

Title: KS3 Science/ GCSE Combined Science (9-1)

For more information, please consult:

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Examination Board: Edexcel

Qualification: GCSE

Tiers: Higher and Foundation

Grades: 9-1

Why study Science? / Learning Aims / Learning Objectives

Students in year 9 study the KS3 science curriculum until February half term and then begin their GCSE studies.

KS3 Science provides a foundation for the students at Giles Academy to understand the world around them through the teaching of Biology, Chemistry and Physics. Students are taught essential aspects of knowledge, methods, processes and uses of science. This foundation aims to encourage our students to recognise the power and importance of rational explanation and develop their excitement and critical curiosity about the world around us. They are encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse the causes.

Teaching in the sciences in key stage 4 continues with the process of building upon and deepening scientific knowledge and the understanding of ideas developed in earlier key stages in the subject disciplines of biology, chemistry and physics. For some students, studying the sciences in key stage 4 provides the platform for more advanced studies, establishing the basis for a wide range of careers. For others, it will be their last formal study of subjects that provide the foundations for understanding the natural world and will enhance their lives in an increasingly technological society. Science is changing our lives and is vital to the world's future prosperity, and all students should be taught essential aspects of the knowledge, methods, processes and uses of science. They should be helped to appreciate the achievements of science in showing how the complex and diverse phenomena of the natural world can be described in terms of a number of key ideas relating to the sciences which are inter-linked, and which are of universal application. These key ideas include:

What will I be learning and progressing to each year?

| Year | Key Knowledge | Key Skills | Key Vocabulary |
|--|--|---|--|
| 9 | <p>During the KS3 part of the year, students will acquire knowledge and understanding within the field of Biology, which includes: the structure and functions of living things, material cycles and energy, interactions & interdependencies, genetics & evolution; Chemistry, which includes: the particulate nature of matter, atoms, elements & compounds, pure and impure substances, chemical reactions, energetics, the periodic table, materials and the Earth & atmosphere; Physics, which includes: energy, motion & forces, waves, electricity & magnetism, matter and space physics.</p> <p>In the KS4 part of the year, students commence their GCSE studies. The Biology section includes cells, enzymes, transport processes, cell division, growth, cell differentiation and the nervous system. The Chemistry section includes states of matter, separation techniques, structure of the atom and the Periodic table. The Physics part of the course includes speed, acceleration (including graphs), Newton's Law's, momentum, stopping distances and crash hazards.</p> | <p>Students develop their 'working scientifically' skills as they progress through this course. These are skills that enable students to think about scientific problems, process and analyse data and communicate their ideas clearly and logically.</p> <p>Development of scientific thinking, experimental skills and strategies, analysis and evaluation, vocabulary, units symbols and nomenclature.</p> | <p>Word lists with definitions are issued to students for each unit.</p> |
| | Link to knowledge organiser here | Link to homework here | Link to full Y9 vocabulary here |
| <p>The content of your curriculum in this academic year for your subject</p> <p><u>Key Stage 3</u></p> | | | |

Biology

Genetics and Evolution

This unit recaps ideas about the causes of variation and then looks at inherited variation in more detail. DNA is introduced before students consider how inherited genes can affect an organism's survival. The unit ends with coverage of natural selection

Plant Growth

This unit looks at photosynthesis and aerobic respiration in plants in more detail, and then considers plant adaptations. The products we get from plants are then looked at, before studying farming methods and their problems.

Chemistry

Making Materials

This unit looks at the manufacture, properties and uses of different types of materials. The first three topics introduce examples of ceramic, polymer and composite materials. In each case, the properties of these materials are linked to their uses. The unit continues by looking at some of the problems caused by synthetic materials and possible solutions to these problems. We also look at the importance of recycling materials is considered.

Reactivity

This unit looks at metals. Physical changes and gas pressure are reviewed, and then the reactivity series and a chemical method of preventing rusting are covered. Exothermic and endothermic reactions are introduced, followed by displacement reactions. The method of extraction of a metal is related to its position in the reactivity series. Calculation of percentage change is related to oxidation and thermal decomposition reactions

Physics

Forces and Motion

This unit starts by revising some aspects of forces and their effects, energy stores and transfers. It then looks at calculations of speed and relative speed, and representing journeys on distance–time graphs. The final topics look at simple machines (levers, ramps and pulleys).

Force Fields and Electromagnets

This unit starts by revising previous work on magnetic and gravitational fields, then introduces static electricity and the idea of an electric field. Work on current electricity is revised, and then extended to look at resistance calculations and at some uses of electromagnets.

