Science

Course Description	Our Combined Sciences course gives learners the opportunity to study Biology, Chemistry and Physics, each covered in separate syllabus sections. Learners gain an understanding of the basic principles of each subject through a mix of theoretical and practical studies, while also developing an understanding of the scientific skills essential for further study. They learn how science is studied and practised, and become aware that the results of scientific research can have both good and bad effects on individuals, communities and the environment. As well as focusing on the individual sciences, the syllabus helps learners to understand the technological world in which they live, and take an informed interest in science and scientific developments. The course places considerable emphasis on the understanding and use of scientific ideas and principles in a variety of situations, including those which are well-known to the learner and those which are new to them. It offers a combination of theoretical and practical studies leading to an understanding of the basic principles of Science as well as their relevance and application to daily life. The Science course is guided by the key stage 3 Science curriculum of the English National Curriculum. The course provides a broad based learning of scientific concepts and principles with an emphasis on scientific thinking. The main areas of study consist of 4 sections: 1. Organisms, behaviour and health 2. Chemical and material behaviour 3. Energy, electricity and forces 4. The environment, earth and universe The course offers a variety of learning experiences that help in the development of transferable life-long skills relevant to the increasingly technological environment in which people find themselves. This course will also prepare learners to gain the necessary knowledge and skills for the IGCSE Science subjects like Physics, Chemistry and Biology.

Course Aims	The national curriculum for science aims to ensure that all pupils: • develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics • develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them • are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future. The programme of study also aims at providing learners the opportunity to: • Understand the nature of scientific ideas and carry out systematic inquiry • Develop an interest in the study of science • Develop experimental and investigative scientific skills • Know and understand the applications of science in everyday life • Communicate using a range of scientific terms and symbols. Use SI units and present their ideas through the use of diagrams, graphs, tables and charts • Develop and apply students' information and communication technology skills in the study of science • Raise awareness of the moral, ethical, social economic and environmental implications of using science and technology • Develop awareness about health and safety and recognise hazards • Understand the basic concepts in the study of Physics, Chemistry and Biology and appreciate their scope, so that they can make an appropriate choice of subjects at the IGCSE level

Course Content (Major Concepts and Areas Covered)	**<u>Year 7</u>** **1. Chemical and Material Behaviour** • Safety in the laboratory • Hazard warning signs • The Bunsen burner • The best flame • What makes things burn? • Putting out a fire • Fire precautions at school • Acids and alkalis • Indicators • Weak and Strong Acids and Alkalis • The pH meter

	• Neutralisation • Particle world • Our watery world • Spreading out • How does heat change things? • How does the mass change? • Chemical reactions • Fizzy reactions • Combustion • Everyday Chemistry • Reactions running backwards **2. Organisms, behaviour and health** • Cells, tissues and organs • Using a microscope • Studying plant cells • Studying animal cells • Designed for a purpose - Specialised cells • Organs and technology • Reproduction in flowering plants **3. Energy, Electricity and Forces** • Types of energy • Changing energy • Tracking energy transfers • What are fuels • Energy release from fuels • Conductors and insulators • Current in circuits • Energy in circuits • Measuring the forces around you • Different forces around you • Balanced and unbalanced forces • Speeding along • Measuring the speed • Friction • Air resistance • Streamlining and drag **4. The Environment, Earth and Universe** • Classification and Food web • How do we classify? • The five kingdoms

	• Water for plants • Why do we need plants? • Food web in the garden • Are leaves bigger in shade? • What conditions do animals prefer? • How plants and animals survive? • Food chains and webs • Weathering and fossils • Looking at rocks • Using rocks • Weathering of rocks • Pebble and powder signs • Rapid weathering • Transporting rocks • Rocks and heat • Fossil past • How fossil fuels are made? • Finding fossil fuels **<u>Year 8</u>** **Chemical and Material Behaviour Separating Mixtures** • Dissolving rocks • Sweet tooth • Pure salt • Super solvents • Distillation • Better boiling • Drinking water • Chromatography **Atoms, Elements and Compounds** • Chemical Alphabet • Getting sorted • All mixed up • What are compounds? • Understanding equations • Combining Elements **Energy, Electricity and Forces Magnetism** • Magnetic materials • Magnetic fields • Earth's magnetic field

