

GCSE Science

Consultation on Conditions and Guidance



March 2015

Ofqual/15/5658

Contents

About this consultation	4
Summary of our proposals – single science GCSEs	5
Summary of our proposals – combined science GCSEs.....	6
How to respond to this consultation.....	7
Evaluating the responses	7
1. Proposed rules and guidance for biology, chemistry and physics	8
Content requirements in biology, chemistry and physics.....	8
Interpretation of subject content	9
Tiering of assessments	11
Assessment requirements and guidance	16
Assessment requirements – GCSE Qualifications in Biology, Chemistry and Physics	19
Practical work.....	21
Assessment objectives.....	25
Guidance on assessment objectives	26
2. Proposed rules and guidance for combined science.....	32
Content requirements in combined science	32
Interpretation of subject content	33
Requirements in relation to subject content for GCSE Qualifications in Combined Science	35
Tiering of assessments	36
Tiering requirements – GCSE Qualifications in Combined Science	38
Assessment requirements and guidance	40
Assessment requirements – GCSE Qualifications in Combined Science.....	42
Practical work.....	44
Assessment objectives.....	47
Guidance on assessment objectives	48
3. Equality impact analysis.....	53
Ofqual’s role, objectives and duties.....	53
Equality impact analysis relating to proposed changes to GCSE qualifications	53
Responding to the consultation	55
Your details	55

Questions	59
Appendix A: Regulatory tools	70
Comparability and innovation	70
Conditions of Recognition	70
Regulatory documents	71
Statutory guidance	71
Appendix B: Ofqual’s role, objectives and duties	72

About this consultation

We are seeking views on the regulatory requirements we propose to put in place for new single science and combined science GCSEs. These new qualifications are due to be taught in England from September 2016.

This consultation follows on from our earlier consultations *GCSE Reform Consultation – June 2013*¹ and the *Consultation on the Assessment of Practical Work in GCSE Science*.² You can find the outcome of those consultations on our website, along with a summary of the responses to the consultations and our equality and regulatory impact assessments.

We do not repeat the policy proposals we consulted on in those earlier consultations or the options we considered when we did so. Instead, this consultation focuses on the subject-specific rules and guidance we need to put in place to implement the decisions we made following those consultations.

We are proposing to introduce two separate sets of rules and guidance – one for the three single science subjects (biology, chemistry and physics), and one for combined science. Although our requirements will be largely the same across all the science subjects, there are a number of differences between combined science and the single science subjects – including the different subject content that applies for combined science – that mean we need to produce separate regulatory documents. This consultation sets out our proposals for the single science subjects first, followed by our proposals for combined science.

We explain how these rules and guidance will work alongside our other regulatory tools in Appendix A.

Further information about the reform of GCSEs, AS and A levels can be found at www.gov.uk/government/publications/get-the-facts-gcse-and-a-level-reform.

¹ <http://webarchive.nationalarchives.gov.uk/20141110161323/http://comment.ofqual.gov.uk/gcse-reform-june-2013/>

² www.gov.uk/government/consultations/assessing-practical-work-in-gcse-science

Summary of our proposals – single science GCSEs

- New GCSEs in biology, chemistry and physics must comply with the Department for Education’s subject content requirements, and with our assessment objectives.
- New GCSEs in biology, chemistry and physics must include at least eight defined practical activities, covering a specified list of apparatus and techniques. Exam boards must require schools to provide a statement confirming they have taken reasonable steps to secure that students complete all the defined practical activities, and make contemporaneous records of the work undertaken and the learning derived from having done so. If a school fails to provide a statement, or provides a false statement, the exam board must treat that as malpractice and/or maladministration.
- New GCSEs in biology, chemistry or physics must have a minimum total assessment time of 3.5 hours.
- Exams for new GCSEs in biology, chemistry and physics will:
 - include questions assessing students in relation to practical work – these must make up at least 15 per cent of the total marks for the qualification;
 - in a change from our previous proposals, allocate at least 10 per cent of the total marks to assessing relevant mathematical skills in biology, 20 per cent in chemistry and 30 per cent in physics; and
 - include questions that test students’ knowledge, skills and understanding in relation to working scientifically.
- We have previously decided that new GCSEs in biology, chemistry and physics will be tiered, with an individual student taking either foundation tier or higher tier papers. We are now consulting on the detailed requirements for tiering:
 - In line with the approach taken in other tiered subjects at GCSE, higher tier papers will target grades 4 to 9, but students taking the higher tier will be awarded a grade 3 if their mark is just below the grade 4 boundary. Foundation tier papers will target grades 1 to 5.
 - Exam boards must take all reasonable steps to ensure grades 4 and 5 are comparable across tiers. This must include ensuring at least 20 per cent of marks at each tier are from common questions targeting grades 4 and 5.

Summary of our proposals – combined science GCSEs

- New GCSEs in combined science must comply with the Department for Education’s subject content requirements, and with our assessment objectives.
- New GCSEs in combined science will include at least 16 defined practical activities, covering a specified list of apparatus and techniques. Exam boards must require schools to provide a statement confirming they have taken all reasonable steps to secure that students complete all the defined practical activities, and make contemporaneous records of the work undertaken and the learning derived from having done so. If a school fails to provide a statement, or provides a false statement, the exam board must treat that as malpractice and/or maladministration.
- Because new combined science GCSEs will be double-award qualifications (i.e. the size of two GCSEs and for which two grades will be awarded), we are specifying a minimum total assessment time of 7 hours for all new combined science GCSEs.
- Exams for new GCSEs in combined science will:
 - include questions assessing students in relation to practical work – these must make up at least 15 per cent of the total marks for the qualification;
 - in a change from our previous proposals, allocate at least 20 per cent of the total marks to assessing relevant mathematical skills; and
 - include questions that test students’ knowledge, skills and understanding in relation to working scientifically.
- We have previously decided that new GCSEs in combined science will be tiered, with an individual student taking either foundation tier or higher tier papers. We have also decided that combined science GCSEs (which are double-award qualifications) will be graded using a 17 point scale – from 1-1, 2-1 and 2-2 through to 8-8, 9-8 and 9-9. We are now consulting on the detailed requirements for tiering:
 - In line with the approach taken in other tiered subjects at GCSE, higher tier papers will target grades 4 to 9. Students taking the higher tier will normally be awarded a grade between 4-4 and 9-9, but may receive a grade 4-3 if their mark is just below the grade 4-4 boundary. Foundation tier papers will target grades 1 to 5, with students receiving grades between 1-1 and 5-5.