Key Stage 4

Biology

CB1 – Key biological concepts

This unit introduces some of the central ideas in biology, including ideas about cells, microscopy, enzymes, nutrition, diffusion, osmosis and active transport.

CB2 – Cells and Control

This unit introduces how plants and animals develop from single cells the size of full stops to become complex organisms made of many different types of cells, which all need to be controlled and coordinated.

Chemistry

CC1/2 – States of matter/ Methods of separating and purifying substances

This unit introduces how materials can be separated from one another using their properties.

CC3/4 Atomic Structure/The Periodic table

These units introduce you to atoms, their structure and to the periodic table.

| | <p>Physics</p> <p>CP1 – Motion</p> <p>This unit introduces quantities that have directions (such as forces), how to calculate speed and acceleration, and how to represent changes in distance moved and speed on graphs.</p> <p>CP2 – Forces and Motion</p> <p>This unit introduces Isaac Newton's Laws of Motion and how these can help the government to work out what the speed limits should be on different roads.</p> | | |
|--|--|---|--|
| Year | Key Knowledge | Key Skills | Key Vocabulary |
| 10 | <p>GCSE Studies continue to include:</p> <p>Biology: DNA, inheritance, variation, natural selection, classification, health, immunity, photosynthesis and adaptation of plants.</p> <p>Chemistry: Bonding, acids and alkalis, solubility, quantitative chemistry, electrolytic processes and extraction of metals from their ores.</p> <p>Physics: Energy, energy efficiency and transfers, stored energies, energy resources, electromagnetic radiation, radioactive materials, work and power.</p> | <p>Development of scientific thinking, experimental skills and strategies, analysis and evaluation, vocabulary, units symbols and nomenclature.</p> | <p>Word lists with definitions are issued to students for each unit.</p> |
| | Link to knowledge organiser here | Link to homework here | Link to full Y10 vocabulary here |
| The content of your curriculum in this academic year for your subject | | | |

Biology

CB3 – Genetics

This unit introduces you to DNA code that produces our features and the processes that allow features to be passed on from parents to their offspring.

CB4 – Natural Selection and Genetic Modification

This unit introduces you to how organisms are changed genetically by natural selection and by humans.

CB5 - Health, Disease and the development of medicines

This unit will help you define health, learn about some pathogens and the diseases they cause, medicines and about the immune system

CB6 - Plant Structures and their Functions

This unit will help you learn about the process of photosynthesis and its importance, how plant structures are adapted to their functions and how water, mineral ions and sugar are transported through plants.

Chemistry

CC5/6/7 – Ionic Bonding, Covalent Bonding and Types of Substances

These units help us understand how bonds being formed and broken is essential in helping us explain even the simplest physical change or chemical reaction.

CC8 – Acids and Alkalis

This unit helps you explore the nature of acidic and alkaline solutions, and their most important reactions, properties and uses

CC9 – Calculations involving Masses

This unit will help you to use relative atomic masses to calculate relative formula masses of elements and compounds, calculate the concentration of a solution and work out empirical and molecular formulae of compounds.

CC10 – Electrolytic Processes, Obtaining and Using Metals, Reversible Reactions and Equilibria

This unit will help you will learn more about reactivity, oxidation and reduction, the advantages of recycling, about the Haber process and what happens during electrolysis

Physics

CP3 – Conservation of Energy

This unit introduces you to ways in which energy can be transferred and stored, how to reduce energy transfers, and the renewable and non-renewable resources we use in everyday life

CP4 – Waves

This unit introduces you to waves characteristics and how they transfer energy and information.

CP5 – Light and the EM Spectrum

This unit will help you learn about the electromagnetic spectrum, harmful effects of waves from this spectrum and that light is part of this family of waves which all have some properties in common.

CP6 – Radioactivity

This unit looks at the structure of atoms, types of radiation and their effect on atoms, and the dangers of radioactive substances and sources.

