Ofqual

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Rewarding Learning

GCSE subject criteria for science

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Contents

Introduction

1. GCSE subject criteria set out the knowledge, understanding, skills and assessment objectives common to all GCSE specifications in science[1]. They provide the framework within which an awarding body creates the detail of the specification.

2. Specifications must also meet the regulators' general requirements, including the common and GCSE criteria as defined in *The statutory regulation of external qualifications* (QCA/04/1293).

3. Subject criteria are intended to:

   - help ensure consistent and comparable standards in the same subject across the awarding organisations
   - ensure that the rigour of GCSEs is maintained
   - ensure that specifications build on the knowledge, understanding and skills established by the national curriculums for England, Northern Ireland and Wales, and support progression to higher level qualifications in science
   - help higher education institutions, employers and other stakeholders, such as learners and parents/guardians, know what has been studied and assessed

4. Any GCSE specification that contains significant elements of science must be consistent with the relevant parts of these subject criteria.

[1] Specifications leading to the certificate title Double Award Science, where the content is that set out in the Science and Additional Science criteria combined, will be accredited by the regulators but will be for use only in centres in Northern Ireland.

Aims and learning outcomes

5. GCSE specifications in science should encourage learners to be inspired, motivated and challenged by following a broad, coherent, practical, satisfying and worthwhile course of study. They should provide insight into and experience of how science works, stimulating learners' curiosity and encouraging them to engage with science in their everyday lives and to make informed choices about further study and about career choices.

6. GCSE specifications in science must enable learners to:

   - develop their knowledge and understanding of the material, physical and living worlds
   - develop their understanding of the nature of science and its applications and the interrelationships between science and society
   - develop an understanding of the importance of scale in science
   - develop and apply their knowledge and understanding of the scientific process through hypotheses, theories and concepts.
   - develop their understanding of the relationships between hypotheses, evidence, theories and explanations
   - develop their awareness of risk and the ability to assess potential risk in the context of potential benefits
   - develop and apply their observational, practical, enquiry and problem-solving skills and understanding in laboratory, field and other learning environments.
   - develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions.
   - develop their skills in communication, mathematics and the use of technology in scientific contexts.

Subject content

7. The content of GCSE specifications in science must reflect the learning outcomes.

8. GCSE specifications in science must be consistent with the national curriculum key stage 4 programmes of study requirements in the orders for England and Wales, and the statutory requirements for key stage 4 in Northern Ireland.

9. GCSE specifications in science must require learners to develop the knowledge, skills and understanding specified below.

10. GCSE specifications in science must ensure the qualification is comparable in content and range with other GCSE science qualifications

11. GCSE specifications in science must require learners to demonstrate knowledge and understanding of:

- science as an evidence-based discipline
- the collaborative nature of science as a subject discipline and the way new scientific knowledge is validated
- how scientific understanding and theories develop and the limitations of science
- the importance of scale in terms of time, size and space
- how and why decisions about science and technology are made
- the evidence for the origin, structure and continuing evolution of the universe
- how the surface of the Earth and its atmosphere have changed since the Earth's origin and are still changing
- the Earth's crust, sea and atmosphere, and living organisms as the ultimate sources from which all useful materials are obtained or synthesised
- the production, use and disposal of materials and how an understanding of biology and chemistry helps to reduce the resulting impacts on the environment

- how, in chemical reactions, atoms are rearranged to make new products with different properties and no atoms are lost or made
- chemical reactions including reduction and oxidation, neutralisation, electrolysis and polymerisation reactions
- patterns in the chemical reactions between substances
- how the properties of materials, including elements and compounds, can be explained by their chemistry
- how the properties of materials determine their uses
- the wave equation and the transfer of energy and information by waves
- the relationship between the properties of electromagnetic waves and their uses
- ionising radiations, including that they are emitted all the time by radioactive materials and that they can transfer energy
- the generation and control of electrical power and the relationship between power, current and voltage
- the distribution and uses of electricity
- the relationship between power, energy and time
- energy conservation, the efficiency of energy transfer and the associated economic and environmental implications,
- energy flow through the biosphere
- cycling and recycling of nutrients including the roles of microorganisms
- how environmental change is measured using living and non-living indicators
- the interdependence of organisms and their adaptations to their environment
- the variety of life, including microorganisms, plants and animals, variation within species including the effects of genotype and environment
- how similarities and differences can be used to classify organisms and the importance of classification

- natural selection and how it can lead to evolutionary changes, and how genes determine the structure and function of organisms
- how animals and plants respond to external and internal changes and how organisms regulate internal systems
- how human health is affected by a range of environmental and inherited factors, by the use and misuse of drugs and by medical treatment
- hazard identification and the nature of risk
- risk factors and risk assessment including potential benefit
- the importance of working accurately and safely
- ethical implications of science and its applications

12. GCSE specifications in science must require learners to develop the ability to:

- plan practical ways to answer scientific questions and test hypotheses; devise appropriate methods for the collection of numerical and other data; assess and manage risks when carrying out practical work; collect, process, analyse and interpret primary and secondary data including the use of appropriate technology; draw evidence-based conclusions; evaluate methods of data collection and the quality of the resulting data
- use models to explain systems and processes; develop arguments and explanations, and draw conclusions using scientific ideas and evidence
- communicate scientific information or ideas and scientific, technical and mathematical language, conventions and symbols.

Assessment objectives

13. All specifications in science must require candidates to demonstrate their ability to:

Assessment objectives		Weighting (%)
AO1	Recall, select and communicate their knowledge and understanding of science	30–40
AO2	Apply skills, knowledge and understanding of science in practical and other contexts	30–40
AO3	Analyse and evaluate evidence, make reasoned judgements and draw conclusions based on evidence	25–35

Scheme of assessment

14. GCSE specifications in science must allocate a weighting of 75 per cent to external assessment and a weighting of 25 per cent to controlled assessment in the overall scheme of assessment.

15. Question papers in science must be targeted at either foundation or higher tier.

Grade descriptions

16. Grade descriptions are provided to give a general indication of the standards of achievement likely to have been shown by candidates awarded particular grades. The descriptions must be interpreted in relation to the content in the specification; they are not designed to define that content.

17. The grade awarded will depend in practice upon the extent to which the candidate has met the assessment objectives overall. Shortcomings in some aspects of candidates' performance in the assessment may be balanced by better performances in others.

Grade	Description
A	
C	
F	

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