

Bolton

AQA Update 2024

Science Curriculum team

26/06/2024

Climate change and sustainability teaching guide



Climate Change and Sustainability in GCSE Science



Contents

Introduction	3
How to use this resource	4
Specification map	5
If you're teaching biology	6
If you're teaching chemistry	13
If you're teaching physics	20
Appendix 1: Cross reference of specification points for separate sciences and Synergy combined science	23
Appendix 2: Climate Change content in AQA GCSE Trilogy: Combined Science identified by the Royal Meteorological Society (RMetS)	26



Layout

Specification point

Linked specification point

Big question

Suggested activity

Third-party resources to help generate ideas:

Articles

Research

Data

Student worksheets

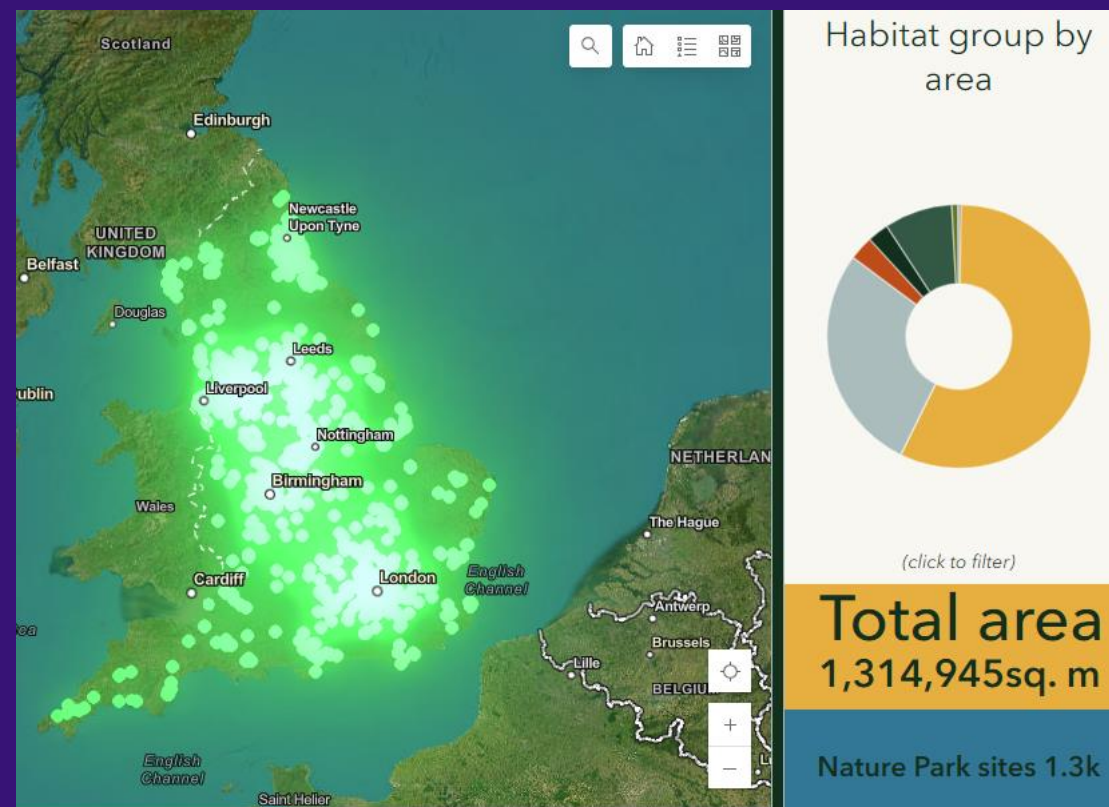
5.9.3 Common atmospheric pollutants and their sources	4.7.1.2 Abiotic factors 4.7.3.2 Waste management	How can poor waste management result in atmospheric pollutants?	In communities without waste management systems, waste is often burned. Discuss the health issues and proposed solutions. Also see activity in 4.7.3.2 Waste management above.	Teacher resources: Give context to air pollution, materials and nanochemistry Ideas RSC Education MetLink - Royal Meteorological Society Particulate Matter, ice, albedo and melting - Teacher's Notes Wood burners and air pollution Clean Air Hub Open waste burning prevention Climate & Clean Air Coalition (ccacoalition.org)
5.10.1.1 Using the Earth's resources and sustainable development (i.e. development that meets the needs of current generations without compromising the ability of future generations to meet their own needs).	4.7.3.3 Land use 4.7.3.6 Maintaining biodiversity	Can mining be sustainable?	In the context of a mobile phone or a battery, discuss the minerals required. Research and discuss the strategies that are being developed to make them more sustainable. Also see 4.7.3.6 Maintaining biodiversity above.	Teacher resources: Your mobile phone is powered by precious metals and minerals Natural History Museum (nhm.ac.uk) What Minerals Are In My Phone And Are They Sustainable? giffgaff Your place or mine? The local business of lithium mining Feature RSC Education Alternative student resource: Reciprocal reading task: agriculture and ammonia (rsc.org)

