



Qualifications and  
Curriculum Authority

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# **GCSE science: double award**

*Review of standards 1995-2000*

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## Introduction

The key changes to GCSE science: double award between 1995 and 2000 were:

- a reduction in content in the national curriculum orders for science
- a simplification of the assessment of Sc1, the coursework component
- a change from a three-tier examination to a two-tier examination, achieved by dropping the intermediate tier and extending the target grades on the foundation- and higher-tier papers.

About 490,000 candidates took GCSE science: double award in 2000. The syllabuses included in this study accounted for approximately 50 per cent of those candidates.

## Examination demand

### *Materials available*

Reviewers considered syllabuses, question papers and associated mark schemes and examiners' reports from each of the awarding bodies in 1995 and 2000, although no 1995 syllabus was available from Edexcel. In addition, the CCEA syllabuses were based on the national curriculum for Northern Ireland, which is different from that operating in England and Wales. This created difficulties for reviewers when making comparisons with syllabuses from other awarding bodies. Further details of the materials used are given at Appendix A.

### *Syllabus changes*

In 1995, syllabus content was largely based on the awarding bodies' interpretations of the national curriculum programmes of study and statements of attainment. Many of the syllabus statements, although closely tied to national curriculum levels, were general in nature. In 2000, syllabuses were based more on learning outcomes which were set out in precise terms and frequently illustrated by examples and contexts. They indicated more clearly the expected level of coverage and demand. This had implications for the ease with which teachers could identify what should be included in their teaching.

Over the period under review, syllabuses from CCEA, OCR and WJEC increased considerably in terms of both detail and the guidance provided to teachers and candidates. The 1995 AQA/N syllabus was already relatively detailed, so any changes to that syllabus in this respect were less noticeable.

Changes made in the national curriculum resulted in an overall reduction in the knowledge and understanding content of syllabuses from all awarding bodies between 1995 and 2000. Assessment objectives, skills and processes remained unchanged.

During the review period there was also a significant simplification of the assessment of Sc1, the coursework component. Revisions to the national curriculum had deliberately lowered demand for performance at the highest levels. These changes were reflected in all syllabuses. Moreover, by 2000 it was no longer necessary for all coursework to be based on whole investigations: this was also considered by reviewers to have decreased demand slightly. Conversely, in 2000 evaluation in coursework was required of all candidates, which was judged to have increased demand, particularly

for less able candidates. Reviewers judged that in 1995 levels 9 and 10 were too demanding and that the revisions had led to a more realistic level of demand. Overall, the more simplified assessment schemes in the 2000 syllabuses were thought to be more appropriate.

Overall, reviewers judged that the level of demand of the 1995 syllabuses had been too high, and in particular that the knowledge and understanding required by 1995 syllabuses was excessive. The small but discernible reduction in the overall level of demand on candidates was, therefore, supported and the level of demand of the 2000 syllabuses considered more appropriate.

### **Question papers**

Over the period under review the system of tiered papers changed. In 1995, examination papers were available at foundation, intermediate or higher tier. By 2000, examinations were only offered at foundation and higher tier. The grades available at each tier of entry also changed accordingly. Details are given in the tables below.

#### **1995**

Tier of entry	Range of grades available
Foundation	G –D(C)
Intermediate	(F)E–B(A)
Higher	(C)B–A*

#### **2000**

Tier of entry	Range of grades available
Foundation	G–C
Higher	(E)D – A*

Grades shown in brackets were not targeted by the question papers, but awarding bodies were allowed to award the grades to candidates whose performance lay outside the expected levels for these papers.

Changes to the tiering system over the period of the review were judged to have affected candidates of different abilities in different ways. For less able candidates and (to a lesser degree) middle-ability candidates, the 2000 foundation tier examination papers were judged to be significantly more demanding than those from 1995. This was a result of the papers containing a higher proportion of more demanding questions targeted at grades C and D. In contrast, extending the range of grades available on the higher tier papers from B–A\* in 1995 to D–A\* in 2000 resulted in fewer questions requiring higher-order skills such as extended writing, interpreting and evaluating unfamiliar information and carrying out multi-stage calculations. The demand of some of the 2000 higher tier examination papers resembled that of the 1995 intermediate tier papers. Discrimination was achieved not by setting more challenging questions but by expecting better performance on questions requiring answers in extended prose.

Apart from these changes, the basic assessment schemes remained largely unchanged over the period, with candidates taking three written papers (or, for modular schemes, two) and submitting coursework.