- | |
|--|
| <ul style="list-style-type: none">□ Exam boards must take all reasonable steps to ensure grades 4-4, 5-4 and 5-5 are comparable across tiers. This must include ensuring at least 20 per cent of marks at each tier are from common questions targeted at a level of demand consistent with grades 4 to 5. |
|--|

How to respond to this consultation

The closing date for responses is 4th May 2015.

Please respond to this consultation in one of three ways:

- complete the online response at <http://surveys.ofqual.gov.uk/s3/gcse-science-consultation-on-conditions-and-guidance>;
- email your response to consultations@ofqual.gov.uk – please include the consultation title (Science Consultation 2015) in the subject line of the email and make clear who you are and in what capacity you are responding; or
- post your response to: Science Consultation 2015, Ofqual, Spring Place, Coventry Business Park, Herald Avenue, Coventry, CV5 6UB, making clear who you are and in what capacity you are responding.

Evaluating the responses

To evaluate responses properly, we need to know who is responding to the consultation and in what capacity. We will therefore only consider your response if you complete the information page.

Any personal data (such as your name, address and any other identifying information) will be processed in accordance with the Data Protection Act 1998 and our standard terms and conditions.

We will publish the evaluation of responses. Please note that we may publish all or part of your response unless you tell us (in your answer to the confidentiality question) that you want us to treat your response as confidential. If you tell us you wish your response to be treated as confidential, we will not include your details in any published list of respondents, although we may quote from your response anonymously.

Please respond by 4th May 2015.

1. Proposed rules and guidance for biology, chemistry and physics

1.1 We are proposing to introduce rules and guidance for new GCSEs in biology chemistry and physics which cover the following areas:

- Content requirements in biology, chemistry and physics
- Interpretation of subject content
- Tiering of assessments
- Assessment requirements and guidance
- Practical work
- Assessment objectives
- Guidance on assessment objectives.

Content requirements in biology, chemistry and physics

1.2 The Department for Education has published a document that sets out the new content for GCSEs in single science subjects. All GCSEs in biology, chemistry and physics must comply with the requirements of that document,³ and with our assessment objectives.

1.3 To bring this about, we propose to introduce the following Condition, which will apply to all GCSEs in single science subjects:

Condition	Compliance with content requirements
GCSE(Single Science)1	
GCSE(Single Science)1.1	In respect of each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must – (a) comply with the requirements relating to that qualification set out in the document published by the Secretary of State

³ www.gov.uk/government/publications/gcse-single-science

entitled ‘Biology, Chemistry and Physics GCSE subject content’,⁴ document reference DFE-00352-2014,

- (b) have regard to any recommendations or guidelines relating to that qualification set out in that document, and
- (c) interpret that document in accordance with any requirements, and having regard to any guidance, which may be published by Ofqual and revised from time to time.

GCSE(Single Science)1.2 In respect of each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must comply with any requirements, and have regard to any guidance, relating to the objectives to be met by any assessment for that qualification which may be published by Ofqual and revised from time to time.

Interpretation of subject content

- 1.4 The subject content for all science GCSEs is written in a way which reflects the particular nature of the subject; it sets out expectations of students in terms of their ability to (for example) ‘describe’, ‘explain’, ‘analyse’ and ‘evaluate’ scientific ideas and knowledge.
- 1.5 Words such as these are often used in exams to indicate how students should answer questions, and the complexity of response that is expected. Because of this, the way the subject content is written could be interpreted as dictating how exam boards should write questions on particular scientific topics.
- 1.6 We have confirmed with the Department for Education that this is not the intention of the subject content. Instead, it is intended to set out the coverage and depth of knowledge and understanding expected of students in relation to particular scientific topics.
- 1.7 Similarly, Appendix 1 of the subject content sets out a list of equations that students should “be able correctly to recall, and apply”. This could be misread as always requiring students to recall these equations – and not permitting questions which gave the equation and required students to apply it to a particular context.

⁴ www.gov.uk/government/publications/gcse-single-science

- 1.8 We are therefore proposing to publish the following rules which require exam boards to interpret the subject content in the way it was intended. We also invite views on whether further rules or guidance on the subject content are needed.

Requirements in relation to subject content for GCSE Qualifications in Biology, Chemistry and Physics

The subject content for GCSE Qualifications (graded 9 to 1) in Biology, Chemistry and Physics is set out in the Department for Education's *Biology, Chemistry and Physics GCSE subject content*, document reference DFE-00352-2014 (the 'Content Document').

Condition GCSE(Single Science)1.1(c) requires awarding organisations to interpret the Content Document in line with any requirements published by Ofqual.

We set out our requirements for the purposes of Condition GCSE(Single Science)1.1(c) below.

Sampling of subject content

The Content Document uses a range of terms to indicate the depth to which knowledge, skills and understanding in relation to particular aspects of subject content should be covered and assessed. Such terms include (but are not limited to) 'describe', 'explain' and 'evaluate'. In relation to each of Biology, Chemistry and Physics the Content Document states –

Awarding organisations may, however, use flexibility to increase depth, breadth or context within the specified topics or to consolidate teaching of the subject content.

In respect of each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must –

- (a) set the specification for that qualification on the basis that the terms in the Content Document described above provide an indication of the minimum depth of the knowledge, skills and understanding which Learners must be expected to demonstrate with respect to specific aspects of content, and
- (b) design and set the assessments for that qualification such that, over time, those assessments require Learners to demonstrate knowledge, skills and understanding of each specific aspect of content up to and including the full depth indicated in the specification (and therefore at least at the depth indicated by the Content Document).

Equations in physics

Paragraph (a) of Appendix 1 to the Content Document specifies a list of equations in physics that:

students should be able correctly to recall, and apply...

In respect of each GCSE Qualification in Physics which it makes available, or proposes to make available, an awarding organisation must –

- (a) interpret the above requirement in the Content Document as permitting awarding organisations to set individual questions and/or tasks which require Learners to –
 - (i) recall one or more of those specified equations,
 - (ii) recall, and then apply, one or more of those specified equations, or
 - (iii) apply one or more of those specified equations which is given in the question and/or task,
- (b) design and set the assessments for that qualification such that, over time, those assessments require Learners to demonstrate their ability to recall, and then apply, each of the equations listed in paragraph (a) of Appendix 1 to the Content Document.

Tiering of assessments

1.9 We have previously decided that all new GCSEs in biology, chemistry and physics will be tiered.

1.10 By default, all new GCSEs are untiered (see our *GCSE (9 to 1) Qualification Level Conditions and Requirements*⁵). To allow tiering in new biology, chemistry and physics GCSEs, we therefore need to introduce an extra Condition. This proposed Condition (set out below) permits tiering in all single science subjects, and requires exam boards to follow our published rules for tiering in biology, chemistry and physics.

