Subject Curriculum Overview for Academic Year 2022/2023

Subject: Triple Science	Subject Leader: Abigail Harker, Hugo Crossley	Year Group: 11	AUTUMN TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Biology: Exchange and transport, Plant Structures and Function	*End Point: To know how exchange surfaces enable efficient exchange of substances. To know the structure and function of plant organs and physiology.* • Understand the general features of exchange surfaces. • Know that smaller organisms with a large SA:V can obtain reactants for chemical processes via simple diffusion whereas the larger an organism gets the smaller the SA:V is meaning they require specialised exchange surfaces. • Know the function and constituent parts of the circulatory system. • Know the aerobic and anaerobic respiration equation. • Know how to describe photosynthesis and factors that affect photosynthesis. • Know how plants transport substances through transpiration and translocation.	• Diffusion • Concentration gradient • Surface area • Circulatory system • Aerobic • Anaerobic • Respirometer • Xylem • Phloem	**Formative Assessment:** • Each lesson starts with a review starter, the teacher provides feedback and students mark in green pen. • Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson. • At the end of each lesson there is a short plenary to review learning. Students review their own work in green pen. **Summative Assessment:** • Students sit two mock exams, one in the Autumn term and one in Spring. These consist of full past papers. **Homework:** GCSE pod quizzes set weekly, other remedial work set at teacher discretion.
Chemistry: Fuels and Earth's Atmosphere, Quantitative analysis and Alcohols	*End Point: To understand how we process fuels and the impact using them has on the environment. To know how the earth's atmosphere has changed over time.* • Know how the process of fractional distillation allows us to obtain more useful mixtures of hydrocarbons from crude oil. • Understand the link between hydrocarbon chain length, volatility and applications in the real world. • Know what complete and incomplete combustion are. • Know the composition of the Earth's atmosphere when it first formed and how it has changed over time until present day. • Know that dynamic equilibrium occurs in a reversible reaction where forward and backward reactions balance each other in a closed system. • Know the chemical structure of alcohols and describe their properties.	• Crude oil • Fractional distillation • Hydrocarbons • Alkanes • Alkenes • Cracking • Combustion • Carbon dioxide • Carbon monoxide • Photosynthesis • Climate change	
Physics: Electrical circuits and Static electricity.	*End Point: To know how electricity works and how electrical circuits are constructed.* • Know the components in an electrical circuit and how they function. • Know that current is the flow of electrons in a circuit and that potential difference is the energy difference between two points in a circuit. • Know that resistance resists the current and leads to heating of components. • Know calculations involving current, potential difference, resistance and power. • Know how energy is transferred by electricity through the national grid. • Know safety features of electrical circuits including the wiring of a plug. • Know how static electricity builds up due to friction and transfer of electrons. • Know the uses of static electricity and how to mitigate potential hazards.	• Alpha • Beta • Gamma • Penetration • Ionising • Geiger-Müller tube • Half-life • Current • Potential difference • Resistance • Ohms	

Subject Curriculum Overview for Academic Year 2022/2023

Subject: Triple Science	Subject Leader: Abigail Harker, Hugo Crossley	Year Group: 11	SPRING TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Biology: Plant Structure and Function and Animal Coordination and Control	*End Point: To understand transport systems in plants and how photosynthesis can be measured. To understand homeostasis in animals.* • Know the adaptations plants have for surviving in extreme environments. • Know the action of plant hormones and how humans use hormones to manipulate plants. • Know the structure and general function of the endocrine system to include names of glands and hormones in the menstrual cycle and control of metabolism. • Know how homeostatic mechanisms work including thermoregulation, osmoregulation and glucose regulation.	• Photosynthesis • Auxin • Gibberellin • Ethylene • Glands • Hormones • Diabetes • Menstrual cycle • Osmoregulation • Thermoregulation	**Formative Assessment:** • Each lesson starts with a review starter, the teacher provides feedback and students mark in green pen. • Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson. • At the end of each lesson there is a short plenary to review learning. Students review their own work in green pen. **Summative Assessment:** • Students sit two mock exams, one in the Autumn term and one in Spring. These consist of full past papers. **Homework:** GCSE pod quizzes set weekly, other remedial work set at teacher discretion.
Chemistry: Rates of Reaction, Heat energy changes, Reversible reactions, Dynamic equilibria and Polymers	*End Point: To understand the features of chemical reactions and how we measure them.* • Know that the rate of a reaction is the speed at which reactants are converted into products. • Know that reaction rate can be measured by measuring change in mass of the reactants or products in a reaction. • Know how factors such as concentration, temperature, pressure, surface area and the presence of a catalyst can affect the rate of reactions. • Know that reactions can be classed as endothermic or exothermic depending on whether they absorb or release energy. • Know how polymerisation occurs and the properties and uses of polymers.	• Reactants • Products • Concentration • Pressure • Surface area • Catalyst • Endothermic • Exothermic • Activation energy • Polymerisation	
Physics: Magnetism, Electromagnets and Energy calculations	*End point: To know how magnetic fields arise and how we can manipulate them. To understand how to describe energy and forces using mathematical formulae.* • Know that magnets exert a force on magnetic objects within the forcefield surrounding the magnet. • Know that an electromagnet is where a current is passed through a coil of wire surrounding an iron core creating a magnetic field. • Know how transformers work in by using electromagnetic induction. • Know the term specific heat capacity as the amount of energy it takes to increase the temperature of 1 kilogram of the substance by 1^0C. • Know how to manipulate and rearrange formulas for physics equations including energy calculations and force equations.	• Attract • Repel • Induced • Permanent • Solenoid • Electromagnet • Magnetic flux • Fleming • Electromagnetic induction • Transformers • Specific heat capacity	

