

SCIENCE

Department Aims

To provide via well designed studies of experimental and practical science a worthwhile educational experience for all students.

To enable students acquire sufficient understanding and knowledge of scientific concepts in all key stages.

Department Ethos

Our vision is to provide an environment where students can enjoy learning to their full potential.

Department Staff

Mrs P Ike - Head of Department

Mr E Inett- 2i/c Science

Mrs T Reid - Head of Year 7 and Science teacher

Mrs L Harris - Head of Sixth Form and Science teacher

Ms R Dean - Science Teacher

Mrs F Mua - Science Teacher

Mr D McCarthy - Science Teacher

Mr S Tormey- Science Teacher

Mrs F Mua - Science Teacher

Dr S Milne- Psychology

Science Technicians

Mrs M Fisher - Science Technician

Mrs B Wright - Science Technician

Key Stage 3 Information

The department follows the AQA KS3 science syllabus approach to teaching the KS3 programme of study. Information can be found at:

<https://filestore.aqa.org.uk/resources/science/specifications/AQA-SCIENCE-KS3-SYLLABUS.PDF>

The syllabus organises the big ideas and topics of the programme of study into clear objectives. It outlines what the students need to know, what they must be able to apply and how to extend that knowledge where appropriate. The KS3 Content is under 10 big idea headings: Forces, Electromagnetism, Energy, Waves, Matter, Reactions, Earth, Organisms, Ecosystems and Genes. Each idea contains four smaller topics: the building blocks for the big ideas

KS3 curriculum content is covered over two years in Years 7 and 8. Students start their GCSE course in year 9.

Big idea	Taught in Year 7		Taught in Year 8	
Forces	Speed	Gravity	Contact forces	Pressure
Electromagnets	Voltage and resistance	Current	Electromagnets	Magnetism
Energy	Energy costs	Energy transfer	Work	Heating and cooling
Waves	Sound	Light	Wave effects	Wave properties
Matter	Particle model	Separating mixtures	Periodic table	Elements

Reactions	Metals and non-metals	Acids and Alkali	Chemical energy	Types of reaction
Earth	Earth structure	Universe	Climate	Earth's Resources
Organisms	Movement	Cells	Breathing	Digestion
ecosystem	Interdependence	Plant reproduction	Respiration	photosynthesis
Genes	Variation	Human reproduction	Evolution	Inheritance

Year 7 and 8 Assessment

Students are assessed formatively throughout the course including:

- Peer and self-assessments
- Verbal feedback
- Extended writing tasks
- End of topic tests
- End of year Examination.

The results of these assessments are used to monitor student progress and to place students in teaching groups based on ability.

In year 8 students take the end of KS3 exam. The result of this exam and other assessments throughout the year is used to place students into their GCSE sets

Key Stage 4 Science

The department follows the AQA science qualifications.

Students can either complete

- Separate Science GCSE in Physics, Chemistry and Biology (3 GCSE qualifications)
or
- Combined Science Trilogy GCSE (2 GCSE qualifications).

The Separate Science qualification (Physics, Chemistry and Biology)

7.1 Separate Sciences Biology

This qualification is linear. Linear means that students will sit all their exams at the end of the course.

Subject content and Biology Syllabus Pages

1. Cell biology (Page 16)
2. Organisation (Page 24)
3. Infection and response (Page 31)
4. Bioenergetics (Page 37)
5. Homeostasis and response (Page 41)
6. Inheritance, variation and evolution (Page 51)
7. Ecology (Page 66)
8. Key ideas (Page 76)

Assessments

Paper 1

What's assessed

Topics 1–4: Cell biology; Organisation; Infection and response; Bioenergetics.

How it's assessed

- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

Paper 2

What's assessed

Topics 5–7: Homeostasis and response; Inheritance; Variation and evolution; Ecology.

How it's assessed

- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

7.2 Separate sciences Chemistry

<https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF>

This qualification is linear. Linear means that students will sit all their exams at the end of the course.

