Sandbach School Science Curriculum: Biology Combined

Intent

A - Level

To encourage students to question and develop themselves beyond simply being able to answer exam questions in the subject. The Biology course uses the principles in science to build student's wider subject knowledge and understanding thereby helping them create the appropriate links across the discipline to better articulate their understanding.

Y9-11

To make sure students learn subject content relevant to the qualifications phase exams and community life. To strengthen student confidence in applying their knowledge to exam questions and new situations and being sufficiently adept in transferring of those skills that adequately reflects their understanding of subject and topic content. The qualification phase science curriculum has been structured for the purpose of reinforcing and building upon vocabulary, concepts and visual models studied in the Transition phase.

Y7-8 Transition phase

Pupils will be taught to:

- Develop an awe and wonder of science
- Develop a confident recall of scientific knowledge and an ability to apply scientific concepts
- Develop the ability to question the credibility of reported science
- Develop confident and independent scientists through individual and collaborative work
- Allow students to have informed and ethical opinions about the big scientific questions facing society
- Develop a sense of responsibility for our planet and the knowledge to be able to best care for it
- The development of a curiosity for what else we can learn about the world through science
- Develop transferable and employability skills

Implementation

Y13

HT4 Nervous control Mutations
HT5 Gene technology Revision
HT6 A level examinations
HT3 Evolution Stimuli & response
HT2 Genetics Respiration /photosynthesis
HT1 Ecosytems & energy Homeostasis
HT6 Kidney & glucose Population Investigations
HT5 Species and taxonomy ecosystems
HT4 DNA & diversity Mass transport
HT3 Immunity Digestion
HT2 Cell division & transport Gas exchange
HT1 Cell structure & biological molecules

A Level Biology

Y12

HT4 B15 Genetics & evolution
GCSE Exams: May / June Paper 1 & 2 Combined Science
HT3 B14 Variation & evolution
Review 3: March: Full paper 2 exam in all subjects. Combined Science 1.15 mins.

Y11

HT2 B13 Reproduction Mock exams
HT1 B16-18 Ecology recap (catch up for 1 year only)
HT6 B16-18 Ecology
HT5 RP Recap from Y9
HT4 B10-12 Homeostasis
HT3 B10-12 Homeostasis
HT2 B10-12 Homeostasis
Review 2: Dec / Jan Mock exam – All subjects to complete a paper 1 Combined 1:15 mins, Triple 1:45
Review 1:Nov Y11 B16-B18 Ecology. Recap from previous units.
Review 3:Deadline June Y10 Combined B8-12. Triple B8-12 Also to include some questions from various Y9-10 RPs.
Review 2:Deadline March Y10 Combined B8-11. Triple B8-12

Y10

HT4 B5-7 Disease
HT5 B5-7 Disease
HT6 B8 & 9 Bioenergetics
HT1 B8 & 9 Recap Bioenergetics B1 Transport
HT3 B3 & 4 Organisation
HT2 B3 & 4 Organisation
HT1 B1 Cell structure(excluding transport B2 Cell Division
Review 2: Deadline March Y9 Combined B3&4 Organisation. Triple: B3&4 extra Biology content to be assessed Eg Antibiotics required practical (from B1) + content from B1&2
Review 3: Deadline June Y9 Combined. B5-7 Disease Triple: B5&7 extra Biology content Eg plant defences
Review 1:Nov Y10 Combined: B1 Transport & recap from previous units. Triple: Also to be assessed on part of the B10-12 homeostasis topic.

Y9

HT6 Chemistry & Physics units
HT5 9A genetics & evolution
HT4 8D unicellular organisms
HT3 8C breathing & respiration
Review 1: Combined & Triple Nov Y9 Cell structure and function. Including microscopes and magnification
Y8 Review 3: SATs-style past paper questions. All 3 Science and HSW
Y8 Review 2: SATs-style past paper questions. All 3 Science and HSW

Y8

HT5 Chemistry & Physics units
HT6 8A food & nutrition
HT1 (Blended Project inc introduction to respiration)
HT2 8B plant reproduction
Y7 Review 3: SATs-style past paper questions. All 3 Science and HSW
Y8 Review 1: SATs-style past paper questions. All 3 Science and HSW

Y7

HT4 7D Ecosystems
HT3 7C Muscles & Bones
HT2 7B Reproduction
HT1 **Our School** (Blended Project inc energy) 7A Cells and Organisms
Y7 Review 2: SATs-style past paper questions. All 3 Science and HSW
Y7 Review 1 – based on teacher assessment from end of module tests

Key Stage 2 Curriculum

Asking questions
Making predictions
Setting up tests
Observing & Measuring
Recording data
Interpreting & communicating results
Evaluating

Impact

By the end of Y13, students will:

Develop essential knowledge and understanding of different areas of Biology.

