

## Subject Curriculum Overview for Academic Year 2023/24

| Subject: KS3 Science                      |   | Subject Leader: Adam Jennings | Year Group: 9   | AUTUMN TERM  |
|---|---|-------------------------------|---|--|
| Topic                                     | Key Learning Points   |                               | Key Vocabulary  | Assessments  |
| <b>Biology:</b><br>Health and Disease     | <p><i>End Point: Understand factors affecting physical, mental and social health and well-being, including diseases and risk factors, such as drug/alcohol abuse &amp; sexual health</i></p> <ul style="list-style-type: none"> <li>Know that health is a state of physical, mental and social wellbeing and not merely the absence of disease or infirmity</li> <li>Know the law regarding the supply and possession of legal and illegal substances</li> <li>Understand the difference between communicable and non-communicable diseases and know that pathogens can be spread by air, water, direct contact, bodily fluids, food and vectors</li> <li>Know of common sexually transmitted infections including chlamydia, gonorrhoea, genital warts, herpes and HIV/AIDS and how they are spread</li> <li>Describe the immune response and the role of white blood cells</li> <li>Know that immunisation can be triggered artificially using a vaccine</li> </ul> |                               | <ul style="list-style-type: none"> <li>Health</li> <li>Physical, mental and social wellbeing</li> <li>Disease</li> <li>Risk factor</li> <li>Communicable</li> <li>Non-communicable</li> <li>Pathogen</li> <li>Transmission</li> <li>Immune response</li> <li>Immunisation</li> <li>Vaccination</li> </ul> | <p><b>Formative Assessment:</b></p> <ul style="list-style-type: none"> <li>Each lesson starts with a review starter, the teacher provides feedback and students mark in green pen.</li> <li>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.</li> <li>At the end of each lesson there is a short plenary to review learning. Students review their own work in green pen.</li> </ul> <p><b>Summative Assessment:</b></p> <ul style="list-style-type: none"> <li>At the end of the term students will have a summative assessment. This will be a 45-mark exam paper (15 marks from each topic).</li> </ul> <p><b>Homework:</b></p> <ul style="list-style-type: none"> <li>Every week students are set review homework tasks in the form of a revision mat.</li> </ul> |
| <b>Chemistry:</b><br>Earth and Atmosphere | <p><i>End Point: Know the structure of the earth and describe processes that cycle carbon and rocks. Understand how earth's atmosphere has changed and how this affects the climate.</i></p> <ul style="list-style-type: none"> <li>Know the structure of the earth including the crust, mantle, outer and inner core</li> <li>Know that rocks can be classified as igneous, sedimentary or metamorphic</li> <li>Describe the processes that take place as part of the rock cycle</li> <li>Know how to represent a compound using chemical formula and know how to balance a chemical equation</li> <li>Know the composition of gases in the Earth's atmosphere and know the processes that add and remove carbon from the atmosphere</li> <li>Know that carbon dioxide levels in the atmosphere are increasing and describe the effects of global warming and climate change</li> </ul>  |                               | <ul style="list-style-type: none"> <li>Weathering</li> <li>Erosion</li> <li>Transportation</li> <li>Deposition</li> <li>Sedimentation</li> <li>Compaction</li> <li>Cementation</li> <li>Melting</li> <li>Rock cycle</li> <li>Carbon cycle</li> <li>Atmosphere</li> </ul>                                  |  |
| <b>Physics:</b><br>Motion and Pressure    | <p><i>End Point: Describe the effects of forces on objects in motion, using speed/acceleration calculations and link this to pressure. Understand energy, using work done calculations.</i></p> <ul style="list-style-type: none"> <li>Know how to draw force diagrams and determine the resultant force</li> <li>Know that weight = mass x gravitational field strength</li> <li>Know that pressure is the measure of the force on an area</li> <li>Know how to calculate speed and acceleration and represent the journey of an object on a distance/time graph</li> <li>Know the different ways that energy can be stored and know that work done is a measure of the energy transferred when a force acts through a distance</li> <li>Know that a moment is the turning effect of a force</li> </ul>  |                               | <ul style="list-style-type: none"> <li>Force</li> <li>Weight</li> <li>Gravitational field</li> <li>Pressure</li> <li>Speed</li> <li>Acceleration</li> <li>Energy store/transfer</li> <li>Work done</li> <li>Distance</li> <li>Moment</li> </ul>   |  |

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| Subject: KS3 Science                         |  | Subject Leader: Adam Jennings | Year Group: 9  | SPRING TERM  |
|--|--|-------------------------------|--|--|
| Topic  | Key Learning Points  |                               | Key Vocabulary   | Assessments  |
| <b>Biology:</b><br>Genetics and Variation    | <p><i>End Point: Know about environmental and inherited variation in a species and how this leads to adaptation. Know how genetic information is stored in an animal cell.</i></p> <ul style="list-style-type: none"> <li>Know that organisms in a species have different characteristics due to inherited and environmental variation</li> <li>Describe how characteristics are passed onto offspring through dominant and recessive genes and use a Punnett square to demonstrate inheritance</li> <li>Know about reproductive health, contraception, choices related to pregnancy and menopause including IVF and fertility treatment</li> <li>Know that variation can lead to organisms becoming better adapted to their environment and describe the process of natural selection</li> <li>Know that desirable characteristics can be selected by selective breeding, genetic modification and cloning</li> </ul> |                               | <ul style="list-style-type: none"> <li>DNA, Genes, Chromosomes</li> <li>Species, Adaptation, Selective breeding, Natural selection, Cloning, Genetic modification</li> <li>Dominant, Recessive</li> <li>Punnett square</li> <li>Contraception, Menopause, Fertility</li> </ul> | <p><b>Formative Assessment:</b></p> <ul style="list-style-type: none"> <li>Each lesson starts with a review starter, the teacher provides feedback and students mark in green pen.</li> <li>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.</li> </ul> |
| <b>Chemistry:</b><br>Materials               | <p><i>End Point: Know about the different types of material that can be used, including metals, alloys, ceramics, polymers and composites. Describe mining, quarrying and extraction.</i></p> <ul style="list-style-type: none"> <li>Describe the processes of mining/quarrying and evaluate environmental impact</li> <li>Know that unreactive metals are found in their native states, whereas reactive metals are found in compounds as ores</li> <li>Determine whether metals should be extracted by heating with carbon or electrolysis, based on their reactivity</li> <li>Know what is meant by an alloy, compare the properties of alloys to pure metals</li> <li>Know the advantages and disadvantages of recycling metals</li> <li>Know the properties and uses of ceramics, polymers and composites.</li> </ul>   |                               | <ul style="list-style-type: none"> <li>Mining</li> <li>Quarrying</li> <li>Extraction</li> <li>Reactivity</li> <li>Native metals</li> <li>Metal ores</li> <li>Smelting</li> <li>Electrolysis</li> <li>Alloys</li> <li>Recycling</li> </ul>                                      | <ul style="list-style-type: none"> <li>At the end of each lesson there is a short plenary to review learning. Students review their own work in green pen.</li> </ul> <p><b>Summative Assessment:</b></p> <ul style="list-style-type: none"> <li>At the end of the term students will have a summative assessment. This will be a 45-mark exam paper (15 marks from each topic).</li> </ul>        |
| <b>Physics:</b><br>Electricity and Magnetism | <p><i>End Point: Understand how energy is transferred electrically, describe circuits by their current, potential difference &amp; resistance. Know how renewable/non-renewable sources generate electricity. Describe magnetic fields and apply this to electromagnetism.</i></p> <ul style="list-style-type: none"> <li>Know that energy can be transferred by electricity, draw circuit diagrams for series and parallel circuits and understand potential difference</li> <li>Know about current and charge, including static electricity</li> <li>Know Ohms law and what is meant by electrical resistance</li> <li>Know how electricity is generated</li> <li>Know that some metals are magnetic, draw a diagram of the magnetic field around a bar magnet and know how to make an electromagnet using a wire coil</li> </ul>  |                               | <ul style="list-style-type: none"> <li>Circuit symbols</li> <li>Current</li> <li>Charge</li> <li>Static electricity</li> <li>Potential difference</li> <li>Resistance</li> <li>Energy</li> <li>Renewable</li> <li>Magnetism</li> <li>Electromagnet</li> </ul>                  | <p><b>Homework:</b></p> <ul style="list-style-type: none"> <li>Every week students are set review homework tasks in the form of a revision mat.</li> </ul>   |