Subject content

- 1 Atomic structure and the periodic table (page 16)
- 2 Bonding, structure, and the properties of matter (page 24)
- 3 Quantitative chemistry (page 33)
- 4 Chemical changes (page 40)
- 5 Energy changes (page 47)
- 6 The rate and extent of chemical change (page 50)
- 7 Organic chemistry (page 56)
- 8 Chemical analysis (page 65)
- 9 Chemistry of the atmosphere (page 70)
- 10 Using resources (page 74)
- 11 Key ideas (page 83)

Assessments

Paper 1:

What's assessed

Topics 1–5: Atomic structure and the periodic table; Bonding, structure, and the properties of matter; Quantitative chemistry, Chemical changes; Energy changes.

How it's assessed

- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

Paper 2:

What's assessed

Topics 6–10: The rate and extent of chemical change; Organic chemistry; Chemical analysis, Chemistry of the atmosphere; Using resources.

How it's assessed

- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

7.3. Separate sciences Physics

<https://filestore.aqa.org.uk/resources/physics/specifications/AQA-8463-SP-2016.PDF>

This qualification is linear. Linear means that students will sit all their exams at the end of the course.

2.1 Subject content

- 1 Energy (page 16)
- 2 Electricity (page 22)
- 3 Particle model of matter (page 32)
- 4 Atomic structure (page 36)
- 5 Forces (page 43)
- 6 Waves (page 58)
- 7 Magnetism and electromagnetism (page 66)
- 8 Space physics (physics only) (page 71)
- 9 Key ideas (page 74)

Assessments

Paper 1:

What's assessed

Topics 1–4: Energy; Electricity; Particle model of matter; Atomic structure.

How it's assessed

- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

Paper 2:

What's assessed

Topics 5–8: Forces; Waves; Magnetism and electromagnetism; Space physics.

Questions in Paper 2 may draw on an understanding of energy changes and transfers due to heating, mechanical and electrical work and the concept of energy conservation from Energy and Electricity.

How it's assessed

- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

The Combined Trilogy Science Qualification (2 GCSE)

<https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF>

This qualification is linear. Linear means that students will sit all their exams at the end of the course.

Subject content and specification pages

8.1 Biology (Combined Science)

- 1 Cell biology (page 19)
- 2 Organisation (page 26)
- 3 Infection and response (page 33)
- 4 Bioenergetics (page 37)
- 5 Homeostasis and response (page 41)
- 6 Inheritance, variation and evolution (page 47)
- 7 Ecology (page 57)
- 8 Key ideas (page 63)

8.2 Chemistry (Combined Science)

- 9 Atomic structure and the periodic table (page 65)
- 10 Bonding, structure, and the properties of matter (page 73)
- 11 Quantitative chemistry (page 81)
- 12 Chemical changes (page 86)
- 13 Energy changes (page 92)
- 14 The rate and extent of chemical change (page 94)
- 15 Organic chemistry (page 100)
- 16 Chemical analysis (page 103)
- 17 Chemistry of the atmosphere (page 106)
- 18 Using resources (page 110)
- 19 Key ideas (page 114)

8.3 Physics (Combined Science)

- 20 Energy (page 116)
- 21 Electricity (page 122)
- 22 Particle model of matter (page 130)
- 23 Atomic structure (page 133)
- 24 Forces (page 138)
- 25 Waves (page 149)
- 26 Magnetism and electromagnetism (page 153)
- 27 Key ideas (page 156)

Assessments

There are six papers: two biology, two chemistry and two physics. Each of the papers will assess

Knowledge and understanding from distinct topic areas.

How it's assessed

Each paper is assessed through

- Written exam: 1 hour 15 minutes
- Foundation and Higher Tier
- 70 marks
- 16.7% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

Working Scientifically

In addition to the key concepts, students have the opportunity to carry out practical tasks throughout the course. There are set required practical which students must complete throughout the course.

Assessment of practical skills

Details of the assessment of required practical can be found in Practical assessment. Working scientifically and use of apparatus and techniques skills will be assessed across all papers.

Key Stage 5 Information

The department offers the following A level Qualifications

- A level Biology (Edexcel)
- Applied General science certificate(AQA)
- A level Psychology (AQA)
- A level Chemistry(OCR)
- A level Physics(AQA)

A level Biology

The department follows the context led approach of the Edexcel A level Biology course.