Develop their interest in and enthusiasm for Biology, including developing an interest in further study and careers.

Develop competence and confidence in a variety of practical, mathematical and problem solving skills
Understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society.

By the end of Y11, :

Students should have a basic understanding of the following biological principles and be able to apply them:

- The structure and functioning of cells and how they divide by mitosis and meiosis from sections Cell biology and Meiosis.
- That variation occurs when gametes fuse at fertilisation from section Sexual and asexual reproduction.
- The two essential reactions for life on Earth: photosynthesis and respiration from sections Photosynthetic reaction and Aerobic and anaerobic respiration.
- Metabolism is the sum of all the reactions happening in a cell or organism, in which molecules are made or broken down from section Metabolism.
- All molecules are recycled between the living world and the environment to sustain life from section How materials are cycled. Students should be able to recall and use this knowledge in questions that link different areas of the specification to develop coherent arguments and explanations.

By the end of transition phase, students will know how to :

Understand that scientific methods and theories develop as earlier explanations are modified to take account of new ideas.
Evaluate risks
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 variable
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
Evaluate methods and suggest possible improvements
Apply mathematical concepts and calculate results
Present observations and data using appropriate methods,
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
Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature

Sandbach School Science Curriculum: Chemistry Combined

Intent

A - Level

We aim to create the very best scientists and have students appreciate that chemistry is fundamental to our world and touches almost every aspect of our existence. We challenge students to think, act and speak like those working in a scientific field would. We do this by using effective questioning techniques in each lesson to push our students to think beyond their first response. Students are expected to carry out practical work in each topic, where it is appropriate, in a responsible manner and record data effectively in order to be able to analyse it and draw conclusions from it.
During practical work, students are expected to select the most appropriate apparatus and justify the choices that they make, thus demonstrating that they are thinking through a problem rather than simply following instructions.
Students are expected to consider their own and others' safety and independently carry out risk assessments.

Y9-11

To make sure students learn subject content relevant to the qualifications phase exams and community life. To strengthen student confidence in applying their knowledge to exam questions and new situations and being sufficiently adept in transferring of those skills that adequately reflects their understanding of subject and topic content. The qualification phase science curriculum has been structured for the purpose of reinforcing and building upon vocabulary, concepts and visual models studied in the Transition phase Science Curriculum.

Y7-8 Transition phase

Pupils will be taught to:

- Develop an awe and wonder of science
- Develop a confident recall of scientific knowledge and an ability to apply scientific concepts
- Develop the ability to question the credibility of reported science
- Develop confident and independent scientists through individual and collaborative work
- Allow students to have informed and ethical opinions about the big scientific questions facing society
- Develop a sense of responsibility for our planet and the knowledge to be able to best care for it
- The development of a curiosity for what else we can learn about the world through science
- Develop transferable and employability skills

Implementation

Y13

- **HT5** 3.3.15 -3.3.16 NMR, chromatography 3.1.12 Acids and bases
- **A Level Chemistry Exam**
- **HT4** 3.3.11 – 3.3.14 Amines, polymers, biochemistry, organic synthesis
- **HT3** 3.1.10 – 3.1.11 Equilibrium constant, electrode potentials
- **HT2** 3.3.8 – 3.3.10 Aldehydes, ketones, carboxylic acid, aromatic chemistry
- **HT1** 3.2.4 period 3 3.1.9 rate equations 3.3.7 optical isomerism
- **HT6** 3.2.5 – 3.2.6 Transition metals and their reactions
- **HT5** 3.1.6 – 3.1.8 Equilibria, redox, Thermodynamics
- **HT4** 3.2.2 – 3.2.3 Group 2, group 7 3.3.6 organic analysis
- **HT3** 3.1.4 – 3.1.5 Energetics and kinetics 3.3.4 – 3.3.5 Alcohols Alkenes,
- **HT2** 3.3.1 – 3.3.3 Introduction to organic chemistry, Alkanes, Halogenoalkanes, 3.2.1 Periodicity

A Level Chemistry

Y12

- **HT3** C9 Crude oil
- **HT4** C14 Earths resources
- **GCSE Exams: May / June Paper 1 & 2 Combined Science**
- **HT1** 3.1.1 – 3.1.3 atomic structure, amount of substance, bonding

Review 3: March: Full paper 2 exam in all subjects. Combined Science 1.15 mins.

Y11

- **HT2** C6 Electrolysis
- **HT1** C4 Chemical calculations
- **HT6** C14 Earths resources
- **HT5** C9 Crude oil / start C14 Earths resources
- **HT4** C9 Crude oil
- **HT3** C8 Rates of reaction.
- **HT2** C4 Chemical calcs F only, C7 Energy changes
- **HT1** C13 Our atmosphere, C12 Chemical analysis

Review 2: Dec / Jan Mock exam – All subjects to complete a paper 1 Combined 1:15 mins

Review 1:Nov Y11 C4 Chemical calculations & other topics from paper 1

Review 3:Deadline June Y10 Combined C12, 13, C4, C7 & 8 Triple Also C10 organic chem.