Next steps

Look out for new subject guides in September

Share any projects you are currently running in your schools so we could showcase some case studies

Sign up to the [National Education Nature Park](#) to engage students on your school site



AI and its impact

AQA's response to the DfE's call for evidence

“

Artificial Intelligence (AI) has the power to transform education for the better – by cutting teacher workload and improving marking reliability. But AI tools can generate wrong or misleading information, which are known as hallucinations, and therefore need close human supervision to be effective.

”



“

AQA researchers trialled AI tools including ChatGPT, GPT4, LLaMA and Alpaca on a range of publicly available science papers.

We found that, with appropriate regulation and human involvement, AI could be used to automate simple marking processes. This in turn could be used to help teachers plan their lessons for students.

”



To date, we have tested AI's potential use in marking through a specific research project. This used historic questions and we measured AI marks against senior examiner marks.

This summer, we will build on this by repeating the exercise using the live data from the summer series. However, this will be purely for research purposes - we will not use the results for awarding in any way.

The ultimate aim of this work is to develop AI which can successfully 'mark the marker', ie quality assure human marking.



AI and exam marking: difficult question of trust and accountability



In the long run, AI could help teachers by:

- helping teachers create tasks and assessments for students
- assisting students with their own research
- giving students automated feedback
- supporting awarding organisations to create digital assessment.

AQAi blog <https://www.aqa.org.uk/about-us/our-research/blog/ai-and-exam-marking-exploring-the-difficult-questions-of-trust-and-accountability>

AQAi blog: [AQA | AQA Assessment Research and Innovation | Research blog | AI and reviews of marking – how is the future looking?](#)

Customer support offer

AQA Support offer: an overview

GCSE

Focus on success

Co-teaching guides

Tiering guide

Teaching guides: support for teaching key maths skills in GCSE science

Marking guidance (Centre Services)

Science termly newsletter (new for autumn)

A-level

Transition activities

Focus on success (Autumn term)

Updated Biology Essay guidance and annotated examples (Centre Services)

Environmental Science Essay guidance and annotated examples (upcoming)

Environmental science Exampro (coming in January)

Marking guidance AS (Centre Services)

Events/training (all subjects)

Termly curriculum connect: July - ERA and Resources update; September – analysis of results data and key themes

Feedback meetings: autumn term

Getting started: on-demand e-Learning

Assessment principles: on-demand e-Learning

Mark scheme guidance: on-demand e-Learning

Focus on Success, Co-teaching and Tiering guides

AQA
Realising potential

**Focus on success:
GCSE science**

A02

Build on your students' assessment performance using our self-guided, modular training pack

Pre-reading booklet

Biology

Co-teaching Combined Science and Biology

April 2016

Area		Spec reference		Combined and Biology	Biology Only
		Combined	Biology		
4.1 Cell Biology	4.1.1 Cell Structure	4.1.1.1	4.1.1.1	Eukaryotes and prokaryotes	
		4.1.1.2	4.1.1.2	Animal cells and plant cells	
		4.1.1.3	4.1.1.3	Cell specialisation	
		4.1.1.4	4.1.1.4	Cell differentiation	
		4.1.1.5	4.1.1.5	Microscopy	
			4.1.1.6		Culturing microorganisms
	4.1.2 Cell division	4.1.2.1	4.1.2.1	Chromosomes	
		4.1.2.2	4.1.2.2	Mitosis and the cell cycle	
		4.1.2.3	4.1.2.3	Stem cells	
	4.1.3 Transport in cells	4.1.3.1	4.1.3.1	Diffusion	
		4.1.3.2	4.1.3.2	Osmosis	
		4.1.3.3	4.1.3.3	Active transport	

Contents

Foundation or Higher tier? How confident are you?

Foundation tier has changed

The safety net

Why the 2018 experience still matters

Common questions: how they can help

Key indicators for sciences

If circumstances change, so can your tier choice

Teaching guides

AQA
Questions matter

Exploring common misunderstandings in GCSE science

How to read and approach science questions and avoid common mistakes

Help prepare your GCSE students with confidence

Every year, in GCSE science exams, students often misread, misunderstand or misinterpret questions and don't always do what the question is asking them to do.