## **Summary**

Significant changes were made to GCSE science: double award syllabuses over the period of the review. The removal of a significant amount of material from the national curriculum and subsequently from syllabuses reduced the amount that needed to be covered. These reductions were confined to knowledge and understanding and did not significantly affect assessment objectives, skills or processes. Reviewers considered that the changes had resulted in a more appropriate level of demand in 2000.

There were also significant changes in the requirements of the coursework component (Sc1). Changes to the assessment of Sc1 resulted in a reduction in the level of demand, particularly for more able candidates. Here, too, reviewers considered the changes had been appropriate.

Significant changes were made to science: double award syllabuses over the period of the review. The removal of a significant amount of material from the national curriculum and subsequently from syllabuses reduced the amount that needed to be covered. These reductions were confined to knowledge and understanding and did not significantly affect assessment objectives, skills or processes. Reviewers considered that the changes had resulted in a more appropriate level of demand in 2000.

## **Standards of performance at grades A, C and F**

### ***Materials available***

Reviewers considered candidates' work at each of the key grade boundaries A/B, C/D and F/G for both 1995 and 2000. No scripts were available from AQA/N, Edexcel and OCR for 1995, although there were some scripts from Edexcel for 1997 which were used instead. The lack of material available for 1995 compared to 2000 made meaningful comparisons over time difficult. Full details of the materials used are given at Appendix B.

In addition to standards of performance across the awarding bodies in 2000 and across awarding bodies over time, reviewers considered standards of performance at the grade C/D boundary at different tiers in 2000.

The descriptions of expected performance used in the review were developed from published grade descriptions, adjusted to take into account the fact that work was from borderline candidates. In carrying out the analysis, reviewers concluded that the performance descriptions were too demanding of grade F candidates. The performance descriptions used are given at Appendix C.

### ***Performance at grades A, C and F***

On the limited evidence available, standards of performance were judged to have fallen over the period under review. On the basis of what was available, it appeared that this perceived fall in standards was not specific to any one awarding body, grade or particular assessment objective, but was more in the nature of a general trend.

There were also differences in performance found between the awarding bodies. However, in almost every case, this was felt to be a result of faults in the question papers rather than in the grading standard. The structure of some examination papers did not give candidates sufficient opportunity adequately to demonstrate some of the aspects of performance. There were several instances where it

was thought that too much emphasis was placed on recall. CCEA and WJEC examination papers, in particular, did not provide sufficient opportunity for candidates to show higher-level skills, and candidates on these papers could not match the descriptions.

The language level on some foundation tier papers was judged to be too high, creating an unfair hurdle for less able candidates. Candidates often received a significant number of marks on foundation papers for general knowledge rather than science. Some foundation tier papers in 2000 did not have sufficient material of a suitable demand properly to identify grade C performance. This meant that candidates entered for the foundation tier had less opportunity to demonstrate performance at grade C than those entered for the higher tier. Thus, foundation tier candidates tended not to match the descriptions because of flaws in the question papers. In addition, significant variation in some candidates' performance on the written components made judgements on standards difficult.

In several cases, especially for the lower grades, a candidate's coursework compensated for a poor performance in the written components and was the major determinant for the award of a grade. This phenomenon was compounded by coursework that did not appear to merit the marks it had been awarded.

Evidence from candidates' work suggested that the general quality of coursework tasks was disappointing. Some candidates, particularly in 1995, limited their ability to access the higher grades through a poor selection of coursework investigations/experiments. In both years, selection of investigations/experiments appeared to be made from tried and tested procedures, which gave something of a set-piece feel to this component.

### **Summary**

There was some evidence that standards of performance had declined over the period.

There were variations in performance across awarding bodies in 2000, but these were largely the result of question papers which did not provide sufficient evidence of attainment for the award of a grade.

Candidates' performance was often enhanced by their coursework marks, which were not always consistently awarded. Conversely, some candidates were handicapped by a choice of investigation in the coursework which did not allow access to the higher mark ranges.