Review 2:Deadline March Y10 Combined C4 F only, C7. Triple Also C8 Rates of reaction.

Review 1:Nov Y10 C13 Atmosphere & recap from previous units from Y9.

Y10

- **HT4** C5 Chemical changes
- **HT5** C13 Our atmosphere
- **HT6** C12 Chemical analysis
- **HT3** C3 Structure & bonding

Review 2: Deadline March Y9 Combined C2 Periodic table. Triple: C3 structure & bonding extra Chemistry content to be assessed

Review 3: Deadline June Y9 Combined. C13 Our atmosphere Triple: Also C7 content

Y9

- **HT2** C2 Periodic table
- **HT1** C1 Atomic structure
- **HT6** 9E Making materials
- **HT5** 8H rocks
- **HT4** Biology & Physics topics
- **HT3** 8G metals

Review 1: Combined & Triple Nov Y9 Atomic structure only. No extra triple content in exam.

Y8 Review 3: SATs-style past paper questions. All 3 Science and HSW

Y8 Review 2: SATs-style past paper questions. All 3 Science and HSW

Y8 Review 1: SATs-style past paper questions. All 3 Science and HSW

Y8

- **HT5** 7H Atoms, element & compounds
- **HT6** Biology & Physics topics
- **HT1** Blended Project inc respiration 8E Combustion
- **HT2** 8F Periodic table
- **HT4** Biology & Physics topics

Y7 Review 3: SATs-style past paper questions. All 3 Science and HSW

Y7 Review 2: SATs-style past paper questions. All 3 Science and HSW

Y7 Review 1 – based on teacher assessment from end of module tests

Y7

- **HT3** 7G Particle model
- **HT2** 7E Mixtures & Separation 7F Acids & Alkalis
- **HT1** **Our School** (Blended Project inc particles)

Key Stage 2 Curriculum

Asking questions
Making predictions
Setting up tests
Observing & Measuring
Recording data
Interpreting & communicating results
Evaluating

Impact

By the end of Y13, students will know how to:

- Use experimental data to make calculations to monitor progress of reactions.
- Calculate pH of acids, bases and buffers
- Make predictions about the feasibility of reactions from experimental and data book values.
- Describe and explain the properties and reactions of transition metals
- Explain periodic trends across the periodic table.
- Plan an multi-step organic synthesis of a target product through a series of reactions.
- Use a range of analytical techniques to elucidate structure of organic compounds.

By the end of Y11, students will know:

The complex and diverse phenomena of the natural world can be described in terms of a small number of key ideas in chemistry. These key ideas are of universal application. They underpin many aspects of the science assessments
Key ideas in chemistry:
• matter is composed of tiny particles called atoms and there are about 100 different naturally occurring types of atoms called elements
• elements show periodic relationships in their chemical and physical properties
• these periodic properties can be explained in terms of the atomic structure of the elements
• atoms bond by either transferring electrons from one atom to another or by sharing electrons • the shapes of molecules and the way giant structures are arranged is of great importance in terms of the way they behave
• there are barriers to reaction so reactions occur at different rates
• chemical reactions take place in only three different ways: • proton transfer
• electron transfer
• electron sharing
• energy is conserved in chemical reactions

By the end of transition phase, students will know how to :

Understand that scientific methods and theories develop as earlier explanations are modified to take account of new ideas.
Evaluate risks
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 variable
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
Evaluate methods and suggest possible improvements
Apply mathematical concepts and calculate results
Present observations and data using appropriate methods, 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
Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature

Sandbach School Science Curriculum: Physics Combined

Intent

A - Level

The curriculum intent of the Physics course is to inspire students to develop an interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with Physics. The course will prepare students to progress into further education, to follow courses in physics, engineering, one of the other sciences or related subjects, or to enter employment where a knowledge of physics would be useful. It will encourage learners to:

- develop essential knowledge and understanding of different areas of the subject and how they relate to each other
- develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods
- develop competence and confidence in a variety of practical, mathematical and problem solving skills
- develop their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject
- understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society

Y9-11:

To make sure students learn subject content relevant to the qualifications phase and community life. To strengthen student confidence in applying their knowledge to exam questions and new situations and being sufficiently adept in transferring of those skills that adequately reflects their understanding of subject and topic content. The qualification phase Science curriculum has been structured for the purpose of reinforcing and building upon vocabulary, concepts and visual models studied in the Transition phase Science Curriculum.

