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	BfL & LAL	
Year 7	**Working scientifically, C1.1 Particles,B1.1 Cells,P1.4 Space:** Students begin with a skills development unit to cover Working scientifically; how scientists ask questions and plan investigations, how they record their data, analyse and evaluate it. 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 lead onto specialised cells and how they are adapted to do their jobs. In the space topic they learn about the night sky, the Solar system and why we have day and night and seasons, as well as the phases of the moon. Throughout the term they will have mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS: C1.1/B1.1/P1.4 TESTS and feedback**	**C1.2 Elements, C2.2 Separation techniques, B1.2 Body systems, P1.2 Forces:** Students learn about elements, atoms and compounds in chemistry. They learn about the structure and function of body systems to include breathing, the skeleton and how we move.(curriculum link PE, HRF) 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 mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS : C1.2/C2.2/B1.2 /P1.2 TESTS and feedback**	**C1.4 Acids and Alkalis, B1.3 Reproduction, P1.3 Sound, P1.4 Light:** Students learn about acids and alkalis, how we can use indicators to identify them, and neutralisation reactions. They study reproduction to include plants as well as animals. This includes changes that happen in adolescence and the menstrual cycle. PD link reproduction. They learn about both sound and light. How they travel and how we detect them. They investigate reflection and refraction, loudness and pitch and learn how the eye and the ear work. Throughout the term they will have mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS : C1.4/B1.3 /P1.3/P1.4 TESTS and feedback**		**Curriculum Enrichment Week**
Reporting Y8	CfCs	BfL & LAL	BfL & LAL	BfL & LAL	BfL & LAL	
Year 8	**Working scientifically, C2.1 The Periodic Table, P2.3 Motion and Pressure,B2.2 Ecosystems:** Students begin by developing their Working scientifically skills before learning about the Periodic Table, to include specifically the elements of Group 1, 7 and 0. They study Motion and Pressure in Physics, which includes how to calculate speed and interpret motion graphs. They learn how to work out pressure in solids, and applications of pressure in liquids and gases. 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. (Curriculum and global link to climate change) Throughout the term they will have mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS: C2.1/B2.2/P2.3 TESTS and feedback**	**C1.3 Reactions, C2.3 Metals and Acids B2.1 Health:** 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 then study reactions of some of the ways metals react before learning about other materials and their properties, including ceramics, polymers and composites. Students will learn about health and the importance of diet (curriculum link DT food). They learn how to test foods for particular nutrients and how the digestive system works.(curriculum link PE) They learn about the effects of smoking, drugs and alcohol on health. (curriculum link PD) Throughout the term they will have mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS C1.3/C2.3/B2.1 TEST and feedback**	**C2.4 Earth, B2.3 Adaptations,P2.1 Electricity, P2.2 Energy:** Students learn about the Earth, it's atmosphere and it's rocks. Specifically sedimentary, metamorphic and Igneous rocks and how they cycle from one to another.(Curriculum link :Geog weathering) They learn more about the importance of carbon cycle and the impact of humans on climate change (Curriculum and global link to climate change).They learn about electricity in circuits, and how to measure current, potential difference and resistance, as well as magnets and electromagnets. Then they learn about energy and how it can be stored and transferred. This topic include how electricity is generated including using renewable sources. They learn about energy and power, and can apply this to electrical appliances in the home. (Curriculum and global link to climate change) Throughout the term they will have mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. **ASSESSMENTS : C2.4/B2.3/P21./P2.2 TESTS and feedback**	**B15**: Students study a topic on Ecology which allows for outside sampling and will be assessed with a TEST	**Curriculum Enrichment Week**
Reporting Y9	CfCs	BfL & LAL	BfL & LAL	BfL & LAL	BfL & LAL	
Year 9	**B5+B6, P3** : Students learn about health and disease to include physical and mental health and how they interact. They study certain communicable diseases which may be bacterial, viral, fungi or protist 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.**(Global link: Health and wellbeing**) 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. **(Curriculum and global link: Climate change).) Throughout the term they will have mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. Assessment : B5,B6,P3 Tests and feedback**	**C1+C2,B7: Students 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 learn about methods to separate mixtures including distillation and chromatography. Next they study the Periodic Table and how it was developed. Specifically about the elements in Group1, 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.(Global link: Health and wellbeing, curriculum link: Sports Studies, PD).Throughout the term they will have mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. Assessment : C1,C2,B7 Tests and feedback**	**P11+P12,C11**: Students study a topic on waves and their properties. The 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. **(Global link: health and wellbeing)**. 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. **(Global link: Climate change)**.Throughout the term they will have mini-quizzes to test their knowledge as well as opportunities to develop their skills including working scientifically, literacy and numeracy. **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**

Richard Lander School

Science Curriculum Overview - 10/11

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	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**	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.
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	**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.	**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.		Paper 1 Required Practical revision and end of Year 10 exam.	**P6 & P7 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 & P9 - 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.		**P11 recap and P12 - Waves properties and electromagnetic waves**. This unit recaps and builds on Year 9 work on the properties of waves and electromagnetic waves. **Required Practical 12: Investigating plane waves in a ripple tank and waves in a solid. Required Practical 21: Investigating infrared radiation**. Time consideration for 2 weeks of PPEs		**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	**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.	**B12 Homeostasis in Action**. 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.	