Condition **Assessing the full range of abilities**
GCSE(Single
Science)2

⁵ www.gov.uk/government/publications/gcse-9-to-1-qualification-level-conditions

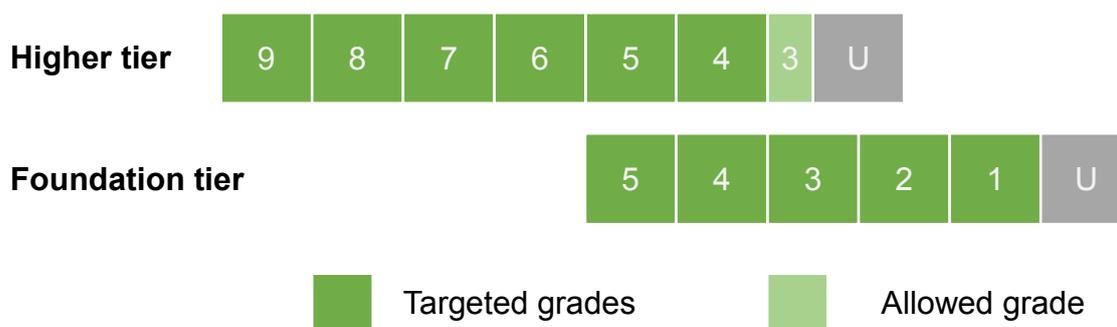
- GCSE(Single Science)2.1** In respect of each GCSE Qualification in Biology, Chemistry or Physics that an awarding organisation makes available, or proposes to make available –
- (a) Condition GCSE 1.1 does not apply, and
- (b) the awarding organisation must ensure that the qualification, and each assessment for it, complies with any requirements which may be published by Ofqual and revised from time to time.

1.11 To support this Condition, we are also proposing to publish detailed rules that govern tiering. These rules implement our previous decisions that:

- Exam boards must offer papers at two tiers – foundation tier and higher tier.
- Mixed tier entry is not permitted, so students will not be able to take a mixture of foundation and higher tier papers in a single subject. A student could, for example, take higher tier biology and foundation tier physics, but could not take one higher tier paper and one foundation tier paper in chemistry.

1.12 In addition, we are proposing that – in line with the approach in other new GCSEs that use tiering – higher tier papers should target grades 4 to 9 (but allow students that narrowly miss a grade 4 to receive a grade 3). Foundation tier papers should target grades 1 to 5. This approach is illustrated in figure 1 below.

Figure 1 – targeting of grades at foundation and higher tier



1.13 We are also proposing to require exam boards to make sure that the assessments are designed to secure accurate classification of students and sound grading judgements.

1.14 Finally, we are proposing that exam boards should do all they can to ensure that grades 4 and 5 are comparable across the two tiers. We are also specifying that one of the things exam boards must do to secure comparability is make sure that 20 per cent of marks are from questions common to both the foundation and higher tier papers (and therefore targeted at grades 4 and 5).

1.15 We set out our proposed tiering requirements below.

Tiering requirements – GCSE Qualifications in Biology, Chemistry and Physics

Condition GCSE(Single Science)2.1(b) allows us to specify requirements relating to assessing the full range of abilities for each GCSE Qualification in Biology, Chemistry or Physics.

We set out below our requirements for the purposes of Condition GCSE(Single Science)2.1(b). An awarding organisation must design, deliver and award each GCSE Qualification in Biology, Chemistry or Physics that it makes available, or proposes to make available, in accordance with these requirements.

Use of the overlapping tiers model

1. Each GCSE Qualification in Biology, Chemistry or Physics must be tiered. An awarding organisation must design and set the assessments for each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, using an overlapping tiers model.
2. Such a model must use two tiers – a foundation tier and a higher tier – and each assessment must be designed and set in such a way as to fall within one of those two tiers only.

Preclusion of mixed tier entry

3. An awarding organisation must ensure that each Learner is permitted to take assessments in either the foundation tier or the higher tier only.

Targeting of grades in each tier

4. The questions or tasks in foundation tier assessments must be targeted at the Level of Demand required for the award of grades 1 to 5.
5. The questions or tasks in higher tier assessments must be targeted at the Level of Demand required for the award of grades 4 to 9.

Awarding of grades in each tier

6. A Learner who takes foundation tier assessments must be awarded a grade within the range of 1 to 5, or be unclassified.
7. A Learner who takes higher tier assessments must be awarded a grade within the range of 4 to 9, or be unclassified. However, if the mark achieved by such a Learner is a small number of marks below the 4/3 grade boundary, that Learner may be awarded a grade 3.

Assessing the full range of abilities

8. An awarding organisation must ensure that the assessments within each tier allow each specified level of attainment available for that tier to be reached by a Learner who has attained the required level of knowledge, skills and understanding.
9. An awarding organisation must ensure that the assessments both within each tier, and taken together across both tiers –
 - (a) ensure sufficient differentiation⁶ between Learners,
 - (b) ensure sufficient discrimination⁷ between Learners, and
 - (c) ensure the accurate and consistent setting of grades across the full range of attainments demonstrated by Learners.
10. In designing assessments, an awarding organisation must take all reasonable steps to ensure, at each tier, that Learners achieving the lowest targeted grade have demonstrated attainment with regard to a sufficient range of the subject requirements, in terms of the subject content and the assessment objectives. Equally, an awarding organisation must take all reasonable steps to ensure, at each tier, that Learners achieving the higher targeted grades must have demonstrated attainment with regard to suitably stretching and challenging requirements, in terms of the subject content and the assessment objectives.

The overlap at grades 4 and 5

11. An awarding organisation must take all reasonable steps in the design and delivery of the assessments and awarding processes to secure that the level of attainment (in terms of the subject content and the assessment objectives) indicated by grades 4 and 5 is comparable regardless of the tier for which a Learner is entered. Each awarding organisation must demonstrate in its assessment strategy the steps it has taken to secure such comparability between tiers, including on an ongoing basis.

⁶ For the purposes of these requirements, 'differentiation' means the provision of opportunities in an assessment for Learners to generate evidence demonstrating different levels of attainment according to their knowledge, skills and understanding.

⁷ For the purposes of these requirements, 'discrimination' means the rank ordering of Learners on the basis of the different levels of attainment they have demonstrated in an assessment or set of assessments.