This booklet has been designed by our curriculum experts for you to use with your students to explore and highlight some of these key misunderstandings in GCSE science assessments.

There are example workings, examiner commentaries, good exam technique and best practice approaches.

1. Arithmetic and numerical computation

Science GCSE subject criteria Maths skill: 1d. Make estimates of the results of simple calculations

1. Brief explanation	- Mental estimates are used frequently in Maths; often before the exact calculation is done on a calculator. They are used to give a ball-park figure for the final answer. - In Maths the word 'Estimate' in a question generally means 'round each number to 1 significant figure before performing the calculation'. Some IGCSE Maths specifications do not require non-calculator skills so these students may need extra assistance with this topic.
2. Statement of coverage from: KS3 Mathematics programme of study (POS) KS4 Mathematics programme of study (POS)	- Use approximation through rounding to estimate answers and calculate possible resulting errors expressed using inequality notation $a < x \leq b$ - Apply and interpret limits of accuracy when rounding or truncating, {including upper and lower bounds}.
3. Maths introduction and development	- Mental arithmetic is introduced from when a student first starts school and is developed through to KS3. - Rounding is first done to 'nearest whole number', nearest 10', etc. before moving on to the introduction of decimal places and significant figures.
4. Ref AQA All About Maths AQA All About Maths Rounding	NEW GCSE Maths (8300) > Foundation tier resources > Number > Rounding Lesson 1 – Rounding reminder; leading to decimal places. Lesson 2 – Rounding to a number of significant figures. Lesson 3 – Upper and lower bounds. Lesson 4 – Use of inequality signs; truncating rather than rounding; and appropriate rounding.
5. Misconceptions	These tend to occur when rounding the number rather than the actual calculation. eg What is 14 489 to the nearest 10 000? A student may do this: 14 489 to the nearest 10 is 14 490

Marking guidance (Centre Services)

🏠 / Resources / Assessment and training / Subjects / Science

Science assessment and training resources

[Clear all filters](#)

Qualification
☒ GCSE

Category
☐ Assessment material (13)

Resource type
☒ Teacher support materials

Specification
☐ 8461 Biology (1)
☐ 8462 Chemistry (1)
☐ 8463 Physics (1)
☒ 8464 Combined Science: Trilogy
☐ 8465 Combined Science: Synergy (8)

A-Z

GCSE Teacher support materials 8464 Combined Science: Trilogy

Showing 1-13 of 13 results

[8461-8465 GCSE Extended Science End of Year 10 tests and mark schemes](#)
12 Jan 2024 | ZIP | 3.47 MB |

[Marking guidance Biology Paper 1 2022](#)
30 Oct 2023 | PDF | 4.22 MB |

[Marking guidance Biology Paper 1 2023 | GCSE | 8464 Combined Science: Trilogy](#)
30 Oct 2023 | PDF | 3.42 MB |

[Marking guidance Biology Paper 2 2022](#)
30 Oct 2023 | PDF | 4.36 MB |

[Marking guidance Biology Paper 2 2023 | GCSE | 8464 Combined Science: Trilogy](#)
30 Oct 2023 | PDF | 4.56 MB |

[Marking guidance Chemistry Paper 1 2022](#)
30 Oct 2023 | PDF | 4.8 MB |

[Marking guidance Chemistry Paper 1 2023 | GCSE | 8464 Combined Science: Trilogy](#)
30 Oct 2023 | PDF | 4.62 MB |

[Marking guidance Chemistry Paper 2 2022](#)
30 Oct 2023 | PDF | 5.15 MB |

[Marking guidance Chemistry Paper 2 2023 | GCSE | 8464 Combined Science: Trilogy](#)
30 Oct 2023 | PDF | 4.22 MB |

[Marking guidance Physics Paper 1 2022](#)
30 Oct 2023 | PDF | 4.06 MB |

Introduction

We have developed this resource to:

- increase your understanding of, and confidence in applying, the mark schemes for the 2023 GCSE Science papers, to help you mark your mocks
- provide guidance on applying the mark schemes using actual student responses from the examiner training materials for the 2023 papers
- help you develop a common understanding of the standards required and ensure consistency of marking across your team or within your department.

The student responses

The student responses making up the sample script in this booklet have been taken from the training materials the senior examiners developed to ensure a common standard of marking across the whole examining team.

