowledge of science to explain how we have used this to extract resources from the Earth and how this has at times, been wasteful.

Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
9	**Topic: Chemistry Fundamentals** **Knowledge:** 1. Changing states of matter 2. Atoms and elements 3. Compounds and formulae 4. Pure substances and solutions 5. Separation techniques (Demonstration) 6. Chromatography (R.Practical) 7. Changing Atomic Theories 8. Protons, Neutrons and Electrons 9. Electron configuration 10. Isotopes and relative atomic mass 11. The periodic table 12. The modern periodic table 13. Mini Quiz 14. Metals and non-metals 15. Uses of metals 16. Alloys 17. Properties and uses of alloys 18. Alkali metals (Demonstration) 19. Halogens 20. Noble Gases 21. Gas tests (Demonstration/Practical	**Topic: Investigative Chemistry** **Knowledge:** 1. Ionic bonding part 1 2. Ionic bonding part 2 3. Properties of ionic bonding 4. Covalent bonding 5. Properties of covalent structures 6. Giant covalent structures 7. Metallic Bonding 8. Comparing and contrasting types of bonding 9. Word and symbol equations 10. Balancing equations 11. Conservation of mass 12. Metals and oxygen (Demonstration) 13. Metals and acid (Demonstration) 14. Metals and water (Demonstration) 15. Redox reactions (Higher only) 16. Acids and bases 17. Neutralisation 18. RP: Soluble Salts 1. Reactivity series and displacement reactions (Practical) 2. Ionic half equations for displacement (Higher only) 3. Reactivity series and extraction methods 4. Electrolysis of molten compounds (ionic half equations - higher only) 5. Electrolysis of aqueous compounds (ionic half equations - higher only) 6. Electrolysis part 1 (R.Practical) 7. Electrolysis part 2 (R.Practical)	**Topic: Physics - Energy and Waves** **Knowledge:** 1. Energy stores and energy transfers 2. Open and closed systems 3. Work done 4. Power 5. Efficiency calculations 6. Insulation 7. Gravitational potential energy 8. Kinetic energy 9. Elastic potential energy 10. Multi-step calculations (GPE/KE/EPE/Efficiency) 11. Non-renewable resources 12. Renewable resources 13. Comparison of energy resources 14. Mini Quiz 15. Introduction to waves 16. Waves equation 17. Measuring period of a wave 18. RP: Measuring speed of a wave using a ripple tank 19. Measuring the speed of sound **20.** EM Spectrum	**Topic: Forces** **Knowledge:** 1. Scalar and vector quantities 2. Types of forces 3. Weight 4. Resultant forces 5. Vector diagrams 6. Speed and velocity 7. Distance time graphs 8. Acceleration and deceleration 9. Velocity time graphs 10. Terminal Velocity 11. Newton's first law 12. Newton's second law 13. Inertia and inertial mass ((higher only) 14. Investigate Newton's Second Law of motion (R. Practical) 15. Newton's third law 16. Stopping distances 17. Energy transfers in stopping 18. Momentum (higher only) 19. Hooke's Law 20. Relationship between force and extension 21. Circular Motion 22. Magnets 23. Magnetic fields **24.** Electromagnets	**Topic: Cell Biology** **Knowledge:** 1. Types of cells 2. Specialised cells 3. Tissues, organs and systems 4. Introducing microscopes 5. RP: Using Microscopes 6. Types of microscope 7. The Human Genome 8. Mitosis and the cell cycle 9. Incredible stem cells 10. Therapeutic cloning 11. Asexual reproduction 12. Sexual Reproduction and Meiosis 13. Sexual vs asexual reproduction 14. Examples of unusual reproduction 15. Inheritance (genetic cross diagrams) 16. Family trees 17. Genetic diseases and sex determination	**Topic: Communicable Diseases** **Knowledge:** 1. Viral diseases 2. Bacterial diseases 3. Fungal and protists 4. Our barriers to diseases 5. The immune system 6. Vaccinations 7. Medicines 8. Multiplying bacteria (Separate only) 9. Culturing microorganisms 10. Analysing Antibiotics 11. Antibiotic resistance 12. Developing new drugs (part 1) 13. Developing new drugs (part 2) 14. Scatter Graphs and Health 15. Frequency tables and histograms 16. Analysis data 17. Mini Quiz