## Appendix A: Materials used in the syllabus review

### Syllabuses

Year	Awarding body and syllabus				
<b>1995</b>	AQA/N modular	CCEA linear (G84)	Edexcel modular (1531)*	OCR linear (1770)	WJEC linear (212)
<b>2000</b>	AQA/N modular (1206)	CCEA linear (G84)	Edexcel modular (1531)	OCR linear (1774)	WJEC linear (212)

\* syllabus not available

### Examination papers and mark schemes

Year	Awarding body and examination papers				
	AQA/N	CCEA	Edexcel	OCR	WJEC
<b>1995</b>	F (1,2) I (3,4) H (5,6)	F (1,2,3) I (1,2,3) H (1,2,3)	F (1,2) I (1,2) H (1,2)	F (1,2) I (1,2) H (1,2)	F (1,2,3) I (4,5,6) H (7,8,9)
<b>2000</b>	F (1,2) H (3,4)	F (1,2,3) H (1,2,3)	F (1,2) H (1,2)	F (1,2) H (1,2)	F (1,2,3) H (4,5,6)

## Appendix B: Scripts used in the script review

AQA/N		CCEA		Edexcel		OCR		WJEC	
1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
-	A(H) <sup>†</sup>	A(H)	A(H)	A(H)*	A(H)	-	A(H)	A(H)	A(H)
-	-	-	-	A(I)*	-	-	-	-	-
-	C(H) <sup>†</sup>	C(H)	C(H)	C(H)*	C(H)	-	-	-	C(H)
-	-	C(I)	-	C(I)*	-	-	-	C(I)	-
-	C(F) <sup>†</sup>	-	C(F)	C(F)*	C(F)	-	C(F)	C(F)	C(F)
-	-	-	-	F(I)*	-	-	-	F(I)	-
-	F(F) <sup>†</sup>	-	-	F(F)*	F(F)	-	F(F)	F(F)	F(F)

\* 1997 material

<sup>†</sup> linear and modular



## **Appendix C: Performance descriptors used in the script review**

### ***Grade A***

Candidates use scientific knowledge and understanding to select an appropriate strategy for a task, identifying the key factors to be considered and making predictions where appropriate; they select a method of presenting data appropriate to the task; they use information from a range of sources where it is appropriate to do so; they identify and explain anomalous observations and measurements and the salient features of graphs; they use scientific knowledge and understanding to draw conclusions from the evidence; they identify shortcomings in the evidence.

Candidates usually select an appropriate level of precision needed in measurements and use a range of apparatus with precision and skill; make appropriately precise measurements; make systematic observations in qualitative work; decide which observations are relevant to the task in hand.

Candidates recall a wide range of knowledge from most areas of the syllabus.

Candidates use scientific knowledge and understanding in a range of applications relating to scientific systems or phenomena: for example, they explain how temperature or water content is regulated in humans; routinely use a range of balanced equations; use understanding of bonding to explain the simple properties of a material; use a wide range of relationships between physical quantities to carry out calculation effectively.

Candidates can use scientific knowledge and understanding to identify patterns and draw conclusions by combining data of more than one kind or from more than one source.

Candidates draw together and communicate knowledge from more than one area; routinely use scientific or mathematics convention in support of arguments; use a range of scientific and technical vocabulary throughout their work.

### ***Grade C***

Candidates use scientific principles and knowledge to identify some key factors to vary and control, and where appropriate make predictions; they present data systematically, in graphs where appropriate, and use lines of best fit; they draw conclusions consistent with their evidence and explain these using scientific knowledge and understanding.

Candidates use a range of apparatus to make careful and precise measurements and systematic observations and usually recognise when it is necessary to repeat measurements and observations.

Candidates recall a range of scientific information from most areas of the syllabus: for example, they describe how some organ systems in living things carry out life processes; recall simple chemical symbols and formulae; recall correct units for quantities.

Candidates can use and apply scientific knowledge and understanding in some general contexts: for example, they describe how a cell is adapted to its functions; use simple balanced equations; use quantitative relationships between physical quantities to perform calculations.

Candidates use scientific knowledge and understanding to make inferences and identify and explain patterns within data; make predictions from patterns in data.

Candidates describe some links between related phenomena in different contexts; use diagrams, charts and graphs to support arguments; use appropriate scientific and technical vocabulary in a range of contexts.

### **Grade F**

Candidates devise fair tests in contexts which involve only a few factors; record observations and measurements in tables and graphs; offer simple explanations consistent with the evidence obtained.

Candidates use simple apparatus to make measurements appropriate to task.

Candidates recall a limited range of information: for example, they state the main functions of organs of the human body and flowering plants; state some uses of materials obtained from oil; suggest ways in which insulation is used in domestic contexts.

Candidates usually use and apply knowledge and understanding in specific everyday contexts: for example, they describe how a reduction in population of one organism in a habitat can effect another organism, suggest a way of speeding up a particular chemical reaction; explain that fuels are energy resources and that energy is sometimes 'wasted'.

Candidates can obtain information from simple tables, chart and graphs and identify simple patterns in information and observations.

Candidates can link cause and effect in simple contexts, make some use of specific and technical vocabulary and make simple generalisations from information.