Details of the specification can be found at:

<https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/biology-a-2015.html>

This approach begins with the consideration of an application that draws on many different areas of biology, and then moves on to the biological concepts underlying this application. The design of this approach is based on the Salters-Nuffield Advanced Biology Project. AS Biology is a stand-alone qualification from September 2015, it will no longer form part of students' A level grades. As such, students could choose to take AS and A level exams to receive grades for both qualifications, and just A level papers at the end of Year 13 to gain an A level grade. The qualification structure is the same for all AS and A level Sciences, regardless of exam board. To achieve an AS Qualification students need to take

As course content

Topic 1: Lifestyle, health and risks

Topic 2: Genes and health

Topic 3: Voice of the genome

Topic 4: Biodiversity and Natural resources.

AS Assessment

Paper 1: Lifestyle, Transport, Genes and Health

*Paper code: 8BN0/01

- Externally assessed
 - Availability: May/June
- 50% of the total qualification

Overview of content

This paper will examine the following topics:

- Topic 1: Lifestyle, Health and Risk
- Topic 2: Genes and Health.

Paper 2: Development, Plants and the Environment

*Paper code: 8BN0/02

- Externally assessed
 - Availability: May/June
- 50% of the total qualification

A2 course content

Topic 5: On the wild side

Topic 6: infection, immunity and forensics

Topic 7: Run for your life

Topic 8: Grey Matter

A2 / A level Assessment

1. Practical Endorsement

From September 2015, AS and A level Biology will be 100% externally assessed; this means there are no coursework elements in the new courses.

Instead, students will be required to complete a number of core practicals throughout the courses that cover specific skills and techniques.

Students' investigative skills and knowledge and understanding of core practicals will be tested in exam papers and will contribute to their final grades.

In addition, students' skills and technical competency when completing practical work will be assessed by teachers.

This will form the basis for the award of a Practical Endorsement at A level. This is separate to the A level grade and, if awarded, will be reported as a 'Pass' on A level certificates for students who achieve it.

2. Assessment

AS paper 1+AS paper 2=AS grade.

Note: AS exam papers will include questions on some of the core practicals in the AS specification.

To achieve A level Grade students will need to take

A Level Paper 1+ A level paper 2+ A level paper 3

Note: A level exam papers will include questions on some of the core practicals in the specification.

All content in the AS specification is included in the A level specification.

Level 3 certificate in Applied Science and Level 3 Extended certificate in Applied Science

<https://www.aqa.org.uk/subjects/science/applied-general/science>

This qualification is aimed at 16 to 18 year old learners who are in full-time Level 3 education and who wish to progress to higher education and/or pursue a career in the applied science sector. There are no formal entry requirements for this qualification, but to optimise their chances of success, learners will typically have four GCSEs at grade C or above, including science, maths and English.

Course content -L3 Certificate in Applied general Science (Yr 12)

The following units:

- Unit 1 Key concepts in science
- Unit 2 Applied experimental techniques
- Unit3 Science in the modern world

Course content -Extended certificate in Applied general Science (Yr 13)

Made up of five mandatory units, plus one optional unit from a choice of three.

Mandatory Units

- 1 Key concepts in science
- 2 Applied experimental
- 3 Science in the modern world
- 4 The human body
- 5 Investigating science Portfolio

Optional

- 6a Microbiology
- 6b Medical physics
- 6c Organic chemistry

Assessment

Mandatory

- 1 Key concepts in science- Written exam
- 2 Applied experimental techniques-Portfolio
- 3 Science in the modern world- Written exam with pre-release material
- 4 The human body written exam
- 5 Investigating science Portfolio

Optional Units

- 6a Microbiology Portfolio
- 6b Medical physics Portfolio

A level Chemistry (OCR)

<https://ocr.org.uk/qualifications/as-a-level-gce/chemistry-a-h032-h432-from-2015/specification-at-a-glance/>

As Level

Content is in four modules:

Content overview

The four modules are each divided into key topics:

Module 1: Development of practical skills in chemistry

Practical skills assessed in a written examination

Module 2: Foundations in chemistry

Atoms, compounds, molecules and equations

Amount of substance

Acid–base and redox reactions

Electrons, bonding and structure

Module 3: Periodic table and energy

The periodic table and periodicity

Group 2 and the halogens

Qualitative analysis

Enthalpy changes

Reaction rates and equilibrium (qualitative)

Module 4: Core organic chemistry

Basic concepts

Hydrocarbons

Alcohols and haloalkanes

Organic synthesis

Analytical techniques (IR and MS)

Practical activities are embedded throughout the course to encourage practical activities in the laboratory, enhancing students' understanding of chemical theory and practical skills.

