Y10 Subject Curriculum Overview per Term

Subject: Combined Science		Year Group: 10	AUTUMN TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Biology: Key concepts part 2 (Enzymes) and Cells and Control	*End Point: Know the action of enzymes. Know how growth of organisms occurs and how the nervous system allows the body to respond to stimuli.* • Know how enzymes work to catalyse reactions and the effect temperature and pH can have on enzyme activity. • Know how plants and animals grow through cell division, cell differentiation and, in plants, cell elongation. • Know the process of mitosis and be able to describe what is happening to the chromosomes in each stage. • Know the structure of the nervous system, neurones and synapses. • Know how neurotransmission occurs in a coordinated response and reflex arc as well as how an electrical impulse is transmitted across a synapse.	• Enzyme • Substrate • Denature • Mitosis • Differentiation • Motor neurone • Sensory neurone • Relay neurone • Electrical impulse • Synapse	**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:** • At the end of each half-term students complete a summative assessment. This will be a 60-mark exam paper (20 marks from each topic). **Homework:** GCSE pod quizzes set weekly, other remedial work set at teacher discretion.
Chemistry: The Periodic table and Bonding.	*End Point: To understand how the periodic table is organised and how different substances are formed through bonding.* • Know the origin and organisation of the periodic table. • Know what the mass number and atomic number of an element is. • Know the properties of group 1, group 7 and group 0 in the periodic table. • Know that an ionic bond forms when electrons are donated or accepted • Know the properties of an ionic lattice. • Know that a covalent bond is formed when atoms share electrons. • Know how to draw diagrams of ionic and covalent bonds. • Know that metallic bonding arises from the electrostatic attraction of positive metal ions and delocalised electrons.	• Mendeleev • Groups • Periods • Mass number • Atomic number • Alkali metal • Halogen • Noble gas • Ionic bond • Covalent bond • Metallic bond • Delocalised electrons	
Physics: Forces and Energy and Motion	*End Point: To understand how motion can be calculated and represented graphically. To describe the interactions of different forces using Newton's Laws.* • Know that quantities that have a size and a direction are defined as vectors and that quantities with just a size are scalars. • Know how to calculate speed and acceleration. • Know how to interpret a distance time graphs and velocity time graphs. • Know Newton's Laws of motion and how to apply them. • Know different stores and transfers of energy and how to calculate them. • Know how to calculate momentum given the mass of an object, change in velocity and time.	• Vector • Scalar • Energy store • Energy transfer • Kinetic energy • Gravitational potential energy • Spring constant • Momentum • Thinking distance	

Y10 Subject Curriculum Overview per Term

Subject: Combined Science	Subject Leader: Leo Roberts	Year Group: 10	SPRING TERM

Topic	Key Learning Points	Key Vocabulary	Assessments
Biology: Genetics and Natural Selection	*End Point: To understand how sexual reproduction leads to genetic variation and explain how genetic variation is the key to evolution through natural selection.* • Know the process of meiosis to produce gametes for sexual reproduction. • Know the structure of DNA and how to extract DNA. • Know that sections of DNA form genes and that alleles have dominant and recessive functions during inheritance. • Know that evolution occurs due to competition and natural selection. • Know the evidence for human evolution and how human tools give correlating evidence for an increase in intelligence over time. • Understand that overuse of antibiotics has led to the evolution of antibiotic resistant bacteria.	• Meiosis • Gametes • DNA • Double helix • Alleles • Dominant • Recessive • Natural selection • Inheritance • Resistant	**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:** • At the end of each half-term students complete a summative assessment. This will be a 60-mark paper (20 marks for each topic). **Homework:** GCSE pod quizzes set weekly, other remedial work set at teacher discretion.
Chemistry: Electrolytic processes and Using and Obtaining Metals	*End Point: To be able to describe the process of electrolysis and its applications. To understand extraction methods for metals* • Describe the process of electrolysis including the oxidation and reduction reactions that occur at each electrode. • Know that displacement reactions are redox reactions because one substance is oxidised and another is reduced. • Know that an ore is a rock containing metal compounds. • Know that metals can be extracted by heating with carbon or electrolysis depending on their reactivity. • Know that bioleaching and phytoextraction are biological methods of extracting metals.	• Ore • Native • Blast furnace • Electrolysis • Bioleaching • Phytoextraction • Recycling • Anode • Cathode • Electrolyte • Migration	
Physics: Waves	*End point: To describe the features of waves and understand different ways to calculate wave speed.* • Know that sound is caused by the vibration of particles. • Know that an area where particles are close together is called a compression and an area where particles are far apart is called a rarefaction • Know the difference between longitudinal and transverse waves. • Know the features of a wave to include amplitude, wavelength, frequency. • Know the equation speed = distance / time • Know that sound travels fastest through solids, then liquids, then gases. • Know that wave speed (m/s) = frequency (Hz) x wavelength (m)	• Compression • Rarefaction • Amplitude • Wavelength • Frequency • Lambda • Longitudinal • Transverse • Oscillation • Hertz	

Y10 Subject Curriculum Overview per Term

Subject: Combined Science	Subject Leader: Leo Roberts	Year Group: 10	SUMMER TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Biology: Health and Disease	*End Point: To know how different pathogens can cause us harm and understand the bodies' various defence mechanisms to infectious disease.* • Know the different facets of health including social, mental, emotional. • Know that non-communicable diseases develop due to a number of factors including genetics, diet and lifestyle. • Know the different types of pathogen and how they can cause disease. • Know how diseases are spread and the body's defences against infection. • Know how immunity develops and that vaccinations are a safe way of exposing the immune system to pathogens. • Know how new medicines such as antibiotics are developed safely.	• Health • Pathogen • Infection • Disease • Communicable • Non-communicable • Lymphocyte • Antigen • Antibody • Immune	**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:** • At the end of each half-term students complete a summative assessment. This will be a 60-mark paper (20 marks for each topic). **Homework:** • GCSE pod quizzes set weekly, other remedial work set at teacher discretion.
Chemistry: Calculations involving masses and Acids and Alkalis	*End Point: To be able to perform calculations involving masses* • Know that the empirical formula of a substance is the whole number ratio of atoms of each element and that the molecular formula is the actual number of atoms of each element. • Know that acids produce excess hydrogen ions when dissolved and alkalis produce excess hydroxide ions in water. • Know the difference between a concentration and strength. • Know that bases neutralise acid to form a salt and water. • Know that metal carbonates react with acids to produce a salt, water and carbon dioxide	• Moles • Avogadro's constant • Acid • Base • Hydrogen ions • Hydroxide ions • Strength • Concentration • Neutralise • Salt	
Physics: Electromagnetic spectrum	*End Point: To understand how wavelength and frequency relate to the properties and uses of waves on the electromagnetic spectrum.* • Know that EM waves are transverse waves that travel at the speed of light. • Know the properties of waves on the EM spectrum in relation to wavelength and frequency • Know that the longer electromagnetic wavelengths, like radio waves and microwaves are used in communication. • Know that shorter electromagnetic wavelengths, such as X-rays and Gamma rays, are used in medicine. • Know that high frequency waves have an ionising affect and can cause damage to cells.	• Transverse • Frequency • Wavelength • Radio • Infrared • Visible • Ultraviolet • X-ray • Gamma • Ionising	

Y10 Subject Curriculum Overview per Term

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.