Y7-8 Transition phase

Pupils will be taught to:
Develop an awe and wonder of science
Develop a confident recall of scientific knowledge and an ability to apply scientific concepts
Develop the ability to question the credibility of reported science
Develop confident and independent scientists through individual and collaborative work
Allow students to have informed and ethical opinions about the big scientific questions facing society
Develop a sense of responsibility for our planet and the knowledge to be able to best care for it
The development of a curiosity for what else we can learn about the world through science
Develop transferable and employability skills

Implementation

Y13

HT4 Nuclear Physics
HT5 Astrophysics
HT6 Revision
A Level Physics Exam

HT3 9.Capacitors 10. Magnetic fields
HT2 8.Gravitational and electric fields
HT1 Further mechanics contd

HT6 7. Further Mechanics
HT5 Electricity contd
HT4 6. Electricity
HT3 4.Mechanics 5. Materials
HT2 3. Waves
HT1 1. Particles and radiation 2. 2. EM radiation

A Level Physics

Y12

HT3 Recap of paper 1 topics
HT4 Recap of paper 2 topics
GCSE Exams: May / June Paper 1 & 2 Combined Science

Review 3: March: Full paper 2 exam in all subjects. Combined Science 1.15 mins.

HT2 P15 Electro magnetism
HT1 P13 EM Waves

HT6 P12 Wave properties
HT5 P10 Forces and motion
HT 4 P9 Motion
HT3 P8 Forces in balance
HT2 P7 Radioactivity
HT1 P6 Molecules + matter

Review 2: Dec / Jan Mock exam – All subjects to complete a paper 1 Combined 1:15 mins, Triple 1:45

Review 1:Nov Y11 P13 EM Waves & earlier units.

Review 3:Deadline June Y10 Combined B5-7, 9-10 & 12. Triple Also questions from P13 & 15.

Review 2:Deadline March Y10 Combined P5- P7 . Triple also P9

Review 1:Nov Y10 Combined: P5 Electricity, P6 Molecules + Earlier work. Triple:

Y11

HT4 P4 Electric circuits.
HT5 P5 Electricity in the home
HT6 P6 Molecules & matter

Review 3: Deadline June Y9 Combined. P1-5. TRIPLE –same topics but extra content.

Review 2: Deadline March Y9 Combined P1, 2 & 3. TRIPLE same (due to rotations in HT 1 & 2).

HT3 P3 Energy resources
HT2 P2 energy transfer by heating
HT1 P1 Conservation & dissipation of energy.

HT6 9I Forces & motion
HT5 8L Earth & Space
HT4 8K energy transfer
HT3 Biology & Chemistry topics

Review 1: Combined & Triple Nov Y9 P1 Conservation & dissipation of energy.

Y8 Review 3: SATs-style past paper questions. All 3 Science and HSW

Y8 Review 2: SATs-style past paper questions. All 3 Science and HSW

Y9

Y7 Review 3: SATs-style past paper questions. All 3 Science and HSW

HT5 7L sound & light
HT6 7I recap

HT1 (Blended Project inc respiration)
HT2 8I Fluids

Y8 Review 1: SATs-style past paper questions. All 3 Science and HSW

Y7 Review 2: SATs-style past paper questions. All 3 Science and HSW

HT4 7K Forces

Y7 Review 1 – based on teacher assessment from end of module tests

HT3 7J Current electricity
HT2 Chemistry & Biology topics
HT1 Our School (Blended Project inc Energy

Y8

Key Stage 2 Curriculum

Asking questions
Making predictions
Setting up tests
Observing & Measuring
Recording data
Interpreting & communicating results
Evaluating

Y7

Impact

By the end of Y13, students will know how to:

- **Apply analytical skills to range of different Physical problems**
- **Be confident in establishing the link between pure mathematics and physics problem solving**
- **Be able to use a range of practical skills to achieve an experimental outcome for a given hypothesis**

By the end of Y11, students will know: The complex and diverse phenomena of the natural and man-made world can be described in terms of a small number of key ideas in physics. These key ideas are of universal application, and we have embedded them throughout the subject content. They underpin many aspects of the science assessment and will therefore be assessed across all papers.

Key ideas in physics:

- the use of models, as in the particle model of matter or the wave models of light and of sound
- the concept of cause and effect in explaining such links as those between force and acceleration, or between changes in atomic nuclei and radioactive emissions
- the phenomena of 'action at a distance' and the related concept of the field as the key to analysing electrical, magnetic and gravitational effects
- that differences between pressures or temperatures or electrical potentials, are the drivers of change
- that proportionality, for example between weight and mass of an object or between force and extension in a spring, is an important aspect of many models in science
- that physical laws and models are expressed in mathematical form.

By the end of transition phase, students will know how to :

Understand that scientific methods and theories develop as earlier explanations are modified to take account of new ideas.
Evaluate risks
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 variable
Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety
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Present observations and data using appropriate methods,
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
Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature