Richard Lander School — Science Curriculum Overview - 7/8/9

BE THE BEST YOU CAN BE

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Reporting Y7	CfCs	BfL & LAL		BfL & LAL		BfL & LAL
Year 7	**C1.1 Particles, B1.1 Cells, P1.1 Forces:** Students begin their science journey with an introduction to safety where they learn the importance of working carefully, considering hazard symbols and how to use laboratory equipment safely. They begin some chemistry by using a particle model to help explain things such as the state of matter and changing state. They study cells in a biology topic that leads onto specialised cells and how they are adapted to do their jobs. In physics they study forces and how they affect things, how we can measure forces and how they can be balanced or unbalanced. Throughout the term they will have opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS: C1.1/B1.1/P1.1 TESTS and feedback**	**C1.2 Elements, C2.2 Separation techniques, B1.2 Body systems, P1.2 Sound** Students move on from particals to learn about elements, atoms and compounds in chemistry. They learn about mixtures and develop their practical skills learning how to separate them using a range of separation techniques. In a biology topic about the structure and function of body systems they learn about the breathing system, the skeleton and how we move. In the topic on sound they learn how sound is made, how it travels and how it can be detected. They learn about loudness and pitch as well as how the ear works. Throughout the term they will have opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS : C1.2/C2.2/B1.2 /P1.2 TESTS and feedback**	**C1.3 Reactions, B1.3 Reproduction, P1.3 Light and P1.4 Space.** Students learn about chemical reactions and how to represent these with word equations. They study reactions that include burning fuels, thermal decomposition and exothermic or endothermic reactions. They study reproduction to include plants as well as animals. This includes changes that happen in adolescence and the menstrual cycle. In the light topic they investigate reflection and refraction, and they find out how the eye works. In the topic on Space students learn about the Solar System as well as what causes day and night and the seasons on Earth. They learn about the phases of the moon and how they are caused. Students are given the opportunity to consolidate their workimg scientifically skills at the end with a unit covering how scientists ask questions and plan investigations, how they record their data, analyse and evaluate it **ASSESSMENTS : C1.3/B1.3 /P1.3/P1.4 TESTS and feedback**		**Curriculum Enrichment Week**
Reporting Y8	CfCs	BfL & LAL		BfL & LAL		BfL & LAL
Year 8	**C1.4 Acids and Alkalis, B2.2 Ecosystems and P2.2 Energy:** Students begin with a consolidation of safety in science lessons. They learn about acids and alkalis, how we can use indicators to identify them, and neutralisation reactions. They develop their understanding of chemical reactions by writing word and symbol equations. Students study the biology of ecosystems which includes how plants make food by photosynthesis, the minerals they need to be healthy and the structure of leaves. They learn about respiration in living organisms to release energy . They then study the interrelationships in ecosystems including food chains and how they can be disrupted. The physics topic on energy shows how energy can be stored and transferred. This topic explains how electricity is generated including using renewable sources. They learn about energy and power, and can apply this to electrical appliances in the home.Throughout the term they will have opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS: C1.4/B2.2/P2.2 TESTS and feedback**	**C2.1 The Periodic Table, B2.1 Health and lifestyle, P2.1 Electricity and magnetism:** Students learn about the Periodic Table and how it is arranged. They study specifically the elements of Group 1, 7 and 0 and any patterns in the properties of these groups. Students will learn about health and the importance of diet. They learn how to test foods for particular nutrients and how the digestive system works. They learn about the effects of smoking, drugs and alcohol on health. In the electricity topic they learn about electricity in circuits, and how to measure current, potential difference and resistance, as well as magnets and electromagnets.Throughout the term they will have opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS C2.1/B2.1 /P2.1 TEST and feedback**	**C2.3 Metals, C2.4 Earth, B2.3 Adaptations and P2.3 Motion and Pressure:** Students learn about the Earth, it's atmosphere and it's rocks. They study sedimentary, metamorphic and igneous rocks and how they cycle from one to another. They learn more about the importance of the carbon cycle and the impact of humans on climate change.They also study some of the ways metals react before learning about other materials and their properties, including ceramics, polymers and composites. In biology they study a topic on adaptation and inheritance, learning about why organisms are different and how natural selection favours the best adapted to survive. They study motion and pressure in Physics, which includes how to calculate speed and interpret motion graphs. They learn how to work out pressure on solids, and applications of pressure in liquids and gases. Throughout the term they will have opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS : C2.4/C2.3/B2.3/P2.3 TESTS and feedback**		**Curriculum Enrichment Week**