## Subject Curriculum Overview for Academic Year 2023/24

| Subject: KS3 Science                        |  | Subject Leader: Adam Jennings | Year Group: 9  | SUMMER TERM  |
|---|--|-------------------------------|--|--|
| Topic                                       | Key Learning Points  |                               | Key Vocabulary   | Assessments  |
| <b>Biology:</b> Key Concepts in Biology     | <p><i>End Point: Describe the structure of living organisms at the cellular level and know the processes that transport substances in and out of cells.</i></p> <ul style="list-style-type: none"> <li>Know the sub-cellular structure of animal, plant and bacterial cells.</li> <li>Know that specialised cells have different structures and variations in their sub-cellular structures in order to perform a specific function</li> <li>Know how to operate a microscope and create a slide to view specimens clearly, including using stains and calculating magnification</li> <li>Know how substances are transported passively down a concentration gradient in diffusion and osmosis and that substances can be actively transported against a concentration gradient.</li> </ul>  |                               | <ul style="list-style-type: none"> <li>Nucleus, Cytoplasm, Mitochondria, Ribosomes, Cell membrane, Cell wall, Chloroplasts, Vacuole</li> <li>Magnification, Resolution, Stain, Objective lens, Eyepiece</li> <li>Diffusion, Osmosis, Active Transport, Concentration</li> </ul>  | <p><b>Formative Assessment:</b></p> <ul style="list-style-type: none"> <li>Each lesson starts with a review starter, the teacher provides feedback and students mark in green pen.</li> <li>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.</li> <li>At the end of each lesson there is a short plenary to review learning. Students review their own work in green pen.</li> </ul> <p><b>Summative Assessment:</b></p> <ul style="list-style-type: none"> <li>At the end of the term students will have a summative assessment. This will be a 45-mark exam paper (15 marks from each topic).</li> </ul> <p><b>Homework:</b></p> <ul style="list-style-type: none"> <li>Every week students are set review homework tasks in the form of a revision mat.</li> </ul> |
| <b>Chemistry:</b> Key Concepts in Chemistry | <p><i>End Point: To know the structure of an atom, the features of different states of matter and how to separate substances.</i></p> <ul style="list-style-type: none"> <li>Know the three states of matter: solid, liquid and gas and how their properties are linked with their structure.</li> <li>Describe how the techniques of filtration, crystallisation, paper chromatography, distillation and fractional distillation are used to separate mixtures.</li> <li>Know how to purify water using separating techniques such as distillation, sedimentation and chlorination.</li> <li>Know the structure of an atom including the subatomic particles, their relative mass, charge and position in the atom and know that isotopes are atoms of the same element with different numbers of neutrons</li> </ul>                               |                               | <ul style="list-style-type: none"> <li>Atom/element</li> <li>Chemical formula</li> <li>Compound</li> <li>Filtration</li> <li>Crystallisation</li> <li>Chromatography</li> <li>Distillation</li> <li>Proton, Electron, Neutron</li> <li>Chlorination</li> <li>Isotopes</li> </ul> |  |
| <b>Physics:</b> Key Concepts in Physics     | <p><i>End Point: To understand how energy can be stored and transferred in relation to the particle model and forces.</i></p> <ul style="list-style-type: none"> <li>Know how particles are arranged in solids, liquids and gases and know that density and pressure are dependent on the arrangement and temperature of particles.</li> <li>Know that thermal energy is the internal heat energy of an object and that thermal energy can be transferred by conduction, convection and radiation.</li> <li>Know the different stores of energy including: chemical, kinetic, thermal, elastic potential, gravitational potential and nuclear and calculate work done and power</li> <li>Know the ways energy is transferred: by mechanical work, electrical work, heating and radiation and calculate the efficiency of energy transfers</li> </ul> |                               | <ul style="list-style-type: none"> <li>Heat, Temperature</li> <li>Conduction, Convection, Radiation</li> <li>Density</li> <li>Pressure</li> <li>Energy store</li> <li>Energy transfer</li> <li>Work done</li> <li>Power</li> <li>Efficiency</li> </ul>                           |  |

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### How parents can support learning in the subject this academic year

- Have an enthusiasm for Science and try to link the world around us to what students are learning in school, this could involve looking at different types of plants when out for a walk, or investigating how yeast works when cooking. Many Science museums are free to access and it can be worth checking if there are any museums near you, or if you are away for the day. There are many great Science documentaries, such as 'Blue Planet' which can be exciting and informative for a whole family to watch.
- Encourage students to complete their homework every week, having a regular routine for homework can be especially helpful. Students can find all the information that they need for their homework on BBC Bitesize, but may need some guidance from parents to find the relevant information.
- Remind students to regularly review their own learning, especially in the run up to end of topic assessments. Asking students to explain a topic to you or asking questions about what they have learnt can support students' revision.

### Recommended Reading

In class all students have their own copy of a textbook to use to support their learning. We use 'Key Stage Three Science, Higher Level, The Study Guide' by CGP. If possible, many parents and students have found it helpful to purchase their own copy to have at home for homework and revision. Please contact your child's Science Teacher if you would like any direction to the appropriate textbook to buy.

Please find below some suggested Science books that students may find interesting, these are linked to the topics that are covered in school and so may extend and strengthen their knowledge:

- Marie Curie and Her Daughters - Imogen Greenberg
- The Human Genome: Mapping the Blueprint of Human Life – Carla Mooney

### Points to note

Our Science curriculum is based on the National Curriculum for Science 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, over three topics per term. The Year 9 Science curriculum has been designed to recap and strengthen the big ideas first introduced in Year 7, whilst linking these to the more complex content from the KS3 National Curriculum. In Biology the key knowledge from Year 7 is levels of organisation, including cells, organs and organ systems. In Chemistry, this is the particle model and the periodic table and in Physics this is forces and energy. In the Summer Term of Year 9, students begin their transition to GCSE, the key concepts topics recap the most fundamental knowledge from KS3 and set this into context ready for students to begin GCSE content in the Autumn Term of Year 10.

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.

Working scientifically is interweaved into the topics of Biology, Chemistry and Physics and students are given regular opportunities to undertake practical work and investigations, with teachers focussing on developing students' procedural, disciplinary knowledge and mathematical relevant to the topic.