Subject Curriculum Overview for Academic Year 2022/2023

Subject: Triple Science	Subject Leader: Abigail Harker, Hugo Crossley	Year Group: 11	SUMMER TERM

Topic	Key Learning Points	Key Vocabulary	Assessments
Revision	*End point: To synthesise content taught over the last two years with exam technique. To use embedded routines for revision to consolidate key knowledge and ensure it can be retrieved in an exam setting.* • Students are guided to structure their revision using the memory clock – a time partitioning tool that ensures students spend time revisiting key knowledge before practising recall and exam technique. • Students have access to a Year 11 Science Revision Team on Microsoft Teams. Here they will find lesson resources if they need to go back to the original source as well as past paper questions, full past papers for timed practice and extra resources such as a guided revision workbook. These should be used for practising recall. • To help structure their revision students are provided with an exemplar revision timetable and checklist of content. They also have access to a Science specific Revision technique guide which outlines different revision techniques and how to structure them. • Students are given a list of purchasable revision resources and class teachers will guide parents at parents evening to the ones that are most helpful for their child. For example the 10-minue tests book focuses on chunked exam question practice, the exam practice work booklet gives more in-depth exam question practice, the Grade 8-9 Targeted Exam Practice Workbook provides higher attaining students with examples of the more challenging questions. • Students are guided to a wealth of online resources to help support their revision. For example: - BBC bitesize GCSE Edexcel - GCSE Pod (Edexcel) - SENECA - OAK Academy • The morning of exams there are laser point exam tips sessions run by subject specialists. Attendance is optional and sessions are focused on reinforcing key points for the specific exam of the day as well as boosting confidence.		**Formative Assessment:** • Each lesson starts with a review starter, the teacher provides feedback and students mark in green pen. • Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson. • At the end of each lesson there is a short plenary to review learning. Students review their own work in green pen. **Summative Assessment:** • GCSE exams **Homework:** • GCSE pod quizzes set weekly, other remedial work set at teacher discretion.

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How parents can support learning in the subject this academic year

- All students are provided with revision guides for home use but there are a variety of other good resources available on the CGP website including revision workbooks, knowledge retrievers, revision question cards, 10-minute tests. Please contact your child's Science Teacher if you would like any direction to the appropriate workbook to buy.
- Remind students to regularly review their own learning, especially in the run up to end of half termly assessments. Parents can offer disciplined rehearsal time of key knowledge in the form of quizzing students or simply asking children to explain a concept to them. To structure this use checklists of key knowledge in student books, revision guides, and other revision materials provided in the lead up to assessments at the end of every half term.
- Ensure students have a quiet space for working and revising. This space should be free from distractions and should ideally not be associated with any other activity e.g. sleeping, socialising, relaxing. Consider encouraging students to give you their mobile phone for a set period of deep work every evening.

Recommended Reading

Please find below some suggested Science books/magazines/websites that students may find interesting. These are linked to the topics that are covered in school and so may extend and strengthen their knowledge but are primarily focused on instilling a sense of curiosity and wonder:

- A Short History of Nearly Everything – Bill Bryson
- The Blind Watchmaker – Richard Dawkins
- Bad Science – Ben Goldacre
- The Gene – Siddhartha Mukherjee
- Women in Science: 50 Fearless Pioneers Who Changed the World – Rachel Ignotofsky
- The Boy Who Harnessed the Wind – Bryan Mealer and William Kamkwamba
- The Universe in Your Hand: A Journey Through Space, Time, and Beyond – Christophe Galfard
- Fun Science: A Guide to Life, The Universe & Why Science Is So Awesome – Charlie McDonnell
- Focus magazine (sciencefocus.com)
- Catalyst magazine (catalyst-magazine.org)
- New Scientist (newscientist.com)

Points to note

The Key Stage 4 Science Curriculum at JMHS is based on the National Curriculum for Science and the Edexcel exam specification which aims to develop a deep understanding of the big ideas in Science. This is split into the three disciplines of Biology, Chemistry and Physics which are taught on a rotational basis.

In addition, students learn how to work scientifically, which involves:

- Procedural Knowledge – tasks that students should be able to do as scientists, such as measuring volume.
- Disciplinary Knowledge – knowledge of the scientific method, such as making predictions and recording results.
- Mathematical Knowledge – knowledge of mathematics, such as being able to calculate the average.