	• Explaining magnetism • Electromagnetism • Using electromagnets • Motors and generators • Power stations • Burning problems • Renewable energy resources • What about nuclear power? **Energy, Electricity and Forces** **Sound and Heat** • What is sound? • Describing sounds • Speed of sound • Sound waves • Sounds in solids, liquids and gases • Ultrasonic sounds • The ear and hearing • Damaging our hearing • Heat and temperature • Getting warmer • Conduction • Convection • Radiation **Organisms, Behaviour and Health** **Keeping healthy** • A balanced diet • Is my diet Ok? • Eating food • Do I have enough energy? • A breath of fresh air • A healthy heart • Measuring your pulse • How do you know if you are fit? **Studying disease** • History of disease • The infection cycle • Preventing disease • Sexually transmitted diseases • Biological warfare

	• Vaccination • What are vaccines? • How to get rid of microbes • Are microbes useful? **The Environment, Earth and Universe Life and Death** • Design a predator • Where has the ox gone? • Population models • The Solar System • Gravity in space • Gravity and weight • Satellites • Space travel • Exploring Further • Recycling by rotters • Populations • Biological control **Space** • Day and Night • The seasons • The Moon • The Solar System • Gravity in space • Gravity and weight • Satellites • Space travel • Exploring Further **<u>Year 9</u>** **Chemical and Material Behaviour** **Chemical patterns** • The alkali metals • Word and symbol equations • Reacting metals • Metals and acids • Acid concentration • Displacement of metals • Predicting reactions • Corrosion of metals

	• How to stop corrosion **Chemical reactions** • Metals and non-metals • Acids, alkalis and bases • Carbonates and acids • Salts • Making a salt • Precipitating salts • Using salts **Energy, Electricity and Forces** **Pressure, forces and moments** • Pressure points • Pressure in gases • Pressure in liquids • Megadiggers • Turning forces and moments • The Body Machine • Speedy sums • Distance-time graphs **Energy, Electricity and Forces** **Energy transfers** • Sources of light • Light and plane mirrors • Curved mirrors • Total internal reflection • Refraction • Issac Newton 'the optickian' • Colour • Using colour • Seeing the light • Seeing clearer Resistance in circuits • Modelling circuits • Using electricity • Electricity in the home **Organism, behaviour and health** **Drugs and behaviour** • What is a drug?

	• Is alcohol really that good? • A nail in the coffin • Another nail in the coffin • Cannabis • Just say no • Detecting your environment • Being in control • What are we born with? • Learning behaviour in animals • Aggression • How do I learn? • Effective learning • Variation • Why are we different? How tall is this group? • What can twins tell us? • It came from my parents • Natural clones • Dog breeding **The Environment Earth and Universe** **Humans and the environment** • What resources do we need? • The effect of acid on plants • How clean is our air? • What happened to the atmosphere? • Looking at your surroundings • Conservation • Can we save the planet? **Geology** • Studying sedimentary rocks • More about sediments • Mountains and folds • Metamorphic rocks • Crystal in igneous rocks • Volcanic magic • The rock cycle

Suggested Texts and Materials	**Year 7** **Textbook**: Ed Walsh (series editor), Collins KS3 Science Book 1 ISBN: 978-0-00-726420-9 **Resource books:** 1. Hollins Martin, et al, Go for Science 1, (1997) Thomas Nelson and Sons Ltd., KT 12 5PL UK ISBN: 0-17-4387032 2. Fullick Ann, et al, Science Now, Part 2, (1996), Heinemann Educational Publishers, Oxford OX2 8EJ ISBN: 0 435 506852 3. Harrison Chris (series editor), Thinking through Science, Part 1 (2002), John Murray (Publishers) Ltd., London W1S4BD, ISBN: 0 7195 7854 **Year 8** **Textbook**: Ed Walsh (series editor), Collins KS3 Science Book 2 ISBN: 978-0-00-726421-6 **Resource books:** 1. Hollins Martin, et al, Go for Science 2, (1997) Thomas Nelson and Sons Ltd., KT 12 5PL UK ISBN: 0-17-4387040 2. Fullick Ann, et al, Science Now, Part 2, (1996), Heinemann Educational Publishers, Oxford OX2 8EJ ISBN: 0 435 506854 3 Harrison Chris (series editor), Thinking through Science, Part 2 (2002), John Murray (Publishers) Ltd., London W1S4BD ISBN: 0 7195 7854 X **Year 9** **Textbook**: Ed Walsh (series editor), Collins KS3 Science Book 3 ISBN: 978-0-00-726422-3 **Resource books:** 1. Harrison Chris (series editor), Thinking through Science, Part 3 (2002), John Murray (Publishers) Ltd., London W1S4BD ISBN: 0 7195 78604 2. Hollins Martin, et al, Go for Science 3, (1997) Thomas Nelson and Sons Ltd., KT 12 5PL UK