12. In particular, an awarding organisation must ensure that –
- (a) at least 20 per cent of the marks available in the assessments for each tier are made available through questions that are
 - (i) common to both tiers, and
 - (ii) targeted at a Level of Demand consistent with grades 4 and 5, and
 - (b) an appropriate proportion of marks for each tier are targeted at a Level of Demand consistent with grades 4 and 5.

Assessment requirements and guidance

1.16 We are proposing to introduce a range of rules and guidance around the assessments for GCSEs in biology, chemistry and physics. In order to do this, we are proposing to introduce a Condition which requires exam boards to comply with the rules and have regard to the guidance.

Condition	Assessment
------------------	-------------------

GCSE(Single Science)3

GCSE(Single Science)3.1	An awarding organisation must ensure that in respect of each assessment for a GCSE Qualification in Biology, Chemistry or Physics which it makes available or proposes to make available it complies with any requirements, and has regard to any guidance, which may be published by Ofqual and revised from time to time.
--------------------------------	--

1.17 Under this new Condition, we will be publishing requirements that build on our proposals from our earlier consultation *Assessment of Practical Work in GCSE Science*.⁸ In our 2014 consultation we proposed that students would be required to:

- demonstrate their understanding of practical activities – with at least 15 per cent of the total marks available in each science GCSE dedicated to this;
- use mathematical skills at a level appropriate for GCSE science subjects – with at least 15 per cent of the total marks available in each science GCSE dedicated to this;

⁸ www.gov.uk/government/consultations/assessing-practical-work-in-gcse-science

- demonstrate their ability in terms of the requirements of working scientifically, their knowledge and understanding of practical and theoretical contexts, and their ability to organise and communicate information and ideas coherently.

- 1.18 We have already confirmed⁹ our proposal in respect of practical activities – with one important change to the wording. Students will need to demonstrate their understanding of practical **work**. This change is designed to ensure questions test students' understanding of practical work in a broad sense, as well as in relation to the specific defined practical activities which are required under proposed Condition GCSE(Single Science)4.1(a). We are also setting out rules that specify how exam boards should design questions that assess practical work.
- 1.19 Consultation responses suggested that we should consider setting different weightings for mathematical skills in biology, chemistry and physics, because the three sciences have different amounts of mathematical content (with physics having the most, and biology the least).
- 1.20 Taking account of respondents' views, our review of the subject content requirements and the weightings set at A level, we have decided that there should be a minimum weighting for mathematical skills of 10 per cent in biology, 20 per cent in chemistry, and 30 per cent in physics.
- 1.21 We have also decided to confirm our proposal that students should be required to demonstrate their ability in terms of the requirements for working scientifically set out in the subject content, but will not impose separate requirements around knowledge and understanding of practical and theoretical contexts, and students' ability to organise and communicate information and ideas coherently. This is because these are already covered within the wider requirements for working scientifically, and we think it is unnecessary to impose further constraints on assessment design.
- 1.22 Finally, we are proposing to introduce requirements in relation to the minimum length of assessments. The importance of science within the secondary school curriculum means we think there is a particular risk that exam boards will compete on the basis of offering the shortest possible assessment, and schools may make decisions based on the length of assessments. While shorter assessments do not necessarily make a qualification less demanding, our view is

⁹ www.gov.uk/government/consultations/assessing-practical-work-in-gcse-science

that differences in the length of assessments could create both actual and perceived differences in demand between specifications.

- 1.23 In arriving at our proposed minimum times, we have considered how new GCSEs in biology, chemistry and physics compare with current GCSEs, which have around 3 hours of exams (75 per cent of total marks), as well as a significant amount of controlled assessment (25 per cent of total marks).
- 1.24 New GCSEs in biology, chemistry and physics will be assessed solely using exams. They have more (and more demanding) content than current GCSEs, and also need to include indirect assessment of students' practical skills. All of these factors suggest that new GCSEs should have more assessment time than current GCSEs.
- 1.25 Taking all this into account, we are proposing that assessments for a GCSE in biology, chemistry or physics must total at least 3.5 hours. This is less than the guideline minimum times we have specified for new GCSEs in mathematics and English literature and the same as GCSE English language.
- 1.26 All of these rules are included in the draft assessment requirements set out below.

Assessment requirements – GCSE Qualifications in Biology, Chemistry and Physics

Condition GCSE(Single Science)3.1 allows us to specify requirements in relation to assessments for a GCSE Qualification in Biology, Chemistry or Physics.

We set out below our requirements for the purposes of Condition GCSE(Single Science)3.1.

Minimum assessment times

In respect of each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must design and set the assessments for that qualification on the basis that the total amount of time spent by each Learner in taking those assessments will be no less than 3.5 hours.

Assessment of mathematical skills

The Content Document sets out the mathematical skills which must form part of each GCSE Qualification in Biology, Chemistry and Physics (the ‘Mathematical Skills’) in the ‘Use of Mathematics’ sections and individual content statements for each subjects, the mathematical forms of Working Scientifically and the appendices addressing different aspects of the mathematical requirements.

On page 5 of the Content Document it is stated –

The mathematics [outlined in the Content Document in respect of each subject] should be at levels up to, but not beyond, the requirements specified in GCSE mathematics for the appropriate tier.

In designing and setting the assessments for each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must ensure that, taking the assessments for that qualification together –

- (a) the total mark used to credit the relevant Mathematical Skills is no less than –
 - (i) for a GCSE Qualification in Biology, 10 per cent of the sum of all of the marks allocated to assessment objective AO1 to AO3,
 - (ii) for a GCSE Qualification in Chemistry, 20 per cent of the sum of all of the marks allocated to assessment objectives AO1 to AO3,
 - (iii) for a GCSE Qualification in Physics, 30 per cent of the sum of all of the marks allocated to assessment objectives AO1 to AO3, and

- (b) the questions and tasks used to target Mathematical Skills are at a Level of Demand which –
- (i) is appropriate to the subject,
 - (ii) will allow effective differentiation between a range of attainments by Learners in relation to the subject content being assessed,
 - (iii) in respect of assessments for the foundation tier, is not lower than that which is expected of Learners at Key Stage 3¹⁰ as outlined in the Department for Education’s document ‘Mathematics programmes of study: key stage 3’¹¹ document reference DFE-00179-2013, and
 - (iv) in respect of assessments for the higher tier, is not lower than that of questions and tasks in assessments for the foundation tier in a GCSE qualification in Mathematics.
- (c) without prejudice to the above requirements and those outlined in the Content Document, mathematical skills are assessed at an appropriate range of Levels of Demand in each set of assessments¹² and over the lifetime of the qualification.