Reporting Y9	CfCs	BfL & LAL		BfL & LAL		BfL & LAL
Year 9	**B5+B6, P3** : Students begin their GCSE studies learning about health and disease to include physical and mental health and how they interact. They study certain communicable diseases which may be caused by bacteria, viruses, fungi or protists and how these are spread. Then they learn about human defence responses and the immune system. Next they learn about preventing and treating disease, including how vaccines work, the difference between painkillers and antibiotics and how new drugs are discovered and developed. In physics they study the energy resources topic which begins with our energy demands then looks at renewable energy resources, how they work and the impact they can have on the environment. They carry out a biology required practical during this term. **Assessment : B5&B6, P3 Tests and feedback**	**C1+C2, B7: S**tudents study a topic on atomic structure; which includes electronic structures, ions and isotopes as well as the history of the atom. They learn to write chemical equations to represent reactions, including state symbols and how to balance symbol equations. They also develop their knowledge of the methods to separate mixtures including distillation and chromatography. Next they study the Periodic Table and how it was developed. They study specifically the elements in Group 1, Group 7 and Group 0 and how to explain trends in their properties. In Biology they learn about non-communicable diseases such as cancer and heart disease, and the risk factors for such diseases including smoking, drugs and alcohol, diet and lack of exercise. They carry out a chemistry required practical during this term. **Assessment : C1&C2, B7 Tests and feedback**	**P11+P12, C11**: Students study a topic on waves and their properties. They learn about transverse and longitudinal waves and how to study waves to find their wavelength, frequency and speed. They investigate the behaviour of both light waves and sound waves before exploring the electromagnetic spectrum. They learn about the properties and uses of radiowaves, microwaves, infrared radiation, ultraviolet, gamma and Xrays. In chemistry they study a topic on the Earth's atmosphere. They learn about the history of our atmosphere and how it changed over time. They also learn about greenhouse gases and global climate change as well as learning about other atmospheric pollutants and their effects on both the environment and health.They carry out two different physics required practicals this term. **Assessment : P11& P12,C11 Tests and feedback**	**B15**: Students study a topic on Ecology which allows for outside sampling and will be assessed	**Curriculum Enrichment Week**

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Reporting Y10	CfCs	BfL & Grades	CfCs	BfL & Grades		BfL & Report
Y10 Combined Teacher 1 (Teaching Biology and Chemistry)	**C3 - Structure and Bonding**. This unit covers ionic, covalent and metallic bonding. Students will also research the different allotropes of carbon. Assessment - C3 end of unit test and feedback.	**B1 & B2 Cell Structure and Division**. Students will investigate cells under a microscope and the movement of substances in and out of a cell. The module will then move onto cell division and stem cell ethics. **Required Practical 1: Using a light microscope. Required Practical 2: Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue**. Assessment - B1&2 end of unit test and feedback.	**B3 & B4 Organisation of animals and plants**. This unit investigates animal organisation in terms of the digestive system, enzymes and the heart. The unit them moves onto plant organisation by investigating transpiration in plants. **Required Practical 4: Investigate the effect of pH on the rate of reaction of amylase enzyme**. Assessment - B3&4 end of unit test and feedback.	**C6 & C7 - Electrolysis and Energy Change**. Students will be able to predict products from liquid or aqueous electrolytes. They will then investigate exothermic and endothermic reactions and be able to interpret reaction profiles. **Required Practical 9: Investigate the electrolysis of a solution. Required Practical 10: Investigating temperature changes in reacting solutions**. Assessment - C6&7 end of unit test and feedback.	Paper 1 Required Practical revision and end of Year 10 exam.	**B8 & B9 - Photosynthesis and Respiration**. Students investigate the factors that effect the rate of photosynthesis. The module moves onto aerobic respiration and exercise, then anaerobic respiration in animals and other organisms. **Required Practical 5: Investigate the effect of light intensity on the rate of photosynthesis**. Assessment - B8&9 end of unit test and feedback.