Assessment

Breadth in chemistry (01)

1 hour 30 mins 50% Assesses content from all four modules

Depth in chemistry (02)

1 hour 30 mins 50% Assesses content from all four modules

Both components include synoptic assessment. Students must complete both components to be awarded the OCR AS Level in Chemistry A.

A2/A level Chemistry

Content is in six modules:

Module 1 – Development of practical skills in chemistry

Module 2 – Foundations in chemistry

Module 3 – Periodic table and energy

Module 4 – Core organic chemistry

Module 5 – Physical chemistry and transition elements

Module 6 – Organic chemistry and analysis

Assessment

Periodic table, elements and physical chemistry (01)

2 hour 15 mins, 37% Assesses content from modules 1, 2, 3 and 5

Synthesis and analytical techniques (02)

2 hour 15 mins 37% Assesses content from modules 1, 2, 4 and 6

Unified chemistry (03)

1 hour 30 minute 26% Assesses content from all modules (1 to 6)

Practical endorsement in chemistry (04) Non-exam assessment

All components include synoptic assessment.

Students must complete all components (01, 02, 03, and 04) to be awarded the OCR A Level in Chemistry A.

A level Physics (AQA)

<https://filestore.aqa.org.uk/resources/physics/specifications/AQA-7407-7408-SP-2015.PDF>

These qualifications are linear. Linear means that students will sit all the AS exams at the end of their AS course and all the A-level exams at the end of their A-level course.

2.1 Subject content

Core content

1 Measurements and their errors (page 10)

2 Particles and radiation (page 12)

3 Waves (page 17)

4 Mechanics and materials (page 21)

5 Electricity (page 27)

6 Further mechanics and thermal physics (A-level only) (page 30)

7 Fields and their consequences (A-level only) (page 34)

8 Nuclear physics (A-level only) (page 41) Options

9 Astrophysics (A-level only) (page 45)

10 Medical physics (A-level only) (page 49)

11 Engineering physics (A-level only) (page 54)

12 Turning points in physics (A-level only) (page 58)

13 Electronics (A-level only) (page 62)

AS Assessments

Paper 1

What's assessed?

Sections 1–5

How is it assessed

- Written exam: 1 hour 30 minutes
- 70 marks
- 50% of AS

Questions

70 marks of short and long answer questions split by topic.

Paper 2

What's assessed

Sections 1–5

How is it assessed

- Written exam: 1 hour 30 minutes
- 70 marks
- 50% of AS

Questions

Section A: 20 marks of short and long answer questions on practical skills and data analysis

Section B: 20 marks of short and long answer questions from across all areas of AS content

Section C: 30 multiple choice questions

A Level Psychology

Overview

Psychology A Level includes the study of the human brain and behaviour. We explore different approaches to understanding and explaining human behaviour. We look at the structure of the brain, how it can be studied and how changes to our brains influence our behaviour. We explore psychology as a science and how psychological research is conducted and interpreted as well as issues, debates and ethical issues within psychology. The main topics we cover include memory, social influence, psychopathology and mental health, infant attachment and its role in subsequent behaviour, forensic psychology and relationships.

Exam board details - AQA

Assessment

EXAM	TIMING	EXAM DETAILS
Paper 1 Introductory topics in psychology	2 HOURS	96 marks 33% OF TOTAL A LEVEL MARK 1. Social influence (24 marks) 2. Memory (24 marks) 3. Attachment (24 marks) 4. Psychopathology (24 marks)
Paper 2 Psychology in context	2 HOURS	96 marks 33% OF TOTAL A LEVEL MARK 5. Approaches in psychology (24 marks) 6. Biopsychology (24 marks) 7. Research methods (48 marks)
Paper 3 Issues and options in	2 HOURS	96 marks 33% OF TOTAL A LEVEL MARK 8. Issues and debates in psychology (24 marks)

Psychology		9. Relationships (24 marks) 10. Schizophrenia (24 marks) 11. Forensic Psychology (24 marks)
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