Assessment of Learners in relation to practical work

In designing and setting the assessments for each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must ensure that, taking the assessments for that qualification together –

- (a) Learners’ knowledge, skills and understanding in relation to practical work is assessed across assessment objectives AO1 to AO3;
- (b) the number of marks used to credit such knowledge, skills and understanding is no less than 15 per cent of the sum of all of the marks allocated to assessment objectives AO1 to AO3;

¹⁰ As defined in section 82(1)(c) of the Education Act 2002.

¹¹

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239058/SECONDARY_national_curriculum_-_Mathematics.pdf

¹² For the purposes of these requirements, a ‘set of assessments’ means the assessments to be taken by a particular Learner for a GCSE Qualification in Biology, Chemistry or Physics. For clarity, the assessments taken by Learners may vary, depending on any possible routes through the qualification.

- (c) the questions and tasks which test Learners’ knowledge, skills and understanding in relation to practical work draw on, and combine as appropriate, the theoretical and practical aspects of experimentation, and
- (d) Learners are required to –
 - (i) show and apply knowledge and understanding of practical activities, and
 - (ii) apply scientific thinking, use experimental skills and strategies, and analyse and evaluate information.

Assessment of ‘working scientifically’

The Content Document states that –

Specifications should encourage the development of knowledge and understanding in science through opportunities for working scientifically. Awarding organisations should identify in their assessment strategy how, over a cycle of assessments, they will ensure that working scientifically is developed and assessed through the subject content.

Pages 7 to 8 of the Content Document go on to set out “the main ways in which working scientifically should be developed and assessed”.

In relation to working scientifically, an awarding organisation must design and set the assessments for each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, to ensure that, taking the assessments for that qualification together, Learners’ knowledge, skills and understanding is assessed across assessment objectives AO1 to AO3.

Practical work

1.27 Following our earlier consultation *Assessment of Practical Work in GCSE Science*,¹³ we have decided that:

- New GCSEs in biology, chemistry and physics will include a minimum of eight practical activities. Individual specifications may require more than the minimum, and schools will of course also be free to do more practical work than is in the specification.

¹³ www.gov.uk/government/consultations/assessing-practical-work-in-gcse-science

- The defined practical activities will set out the apparatus that students should use and the techniques they should develop.
- Schools will be required to confirm that they have taken reasonable steps to secure that their students do the full range of practical work and that their students keep contemporaneous records of their practical work.

1.28 To bring this about, we propose to introduce a new Condition, which will apply to all GCSEs in single science subjects. Building on our previous decisions, we are proposing that this condition will:

- require GCSEs in biology, chemistry and physics to include at least eight practical activities which, taken together, cover all the apparatus and techniques set out in a list published as part of the subject content;
- require exam boards to require schools (or any other body that delivers GCSEs on their behalf) to provide an annual statement about the practical work done by that year's GCSE students. If any school fails to provide this statement, or it makes a false statement, exam boards must treat this as malpractice and/or maladministration, and take appropriate action.

1.29 We have considered what exam boards should expect schools to confirm in their annual statement about practical work. Practical work is central to good science qualifications, and good science teaching and learning. The required practical activities form part of the work students are expected to do for a GCSE in biology, chemistry or physics, and schools should be devoting sufficient teaching time to those (and other) practical activities.

1.30 We will require the exam boards to design their exams so that students who demonstrate they have learned from undertaking practical activities are rewarded for this. This will provide a further incentive for schools to integrate practical work into their teaching and for students to complete the activities.

1.31 The requirement on schools to provide exam boards with a statement will act as an extra safeguard that students are completing the practical activities. To reflect the importance of practical work in science subjects, we propose that exam boards should require schools to confirm they have taken reasonable steps to secure that each student they have entered for a GCSE in biology, chemistry or physics has:

- completed the practical activities set by the exam board; and
- made a contemporaneous record of both the work the student has undertaken during the practical activities, and what the student has learned from them.

1.32 We recognise some students might not, despite the best efforts of their school, complete all the practical activities. In some cases this might be for legitimate reasons such as illness or disability. Our proposed approach recognises this fact. It places a requirement on a school to take reasonable steps to make sure its students complete the practical activities, but it would not prohibit a school that had taken such steps from entering a student for the exams who, despite the school's efforts, had not done so.

1.33 The proposed Condition also requires exam boards to set out the required practical activities in the specification for the qualification, and to update their practical activities in line with any future changes to the required apparatus and techniques.

1.34 We set out our proposed new Condition below.

Condition Practical work
GCSE(Single Science)4

GCSE(Single Science)4.1 In respect of each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must –

- (a) require each Learner to complete at least eight practical activities set by the awarding organisation, and**
- (b) ensure that, taken together, those practical activities provide opportunities for each Learner to use all of the apparatus and techniques set out in the document published by the Secretary of State entitled 'Biology, Chemistry and Physics GCSE subject content',¹⁴ document reference DFE-00352-2014.**

GCSE(Single Science)4.2 In respect of each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must –

- (a) review the practical activities which it has set following any revision by the Secretary of State of the apparatus or techniques specified in respect of that qualification, and**
- (b) revise those practical activities if appropriate.**

¹⁴ www.gov.uk/government/publications/gcse-single-science

GCSE(Single Science)4.3 In respect of each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must –

- (a) set out in the specification for that qualification the practical activities which each Learner must complete,
- (b) promptly amend that specification when the awarding organisation makes any revision to those practical activities, and
- (c) where such an amendment has been made to the specification, publish that specification as amended.

GCSE(Single Science)4.4 In respect of each assessment cycle for a GCSE Qualification in Biology, Chemistry or Physics which it makes available, an awarding organisation must –

- (a) require each Centre to provide a practical science statement to the awarding organisation, and
- (b) treat any failure by a Centre to provide a practical science statement to the awarding organisation in a timely manner as malpractice and/or maladministration (under General Condition A8 (*Malpractice and maladministration*)).

GCSE(Single Science)4.5 For the purposes of this Condition, a ‘practical science statement’ is a true and accurate written statement made by a Centre to an awarding organisation which confirms that it has taken reasonable steps to secure that each Learner to which that Centre has delivered the assessments to be taken in a particular assessment cycle for a GCSE Qualification in Biology, Chemistry or Physics which the awarding organisation makes available –

- (a) has completed the practical activities set by the awarding organisation, and
- (b) has made a contemporaneous record of –
 - (i) the work which that Learner has undertaken during those practical activities, and
 - (ii) the knowledge, skills and understanding which that Learner has derived from those practical activities.