| | <p>CP7 & CP8 – Energy - Forces and Doing Work, Forces and their Effects</p> <p>This unit introduces you to the ways in which energy can be changed in a system, and how to calculate power and work done. CP8 covers objects affecting each other and vector diagrams.</p> | | |
|------|---|---|--|
| Year | Key Knowledge | Key Skills | Key Vocabulary |
| 11 | <p>GCSE Studies continue to include:</p> <p>Biology: Hormonal control mechanisms, diabetes, circulation and the heart, cellular respiration, ecosystems, feeding relationships, biodiversity and material cycles.</p> <p>Chemistry: Groups of the Periodic Table, rates of reaction, energy changes in reactions, fuels, the atmosphere and climate change.</p> <p>Physics: Electricity, circuits, resistance, Power, magnets and electromagnets, transformers, particle models, density, changes of state, gases, bending and stretching</p> | <p>Development of scientific thinking, experimental skills and strategies, analysis and evaluation, vocabulary, units symbols and nomenclature.</p> | <p>Word lists with definitions are issued to students for each unit.</p> |
| | <p>Link to knowledge organiser here</p> | <p>Link to homework/revision here</p> | <p>Link to full Y11 vocabulary here</p> |
| | <p>The content of your curriculum in this academic year for your subject</p> <p><u>Biology</u></p> <p>CB7 – Animal Coordination, Control and Homeostasis</p> | | |

This unit introduces you to hormones, metabolic rate, the menstrual cycle, blood glucose and diabetes

CB8 – Exchange and Transport in Animals

This unit introduces you to diffusion, different kinds of respiration, how the lungs are adapted to their functions, and calculating cardiac output

CB9 – ecosystems and Material Cycles

This unit introduces you to ecosystems, abiotic and biotic factors and communities, parasitism, biodiversity, and the water, carbon and nitrogen cycles.

Chemistry

CC13– Groups in the Periodic Table

This unit introduces you to alkalis, halogens, displacement reactions and noble gases.

CC14 - Rates of Reaction

This section introduces you to rates of reaction and catalysts

CC15 - Heat Energy Changes in Chemical Reactions

This section introduces you to exothermic and endothermic reactions and energy changes in reactions.

Physics

CP9 – Electricity and Circuits

This unit introduces you to electric circuits, current and potential difference, charge and energy, resistance, transferring energy, and power.

CP10/11 – Magnetism and the Motor Effect/ Electromagnetic Induction

CP10 introduces you to magnets and magnetic fields, electromagnetism and magnetic forces. CP11 covers transformers and energy

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| | <p>CP12/13 – Particle Model/ Forces and Matter</p> <p>CP12 introduces you to particles and density, energy and changes of state, energy calculations, and gas temperature and pressure. CP13 covers bending and stretching, and extension and energy transfers</p> |
| <p>How will my work be assessed? / assessment components / frequency / term</p> | |
| <p>Y9</p> | <p>Key Stage 3 Work Students will complete an end of topic test for each of the 6 units studied and at the start of term 4, they will carry out an end of Key stage examination. To provide a baseline assessment for KS4.</p> <p>Key Stage 4 Work Students to complete 6 end of topic tests, two Biology, two Chemistry and two Physics</p> |
| <p>Y10</p> | <p>Over the course of the year, there will be eleven end of unit tests to be carried out and an end of year examination. Throughout the course, there will be other opportunities to assess student work, particularly through scientific literacy and numeracy tasks.</p> |
| <p>Y11</p> | <p>Over the course of the year, there will be eight end of unit tests to be carried out and two Pre Public Examination sessions. In each session, students will take 3 papers which are 1 hour 10 minutes long, one for each of the three disciplines. Again, throughout the course, there will be other opportunities to assess student work, particularly through scientific literacy and numeracy tasks.</p> |
| <p>Extra-curriculum activities / Trips / Work experience / Community cohesion / Events participation</p> | |
| <p>This year we took part in Biology Week. We invited students from the local primary school and all classes had the opportunity to take part in lessons that would encourage an interest in Biology. As part of this week, students were selected from each Year group to visit Frampton Marsh and study the biological systems that can be found there.</p> <p>We have in previous years, taken a small number of students to compete in STEM activity days</p> | |
| <p>What would this subject enable me to do when I finish school? / Career Paths</p> | |
| <p>Science provides students with an excellent opportunity to develop their investigative skills, problem solving skills and to understand how science can be applied in the work place. There are many careers where a qualification in science will be useful and in some cases essential. These include the following: Medicine, Veterinary Science (including nursing), Dentistry, Nursing, Engineering, Research & Development, Architecture, Education many professions within the ICT world, amongst many others.</p> | |

How parents or other members of the public can find out more about the curriculum your subject is following

The Key Stage 4 National Curriculum can be found at the following website:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/381380/Science_KS4_PoS_7_November_2014.pdf

Edexcel (9-1) GCSE in Combined Science Specification:

https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/Specification/GCSE_CombinedScience_Spec.pdf

5 Year Scheme of Work (2.5 Years KS3 and 2.5 Years KS4) can be found at: <https://www.pearsonschoolsandfecolleges.co.uk/secondary/Science/11-16/Edexcel91GCSEScience2016/FreeResources/FreeResources.aspx>