Y10 Combined Teacher 2 (Teaching Physics and Chemistry)	**P6 & P7 - Molecules, Matter and Radioactivity**. This module covers energy in terms of changes of state and latent heat. Students compare alpha, beta and gamma radiation and predict half life from a graph. **Required Practical 17: Calculating densities**. Assessment - P6&7 end of unit test and feedback.	**C4 & C5 - Chemical calculations and changes**. Students will develop the skills required to calculate formula masses, moles (HT only) and concentration. The module will then move onto applying the reactivity series to displacement reactions. **Required Practical 8: Prepare a salt from an insoluble metal carbonate or oxide**. Assessment - C4 & 5 end of unit test and feedback.	**P1 & P2 - Energy: Conservation, Dissipation and transfer**. Students calculate energy changes and efficiency as well as investigating heating and insulating buildings. **Required Practical 14: Determining specific heat capacity**. Assessment - P1 & 2 end of unit test and feedback.	**P4 & P5 Electricity: Circuits and the Home**. Students investigate series and parallel circuits in terms of current, potential difference and resistance. The module then moves onto electricity in the home and the efficiency of common appliances. **Required Practical 15: Investigating resistance. Required Practical 16: Investigating electrical components**. Assessment - P4 & 5 end of unit test and feedback.	Paper 1 Required Practical revision and end of Year 10 exam.	PAPER 2 - **C8 Rates and Equilibrium.** In this unit students will investigate how temperature, surface area, concentration and catalysts affect rate of reaction. Student will also relate reversible reaction to dynamic equilibrium. **Required Practical 11: Investigating the effect of concentration on rate of reaction**. This unit will be re-capped and assessed in Y11.
Y10 Triple Biology	**B1 & B2 Cell Structure and Division**. Students will investigate cells under a microscope, and the movement of substances in and out of a cell. The module will then move onto cell division and the ethics of stem cells. **Required Practical 1: Using a light microscope. Required Practical 3: Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue**. Assessment - B1&2 end of unit test and feedback.	**B3 & B4 (+ Triple B5&6) Organisation of animals and plants**. This unit investigates animal organisation in terms of the digestive system, enzymes and the heart. The unit then moves onto plant organisation by investigating transpiration in plants. **Required Practical 5: Investigate the effect of pH on the rate of reaction of amylase enzyme. Required Practical 2: Investigate the effect of antiseptics or antibiotics on bacterial growth**. Assessment - B3&4 end of unit test and feedback.	**B8 & B9 - Photosynthesis and Respiration**. Students investigate the factors that effect the rate of photosynthesis. The module moves onto aerobic respiration and exercise, then anaerobic respiration in animals and other organisms. **Required Practical 6: Investigate the effect of light intensity on the rate of photosynthesis**. Assessment - B8&9 end of unit test and feedback.	PAPER 2: **B10 & B11 The Nervous System and Hormonal Control.** This module covers reflex actions, structure of the brain and the eye, and correcting problems with the eye. Students will then investigate how hormones effect the body in terms of blood-glucose control, puberty, fertility and fertility treatment. **Required Practical 7: Investigate the effect of a factor on human reaction time. Required Practical 8: Investigate the effect of light or gravity on the growth of newly germinated seedlings**. Assessment - B10&11 end of unit test and feedback.	Paper 1 Required Practical revision and end of Year 10 exam.	**B10 & B11 continued**	**B18 Biodiversity and Ecosystems**. This unit covers the impact of the growing human population on biodiversity and ecosystems. The unit moves onto the sustainability of global food production. Global links and geography links - human population explosion. Assessment - B18 end of unit test and feedback.
Y10 Triple Chemistry	**C2 & 3 - Transition elements and Structure & Bonding**. This unit covers the transition elements along with ionic, covalent and metallic bonding. Students will also investigate the use of nanotechnology. Assessment - C2 & 3 end of unit test and feedback.	**C4 & C5 - Chemical calculations and changes**. Students will develop the mathematical skills required to calculate formula masses, moles and concentration. They will carry out titration reactions and calculate yields. The module will then move onto applying the reactivity series to displacement reactions. **Required Practical 1: Prepare a salt from an insoluble metal carbonate or oxide. Required Practical 2: Use titration to investigate reacting volumes.** Assessment - C4 & 5 end of unit test and feedback.	**C6 & C7 - Electrolysis and Energy Change**. Students will be able to predict products from liquid or aqueous electrolytes. They will then investigate exothermic and endothermic reactions and be able to interpret reaction profiles. **Required Practical 3: Investigate the electrolysis of a solution. Required Practical 4: Investigating temperature changes in reacting solutions.** Assessment - C6&7 end of unit test and feedback.		Paper 1 Required Practical revision and end of Year 10 exam.	PAPER 2 - **C8 & C9- Rates of reaction and crude oil and fuels**. This unit applies collision theory to the rate of reactions, and covers the separation and use of hydrocarbons. **Required Practical 5: Investigating the effect of concentration on rate of reaction.** Assessment - C8 & C9 end of unit test and feedback.