Assessment objectives

1.35 We have previously consulted on our proposed assessment objectives for GCSEs in single science subjects. Following consultation, we have made a small change to the weighting of those assessment objectives (reducing the weighting of AO3 by 5 per cent and increasing the weighting of AO1 by 5 per cent) – this is to ensure our assessment objectives reflect the relative weightings of the different skills in the subject content.

1.36 Because of the other constraints on assessment design in GCSE science (for example, the required weightings for questions testing mathematical skills and practical work), we propose to allow exam boards limited flexibility to deviate from the prescribed assessment objective weightings. Our proposed approach is to allow assessments in any given year to vary assessment objective weightings by ± 3 per cent – but to require assessments to (on average) meet the specified weightings over a 4-year period.

	Objective	Weighting
AO1	Demonstrate knowledge and understanding of: <ul style="list-style-type: none"> ■ scientific ideas ■ scientific techniques and procedures 	40%
AO2	Apply knowledge and understanding of: <ul style="list-style-type: none"> ■ scientific ideas ■ scientific enquiry, techniques and procedures 	40%
AO3	Analyse information and ideas to: <ul style="list-style-type: none"> ■ interpret and evaluate ■ make judgements and draw conclusions ■ develop and improve experimental procedures 	20%

In respect of each GCSE Qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available, an awarding organisation must design and set the assessments on the basis that –

- (a) in each set of assessments¹⁵ the weightings in respect of the assessment objectives outlined above may vary by +/- 3 per cent, and
- (b) taking together those assessments over each consecutive four-year period the weightings outlined above are achieved.

Guidance on assessment objectives

1.37 The draft guidance on assessment objectives (set out below) explains how we expect exam boards to interpret the assessment objectives in terms of:

- the discrete ‘strands’ within each of the assessment objectives;
- the discrete ‘elements’ within each assessment objective and its strands that questions and tasks could target and/or seek to credit;
- the coverage expectations, such as in relation to the different elements within each assessment objective and how those elements should be sampled over time; and
- the key areas of emphasis in each assessment objective and the particular meaning for the subject of any key terms and phrases used; defined terms are shown in bold text, followed by their definitions.

1.38 In line with the obligations set out in draft Condition GCSE(Single Science)1.2, exam boards must have regard to any guidance on the assessment objectives. For example, an exam board could map how it has regard to the guidance as it:

- develops its sample assessment materials;
- delivers the qualification;
- develops and applies its approach to sampling the elements into which the assessment objectives are divided; and
- monitors the qualification to make sure it addresses all elements appropriately.

1.39 The subject content for GCSE science includes a broad range of facts and concepts that students must know and understand. This means assessments

¹⁵ For the purposes of this requirement, a ‘set of assessments’ means the assessments to be taken by a particular Learner for a GCSE Qualification in Biology, Chemistry or Physics. For clarity, the assessments taken by Learners may vary, depending on any possible routes through the qualification.

could be designed in a way that focuses too much on assessing superficial subject knowledge, rather than on deeper understanding of scientific ideas and concepts. In turn, this could lead to actual, or perceived, differences in demand across different specifications.

1.40 We have considered two approaches to addressing this issue:

- limiting the proportion of total marks available for questions/tasks that focus solely on rewarding recall of facts and other knowledge; and
- limiting the proportion of total marks that are used to reward recall of facts and other knowledge.

1.41 Both of these approaches would limit the extent to which questions could solely reward students for recalling facts they have learned. In both cases, single-mark questions requiring factual responses would count towards the specified limit, as would short-answer questions where the student simply has to recall facts to gain all the marks. Questions which require students to do more than just recall facts – for example where students need to select appropriate facts to evidence an argument – would not.

1.42 Where these approaches differ is in their treatment of questions which require students to recall knowledge in combination with something else – for example a question which requires students to ‘recall and apply’ knowledge.

1.43 Because the first approach focuses on individual questions, a single question requiring students to ‘recall and apply’ knowledge would not count towards the specified limit.

1.44 The second approach, however, targets any marks which are used to reward recall of facts and other knowledge, including where those marks are part of a larger question. So any marks awarded for recall within a ‘recall and apply’ question would count towards the specified limit.

1.45 Although this difference is subtle, it is important. The first approach would draw a distinction between an assessment which asks separate, linked questions requiring students to ‘recall’ and ‘apply’ knowledge (where the marks for recalling knowledge would count against the limit), and an otherwise identical assessment that uses single questions requiring students to ‘recall and apply’ knowledge (where the marks for recalling knowledge would not count against the limit). The second approach treats both these assessments in the same way.

1.46 We think that there is no material difference in demand between these two different ways of structuring questions. Treating them differently (which the first

approach would do) could potentially undermine comparability, and have undesirable impacts on assessment design.

- 1.47 Our view is that the second approach (a limit on the total marks which reward recall) is less likely to compromise comparability, or to have harmful impacts on assessment design. It is also slightly simpler. However, we would welcome views on both the options we have proposed.
- 1.48 We would also welcome views on what limit we should place on the proportion of total marks that reward recall of facts and other knowledge. Our view, as set out below, is that 15 per cent of total marks would be sufficient to allow exam boards to sample the full range of knowledge requirements in the subject content effectively.

AO1: Demonstrate knowledge and understanding of:			40%
<ul style="list-style-type: none"> ■ scientific ideas ■ scientific techniques and procedures. 			
Strands	Elements	Coverage	Interpretations and definitions
1 – Demonstrate knowledge and understanding of scientific ideas	This strand is a single element.	<ul style="list-style-type: none"> ■ Full coverage in each set of assessments¹⁶ (but not every assessment). 	<ul style="list-style-type: none"> ■ Scientific ideas are aspects of the subject content. They include the subject-specific requirements and the requirements for Working Scientifically as set out in the Content Document – for example, theories, models, methods and how these develop over time, as well as recall of mathematical formulae and units. ■ Scientific techniques and procedures encompasses, but is broader than, knowledge and understanding of the core practical activities. In the context of this assessment objective, it involves the knowledge and understanding of such techniques and procedures. ■ The emphasis in this assessment objective is on Learners recalling and communicating relevant knowledge and understanding from the course of study, for example, facts, definitions, explanations, how to do something and why it should be done in a particular way.
2 – Demonstrate knowledge and understanding of scientific techniques and procedures	This strand is a single element.	<ul style="list-style-type: none"> ■ No more than 15% of the total marks for the qualification should reward demonstrating knowledge in isolation.¹⁷ 	

¹⁶ For the purposes of this guidance, a 'set of assessments' means the assessments to be taken by a particular Learner for a GCSE Qualification in Biology, Chemistry or Physics. For clarity, the assessments taken by Learners may vary, depending on any possible routes through the qualification.