	ISBN: 0-17-438705-9 3. Fullick Ann, et al, Science Now, Part 3, (1996), Heinemann Educational Publishers, Oxford OX2 8EJ ISBN: 0 435 506897

Delivery and Methodology	Duration of course: 3 years Number of hours taught per week: 4 A variety of teaching techniques are used in order to make learning more effective and enjoyable. These include demonstrations and hands on experimental work, expositions and discussions. Other strategies include presentations by students individually or in groups, debates on ethical issues, projects that encourage research work and hands on experience with special equipment including data loggers. Students are also taken for educational trips, and talks or workshops by subject specialists are organized. Charts, models, micro slides (in Biology), videos, animations and simulations are used as appropriate to enrich the learning experience. The use of information and communication technology is an integral part of teaching and learning strategies.

Assessment Objectives (Specifications and Standards)	Through the content across all three subject disciplines of biology, chemistry and physics, pupils should be taught to: **AO1: Scientific attitudes** • pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility • understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review • evaluate risks. **AO2: Experimental skills and investigations** • ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience • make predictions using scientific knowledge and understanding • select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control

	variables, where appropriate • use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety • make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements • apply sampling techniques. **AO3: Analysis and evaluation** • apply mathematical concepts and calculate results • present observations and data using appropriate methods, including tables and graphs • interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions • present reasoned explanations, including explaining data in relation to predictions and hypotheses • evaluate data, showing awareness of potential sources of random and systematic error • identify further questions arising from their results. **AO4: Measurement** • understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature • use and derive simple equations and carry out appropriate calculations • undertake basic data analysis including simple statistical techniques.

Scheme of Assessment (Evaluation of Student Performance)	In keeping with the whole school assessment policy, assessment in Science is an ongoing process of evaluating, recording, tracking and reporting student progress to enhance learning and raise achievement. Both formative and summative assessments are carried out in the Science course. All students are given a baseline test in term one in order to identify strengths and weaknesses, as well as to inform teaching and learning. In addition to teacher led assessments peer and self assessment is also carried out. Exemplar work is used to guide student learning and raise achievement whenever appropriate. Some of the widely used forms of assessments are: 1. Homework 2. Practical assignments 3. Charts/Models/Presentations/Research folders

	4. Written tests 5. Practical tests 6. Oral test/Quiz Approximate weighting of assessment objectives for qualification: AO1: 50% AO2: 30% AO3: 20% Weighting of formative and summative assessments (Y7-9): Formative (progressive) assessments: Before midterm: 20% After midterm: 20% Summative assessments: Midterm Examination: 30% Final Examination: 30%

Grading Policy and Additional Expectations (if any)	All assessment is criterion referenced and aligned to learning objectives as outlined in teacher's semester projections. Teachers mark work on the basis of mark schemes made in collaboration with colleagues of the same year group Formative assessments may be given a mark, a grade or a comment. It values teacher judgement and informs the learner about strengths and weaknesses as well as next steps. All summative assessments are graded on a scale as published in the whole school assessment policy. The grades and grade boundaries for Science are: 90-100%: A* 80-89%: A 75-79%: B+ 70-74%: B 65-69%: C+ 60-64%: C 55-59%: D+ 50-54%: D 0-49%: F