Y10 Triple Physics	**P6 & P7 - Molecules, Matter and Radioactivity**. This module covers energy in terms of changes of state and latent heat. Students compare alpha, beta and gamma radiation and predict half life from a graph. Finally, students will investigate nuclear fission, fusion and nuclear issues. **Required Practical 5: Calculating densities.** Assessment - P6&7 end of unit test and feedback.	**P1 & P2 - Energy: Conservation, Dissipation and Transfer**. Students calculate energy changes and efficiency as well as investigating heating and insulating buildings. R**equired Practical 1: Determining specific heat capacity. Required Practical 2: Investigating thermal insulators.** Assessment - P1 & 2 end of unit test and feedback.	**P4 & P5 Electricity: Circuits and the Home**. Students investigate series and parallel circuits in terms of current, potential difference and resistance. The module then moves onto electricity in the home and efficiency of common appliances. **Required Practical 3: Investigating resistance. Required Practical 4: Investigating electrical components.** Assessment - P4 & 5 end of unit test and feedback.		Paper 1 Required Practical revision and end of Year 10 exam.	**P4 & P5 continued**	PAPER 2- **P8 & P11 - Forces: Balance and Pressure.** Students investigate resultant forces and moments. The module will also cover pressure on surfaces, in liquids and the atmosphere. Assessment - P6&7 end of unit test and feedback.

Reporting Y11		CfCs & Grades		Rep & Grades		CfCs & Grades		BfL & Grades				
Y11 Combined Teacher 1 (Teaching Biology and Chemistry)	**C8 recap & C9 - Rates of reaction and crude oil and fuels**. This unit applies collision theory to the rate of reactions, and covers the separation and use of hydrocarbons. Assessment - C8 & C9 end of unit test and feedback.		**B10 & B11 - The nervous system and hormonal control.** This unit considers how the nervous and hormonal system cause responses within the body. **Required Practical 6: Investigate the effect of a factor on human reaction time**. PD link - reproduction and contraception. Global link - Diabetes in developed worlds. Assessment - B10 & 11 end of unit test and feedback. (2 weeks of PPEs have been considered in the curriculum map).		**B12 - Reproduction.** This unit covers how genes and genetic disorders are inherited with consideration of the ethics of screening embryos. Assessment - B12 end of unit test and feedback.	**B13 & B14 - Variation, evolution and genetics.** This unit covers evolution by natural selection and the evidence to support this theory. Global link - Antibiotic resistant bacteria. The students also discover how living classification systems have changed over time. Assessment - B13 & 14 end of unit test and feedback.	**B16 & 17 - Organising and ecosystem and biodiversity.** This unit covers the cycling of materials in terms of decay, carbon and water. They will investigate how humans have an impact on such cycles, and the biodiversity of the planet. Global links and Geography links - Biodiversity and climate change. Time consideration for 2 weeks of PPEs. Assessment - B16 & 17 end of unit test and feedback. (2 weeks of PPEs have been considered in the curriculum map).	**Paper 1 & 2 revision.** Revision of Biology and Chemistry Paper 1 content (alongside partner teacher). Biology paper 2 revision will take place in the drop-down revision sessions.	**Science exam window**. Students will attend drop-down science revision sessions as listed in the Year 11 revision timetable.	