¹⁷ Marks which 'reward demonstrating knowledge in isolation' means any mark awarded solely for recalling facts or other knowledge that is part of the specification. It does not include marks awarded for selecting appropriate knowledge (for example to evidence an argument), or for applying knowledge to a particular context

AO2: Apply knowledge and understanding of:			40%
<ul style="list-style-type: none"> ■ scientific ideas ■ scientific enquiry, techniques and procedures. 			
Strands	Elements	Coverage	Interpretations and definitions
<p>1 - Apply knowledge and understanding of scientific ideas.</p>	<p>This strand is a single element.</p>	<ul style="list-style-type: none"> ■ Full coverage in each set of assessments (but not every assessment). 	<ul style="list-style-type: none"> ■ Scientific ideas are aspects of the subject content. They include the subject-specific requirements and the requirements for Working Scientifically as set out in the Content Document – for example, theories, models and the use of relevant mathematics. ■ Scientific enquiry, techniques and procedures encompasses, but is broader than, knowledge and understanding of the core practical activities. In the context of this assessment objective, it involves applying such knowledge and understanding to a given context. ■ The emphasis in this assessment objective is on Learners applying their knowledge and understanding to provide meaning or explanation, for instance to connect theory with particular contexts, stimuli or materials. This application should relate principally to: <ul style="list-style-type: none"> □ novel situations that are not clearly indicated in the specification; □ developing further material that is covered in the specification; □ making links between such types of material, which are not signalled in the specification. ■ Application of knowledge should also involve determining how to make sense of connections and linkages within data, information and detail; though not to the extent of drawing conclusions or making judgements.
<p>2 - Apply knowledge and understanding of scientific enquiry, techniques and procedures.</p>			

AO3: Analyse information and ideas to:			20%
<ul style="list-style-type: none"> ■ interpret and evaluate ■ make judgements and draw conclusions ■ develop and improve experimental procedures 			
Strands	Elements	Coverage	Interpretations and definitions
1 – Analyse information and ideas to interpret and evaluate.	1a – Analyse information and ideas to interpret.	<ul style="list-style-type: none"> ■ Full coverage in each set of assessments (but not every assessment). ■ Balanced coverage of all strands. 	<ul style="list-style-type: none"> ■ Develop and improve covers a range of approaches to assessment, including questions related to adapting, modifying and enhancing experimental procedures. Learners should not be expected to develop their own procedures. ■ Experimental procedures encompasses, but is broader than, the core practical activities. In the context of this assessment objective, questions/tasks should take an analytical form such as suggesting the limitations of a particular method. ■ The emphasis here is on the outcome that Learners produce through the analysis of information – for instance, the interpreting, evaluating, judgement, conclusion or modification/improvement of procedures that stems from their reasoning and synthesis of skills. The abilities to interpret and evaluate in this context are both linked and complementary. ■ Questions/tasks should address a range of sources here: for example, written, numerical, theoretical, practical, ethical, social, economic and environmental.
	1b – Analyse information and ideas to evaluate.		
2 – Analyse information and ideas to make judgements and draw conclusions.	2a – Analyse information and ideas to make judgements.		
	2b – Analyse information and ideas to draw conclusions.		
3 – Analyse information and ideas to develop and improve experimental procedures.	3a – Analyse information and ideas to develop experimental procedures.		
	3b – Analyse information and ideas to improve experimental procedures.		

2. Proposed rules and guidance for combined science

2.1 Our proposed rules and guidance for combined science GCSEs are largely identical to those described above for single science GCSEs. They include rules and guidance in relation to:

- content requirements in combined science;
- interpretation of subject content;
- tiering of assessments;
- assessment requirements and guidance;
- practical work;
- assessment objectives.

2.2 The differences in our rules and guidance for combined science are:

- Combined science GCSEs must comply with the combined science subject content, not the single science subject content.
- Grades awarded will use a 17-point grade scale (from 1-1, 2-1, 2-2 through to 8-8, 9-8, 9-9). We will be consulting separately on the detail of this approach. Students taking the higher tier will normally receive a grade between 4-4 and 9-9 (but may receive a grade 4-3). Students taking foundation tier will receive a grade between 1-1 and 5-5.
- Exams must allocate at least 20 per cent of the total marks to assessing relevant mathematical skills with a balance of 1:2:3 for biology, chemistry and physics respectively.
- A minimum total assessment time of 7 hours (compared with 3.5 hours for a single science GCSE).
- 16 required practical activities (compared to 8 for a single science GCSE).

Content requirements in combined science

2.3 The Department for Education has published a document that sets out the new content for GCSEs in combined science. All GCSEs in combined science must

comply with the requirements of that document,¹⁸ and with our assessment objectives.

2.4 To bring this about, we propose to introduce the following Condition:

Condition	Compliance with content requirements
GCSE(Combined Science)1	
GCSE(Combined Science)1.1	<p>In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must –</p> <ul style="list-style-type: none">(a) comply with the requirements relating to that qualification set out in the document published by the Secretary of State entitled ‘Combined Science GCSE subject content’,¹⁹ document reference DFE-00351-2014,(b) have regard to any recommendations or guidelines relating to that qualification set out in that document, and(c) interpret that document in accordance with any requirements, and having regard to any guidance, which may be published by Ofqual and revised from time to time.
GCSE(Combined Science)1.2	<p>In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must comply with any requirements, and have regard to any guidance, relating to the objectives to be met by any assessment for that qualification which may be published by Ofqual and revised from time to time.</p>

Interpretation of subject content

2.5 The subject content for all science GCSEs is written in a way which reflects the particular nature of the subject; it sets out expectations of students in terms of their ability to (for example) ‘describe’, ‘explain’, ‘analyse’ and ‘evaluate’ scientific ideas and knowledge.

2.6 Words such as these are typically used in exams to indicate how students should answer questions, and the complexity of response that is expected. Because of

¹⁸ www.gov.uk/government/publications/gcse-combined-science

¹⁹ www.gov.uk/government/publications/gcse-combined-science

this, the way the subject content is written could be interpreted as dictating how exam boards should write questions on particular scientific topics.