Before marking the exam papers of your own students, we recommend that you work through this booklet as a group to ensure that all members of your team have a common understanding.

This sample script has three sections:

- Foundation-tier only questions
- Questions common to Foundation and Higher tiers
- Higher-tier only questions.

Student responses to common questions may have been taken from the Foundation or the Higher tier paper.

The examples we have used here were chosen by the examiners to challenge the mark scheme, to ensure that it is robust and can be applied fairly and consistently to all. Every response has been discussed in depth by the senior examiners, and marks and comments agreed before sharing with the wider team. The result of these discussions is the final mark scheme that is published on [Centre Services](#) at awarding.

The examiner standardisation process takes several days, and we scrutinise many student responses, preparing several sample scripts for each response in order to give examiners a good understanding of potential marking issues and to ensure they can mark consistently.

In this booklet we are **modelling** the approach used by examiners to help your department become more consistent in applying a mark scheme. As the mark scheme you are using has been through this rigorous process, and your time is limited, we feel that the one full script plus the comments will give you a taster of the process.

You can find other example responses from the 2023 exam series, commentaries and marks awarded, in the materials provided with the Feedback from the 2023 exams. These are available for download from Centre Services.

GCSE Virtual Communities

Materials from these meetings can be used to aid teacher and student understanding

Topics include:

- Extended prose and extended response questions
- Progression in practical skills
- Understanding key command words
- Assessing maths skills at different levels of demand
- Revisiting AO2
- Understanding AO1
- Presentations and support booklets for each meeting on website
- Specially written facilitation packs for teachers to run in-school CPD

AS and A-level resources: transition activities

AS and A-level Chemistry

7404, 7405

Specification

Planning resources

Planning resources



Resource type

☒ GCSE to A-level progression (2)

☐ Getting started (2)

☐ Options evenings (1)

☐ Switching to AQA (1)

Qualification



Aim of the booklet

This booklet will support your transition from GCSE science to A-level. At first, you may find the jump in demand a little daunting, but if you follow the tips and advice in this guide, you'll soon adapt. As you follow the course you will see how the skills and content you learnt at GCSE will be developed and your knowledge and understanding of all these elements will progress.

We have organised the guide into two sections:

1. Understanding the specification and the assessments
2. Transition activities to bridge the move from GCSE to the start of the A-level course.

Understanding the specification and the assessments

Specification at a glance

The specification is a useful reference document for you. You can download a copy from our website [here](#).

The most relevant areas of the specification for students are the following:

- Section 3: Subject content
Section 6: Maths requirements and examples
Section 7: Practical assessment

In Chemistry the subject content is split into three broad areas:

- 3.1 Physical chemistry
3.2 Inorganic chemistry
3.3 Organic chemistry

There are several sections within each of these broad areas. The content of each of these three broad areas is then split between AS and A-level.

The split of content between AS and A-level is shown in the tables below.

Transition activities

The following activities cover some of the key skills from GCSE science that will be relevant at AS and A-level. They include the vocabulary used when working scientifically and some maths and practical skills.

You can do these activities independently or in class. The booklet has been produced so you can complete it electronically or print it out and do the activities on paper.

The activities are **not a test**. Try the activities first and see what you remember and then use textbooks or other resources to answer the questions. **Don't** just go to Google for the answers, as actively engaging with your notes and resources from GCSE will make this learning experience much more worthwhile.

The answer booklet guides you through each answer. It is not set out like an exam mark scheme but is to help you get the most out of the activities.

Understanding and using scientific vocabulary

Understanding and applying the correct terms are key for practical science. Much of the vocabulary you have used at GCSE for practical work will not change but some terms are dealt with in more detail at A-level so are more complex.

AS and A-level resources: Teach

Chemistry

Resource type

- ☐ Command words (1)
- ☐ Community links (10)
- ☐ Equipment and apparatus (11)
- ☐ Lesson plans (5)
- ☐ Practical endorsements (6)
- ☐ Practical handbooks (2)
- ☐ Practical visits (1)
- ☐ Resource lists (1)
- ☐ Schemes of work (4)
- ☐ Student worksheets (7)
- ☐ Subject specific vocabularies (1)
- ☐ Teaching guides (4)
- ☐ Teaching plans (2)
- ☐ Teaching slides (5)
- ☐ Technician support (1)
- ☐ Textbooks (8)