Y11 Combined Teacher 2 (Teaching Physics and Chemistry)	**P8 & P9 - Forces in balance, and motion**. In this unit students compare scalar to vectors and calculate resultant forces. This module also investigates how to interpret motion graphs. Assessment - P8 & 9 end of unit test and feedback.		**C10 & C12 - Chemical analysis and the Earth's resources.** Students will investigate how chemicals are analysed in terms of pure substances, mixtures, gases and chromatograms. They will then move onto investigating how water is treated, and how life cycle assessments can be used to assess the environmental impact of different products. Global links and DT links - Environmental impact of different materials. Assessment - C10 & 12 end of unit test and feedback.		**P10 & P13 -Forces, motion and electromagnetism**. This units considers forces in terms of braking and momentum, then moves onto electromagnetism and the motor effect. **Required Practical 19: Investigating the relationship between force and acceleration.** Assessment - P10 & 13 end of unit test and feedback. (2 weeks of PPEs have been considered in the curriculum map).	**Paper 2 revision**. Revision of Chemistry and Physics paper 2 content.	**Paper 1 revision**. Revision of Chemistry (with the partner teacher) and Physics paper 1 content.	**Science exam window**. Students will attend drop-down science revision sessions as listed in the Year 11 revision timetable.	
Y11 Triple Biology	**B12 Homeostasis in Action**. PAPER 2 - B12 -Homeostasis in Action. Students apply their understanding of homeostasis to temperature and water control. They will compare kidney transplants to dialysis machines. Assessment - B10&11 end of unit test and feedback. This unit covers water, waste and temperature control in the body. Assessment - B12 end of unit test and feedback.		**B13 & 14 Reproduction, Variation and Evolution**. This unit covers genetics and inherited disorders, followed by the role inheritance plays in evolution. Assessment - B13 &14 end of unit test and feedback. (2 weeks of PPEs have been considered in the curriculum map)		**B15 Genetics**. Students research the contributions that Mendel, Darwin and Lamarck made towards advances in genetics. Students then look at how genetics can be used to classify animals and to develop evolutionary trees. Assessment will take place after the next unit. (2 weeks of PPEs have been considered in the curriculum map)	**B17 Cycling of Materials**. This unit covers the cycling of materials in terms of decay, carbon and water. **Required Practical 10: Investigating the effect of temperature on the rate of decay of fresh milk**. Assessment B15 & 17 end of unit test and feedback.	**Revision**. Paper 1 and Paper 2 revision in class.	**Biology exam window**. Students will attend drop-down Biology revision sessions as listed in the Year 11 revision timetable.	

Y11 Triple Chemistry	**C10 & C11 Organic reactions and polymers**. This unit covers alkenes, alcohols, esters and carboxylic acids, as well as the formation of polymers. Biology link - DNA polymer. Assessment - C10 & 11 end of unit test and feedback.	**C12 Chemical analysis**. Students will investigate how chemicals are analysed in terms of pure substances, mixtures, gases, chromatograms and positive and negative ions. **Required Practical 7: Use chemical tests to identify unknown compounds**. Assessment - C12 end of unit test and feedback. (2 weeks of PPEs have been considered in the curriculum map)		**C14 & C15 Earth resources and using our resources**. Students will investigate how water is treated, and how life cycle assessments can be used to assess the environmental impact of different products. they will move onto the use of alloys and the Haber process. Global links and DT links - Environmental impact of different materials. **Required Practical 8: Purify and test water**. Assessment - C14 & 15 end of unit test and feedback.(2 weeks of PPEs have been considered in the curriculum map)		**Revision.** Paper 1 and Paper 2 revision in class.	**Chemistry exam window**. Students will attend drop-down Chemistry revision sessions as listed in the Year 11 revision timetable.	
Y11 Triple Physics	**P9 & P10 Motion graphs and Force and motion.** This module investigates how to interpret motion graphs, and links motion to acceleration, braking and car safety features. **Required Practical 7: Investigating the relationship between force and acceleration. Assessment - P9 & 10 end of unit test and feedback.**	**P12 & P14 Wave properties and light. Required Practical 8: Investigating plane waves in a ripple tank and waves in a solid. Required Practical 9 Investigating the reflection and refraction of light. Required Practical 10: Investigating infrared radiation. Assessment - P12 & 14 end of unit test and feedback.**(2 weeks of PPEs have been considered in the curriculum map)	**P15 Electromagnetism.** This unit investigates the motor effect, generators and transformers. Assessment - P15 end of unit test and feedback.	**P16 Space**. Students discover evidence to support the structure of stars, planets, the solar system and expanding universe. Assessment - P16 end of unit test and feedback.(2 weeks of PPEs have been considered in the curriculum map)	**Revision**. Paper 1 and Paper 2 revision in class.	**Physics exam window**. Students will attend drop-down Physics revision sessions as listed in the Year 11 revision timetable.	