Topic

Qualification

Physics

Resource type

- ☐ Command words (1)
- ☐ Community links (14)
- ☐ Equipment and apparatus (12)
- ☐ Lesson plans (5)
- ☐ Practical endorsements (6)
- ☐ Practical handbooks (3)
- ☐ Practical visits (1)
- ☐ Schemes of work (2)
- ☐ Student worksheets (5)
- ☐ Subject specific vocabularies (1)
- ☐ Teaching guides (5)
- ☐ Teaching plans (1)
- ☐ Teaching slides (5)
- ☐ Technician support (1)
- ☐ Textbooks (8)

Topic

Qualification

Biology

Resource type

- ☐ Command words (1)
- ☐ Community links (13)
- ☐ Equipment and apparatus (12)
- ☐ Lesson plans (5)
- ☐ Practical endorsements (6)
- ☐ Practical handbooks (2)
- ☐ Practical sample activities (1)
- ☐ Practical visits (1)
- ☐ Resource lists (1)
- ☐ Schemes of work (2)
- ☐ Student worksheets (5)
- ☐ Subject specific vocabularies (1)
- ☐ Teaching guides (20)
- ☐ Teaching plans (2)
- ☐ Teaching slides (5)
- ☐ Technician support (1)
- ☐ Textbooks (8)

Component

Topic

Qualification

Environmental Science

Resource type

- ☐ Community links (10)
- ☐ Lesson plans (5)
- ☐ Practical handbooks (1)
- ☐ Schemes of work (1)
- ☐ Student worksheets (5)
- ☐ Subject specific vocabularies (1)
- ☐ Teaching guides (1)
- ☐ Teaching slides (5)
- ☐ Textbooks (1)

Topic

Online and on-demand training

All accessible through the Professional Development pages of the website

GCSE/A-level Curriculum Connect: termly online meetings to update and support your teaching through the year. The next meeting is in July, and includes using ERA to analyse results and a detailed update on our resources.

GCSE Getting started: Online e-learning – introduction to the GCSE specifications and assessments. Great for new teachers or teachers new to AQA.

Mark scheme guidance: Applying mark schemes – talk through by senior examiner, GCSE and A-level (Biology, Chemistry, Physics).

Feedback on the exams: All specifications and all levels (Biology, Chemistry, Physics, Trilogy, Synergy, Environmental Science, Applied General and Entry Level Certificate), recorded sessions discussing key aspects of the 2023 exams and insight into possible future strategies.

A-level practical endorsement: e-learning for the A-level practical science endorsement. Builds on the training that lead teachers for the endorsement undertake.

Supporting Student Exam Prep: All levels, all subjects (GCSE and A-level). Focus on key areas of assessment to improve student confidence. Refresh of previous session, so some content will be repeated.

Resources in development

GCSE Sustainability and Climate Change

A-level Biology essay guidance and A-level Environmental Science essay guidance: how we mark the 25-mark synoptic questions, using clearly annotated examples of student work.

A-level Biology essay writing skills: on-demand course offering strategies and examples to help students improve their skills for the Paper 3 essay. It will complement the A-level Biology essay guidance written resource and the Biology Focus on Success Pack.

A-level Focus on Success: Biology, Chemistry, Physics, Environmental Science – focusing on key areas of teaching relevant to each specification (eg in Chemistry supporting understanding of organic mechanisms).

A-level Getting Started: online, on-demand e-learning – introduction to each A-level specification and its assessments. Great for teachers new to A-level or to AQA.

Science termly newsletter: a brief termly update for busy teachers to highlight important events/deadlines and new resources.

Examiner reports pilot phase 2: all Trilogy papers

Biology Paper 3 essay resource (new)

Support for the 25-mark Paper 3 essay

- Supplements the guidance in the levels mark scheme
- Explains the expectations of each level of the mark scheme
- Answers queries commonly asked by teachers and students
- Appendix of marked student essays from 2023
- Supersedes the five documents currently on the website

Section
Introduction
Expectations of the levels mark scheme:
Extended Abstract
Relational
Multistructural
Unistructural
Unfocused
Key cut-off points for each level
Selecting topics
How much should a student write?
What is expected for the AO2 element of the essay?
What constitutes a significant error?
What constitutes an irrelevant section?
What constitutes material beyond the specification?
Use of abbreviations
Appendix 1: Level of response marking instructions
Appendix 2: A-level Biology essay titles
Appendix 3: Marked and annotated examples of student responses

A woman with long dark hair, wearing a dark button-down shirt, is leaning over two students. The student on the left is a young man with dark hair, looking down at something in his hands. The student on the right is a young woman with dark hair, smiling and looking towards the woman. The background is a bright, out-of-focus classroom with windows and plants.

Get in touch

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Thank you