- 2.7 We have confirmed with the Department for Education that this is not the intention of the subject content. Instead, it is intended to set out the depth of knowledge and understanding expected of students in relation to particular scientific topics.
- 2.8 Similarly, Appendix 1 of the subject content sets out a list of equations that students should “be able correctly to recall, and apply”. This could be read as always requiring students to recall these equations – and not permitting questions which gave the equation and required students to apply it to a particular context. Again, this is not the intention of the subject content.
- 2.9 As for single science GCSEs, we are therefore proposing to publish the following rules which require exam boards to interpret the subject content in the way it was intended. We also invite views on whether further rules or guidance on the subject content are needed.

Requirements in relation to subject content for GCSE Qualifications in Combined Science

The subject content for GCSE Qualifications (graded 9 to 1) in Combined Science is set out in the Department for Education's *Combined Science GCSE subject content* document reference DFE-00351-2014 (the 'Content Document').

Condition GCSE(Combined Science)1.1(c) requires awarding organisations to interpret the Content Document in line with any requirements published by Ofqual.

We set out our requirements for the purposes of Condition GCSE(Combined Science)1.1(c) below.

Sampling of subject content

The Content Document uses a range of terms to indicate the depth to which knowledge, skills and understanding in relation to particular aspects of subject content should be covered and assessed. Such terms include (but are not limited to) 'describe', 'explain' and 'evaluate'. In relation to each of biology, chemistry and physics the Content Document states –

Awarding organisations may, however, use flexibility to increase depth, breadth or context within the specified topics or to consolidate teaching of the subject content.

In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must –

- (a) set the specification for that qualification on the basis that the terms in the Content Document described above provide an indication of the minimum depth of the knowledge, skills and understanding which Learners must be expected to demonstrate with respect to specific aspects of content, and
- (b) design and set the assessments for that qualification such that over time those assessments require Learners to demonstrate knowledge, skills and understanding of each specific aspect of content up to and including the full depth indicated in the specification (and therefore at least at the depth indicated by the Content Document).

Equations in physics

Paragraph (a) of Appendix 1 to the Content Document specifies a list of equations in physics that:

students should be able correctly to recall, and apply...

In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must –

- (a) interpret the above requirement in the Content Document as permitting awarding organisations to set individual questions and/or tasks which require Learners to –
 - (i) recall one or more of those specified equations;
 - (ii) recall, and then apply, one or more of those specified equations; and
 - (iii) apply one or more of those specified equations which is given in the question and/or task.
- (b) design and set the assessments for that qualification such that, over time, those assessments require Learners to demonstrate their ability to recall, and then apply, each of the equations listed in paragraph (a) of Appendix 1 to the Content Document.

Tiering of assessments

2.10 We have previously decided that all new combined science GCSEs will be tiered.

2.11 As with single science GCSEs, we need to introduce a Condition to allow tiering in new combined science GCSEs as the default position for GCSEs is that unless expressly allowed, tiering is not permitted. This proposed Condition (set out below) permits tiering in combined science, and requires exam boards to follow our published rules for tiering in combined science.

Condition **Assessing the full range of abilities**
GCSE(Combined
Science)2

GCSE(Combined **In respect of each GCSE Qualification Combined Science that**
Science)2.1 **an awarding organisation makes available, or proposes to**
 make available –

- (a) Condition GCSE 1.1 does not apply, and**
- (b) the awarding organisation must ensure that the**
qualification, and each assessment for it, complies with
any requirements which may be published by Ofqual and
revised from time to time.

2.12 To support this Condition, we are also proposing to publish more detailed rules that govern tiering. These rules implement our previous decisions that:

- exam boards must offer papers at two tiers – foundation tier and higher tier;
- mixed tier entry is not permitted, so students will need to take exclusively foundation tier papers, or exclusively higher tier papers.

2.13 In line with our proposals for single science GCSEs, higher tier papers in combined science will target grades 4 to 9, and foundation tier papers will target grades 1 to 5.

2.14 Students will be awarded grades using a 17 point scale (from 1-1, 2-1 and 2-2 through to 8-8, 9-8 and 9-9); we will be consulting on this approach – and on awarding of grades – later in the year. But we are proposing that students who narrowly miss the 4-4 grade at higher tier should be awarded a grade 4-3, rather than being unclassified.

2.15 Consistent with our approach for single science, we are also proposing to require exam boards to make sure that the assessments in combined science are designed to secure accurate classification of students and robust grading judgements.

2.16 Finally, we are proposing that exam boards should do all they can to ensure that grades 4-4, 5-4 and 5-5 are comparable across the two tiers. We are also specifying that one of the things exam boards must do to secure comparability is make sure that 20 per cent of marks come from questions that are common to both the foundation and higher tier papers (and therefore targeted at grades 4 and 5).

2.17 We set out our proposed tiering requirements below.

Tiering requirements – GCSE Qualifications in Combined Science

Condition GCSE(Combined Science)2.1(b) allows us to specify requirements relating to assessing the full range of abilities for each GCSE Qualification in Combined Science.

We set out below our requirements for the purposes of Condition GCSE(Combined Science)2.1(b). An awarding organisation must design, deliver and award each GCSE Qualification in Combined Science that it makes available, or proposes to make available, in accordance with these requirements.

Use of the overlapping tiers model

1. Each GCSE Qualification in Combined Science must be tiered. An awarding organisation must design and set the assessments for each GCSE Qualification in Combined Science which it makes available, or proposes to make available, using an overlapping tiers model.
2. Such a model must use two tiers – a foundation tier and a higher tier – and each assessment must be designed and set in such a way as to fall within one of those two tiers only.

Preclusion of mixed tier entry

3. An awarding organisation must ensure that each Learner is permitted to take assessments in either the foundation tier or the higher tier only.

Targeting of grades in each tier

4. The questions or tasks in foundation tier assessments must be targeted at the Level of Demand required for the award of grades 1 to 5.
5. The questions or tasks in higher tier assessments must be targeted at the Level of Demand required for the award of grades 4 to 9.

Awarding of grades in each tier

6. A Learner who takes foundation tier assessments must be awarded a grade within the range of 1-1 to 5-5, or be unclassified.
7. A Learner who takes higher tier assessments must be awarded a grade within the range of 4-4 to 9-9, or be unclassified. However, if the mark achieved by such a Learner is a small number of marks below the lower 4-4 grade boundary, that Learner may be awarded a grade 4-3.

Assessing the full range of abilities

8. An awarding organisation must ensure that the assessments within each tier allow each specified level of attainment available for that tier to be reached by a Learner who has attained the required level of knowledge, skills and understanding.
9. An awarding organisation must ensure that the assessments both within each tier, and taken together across both tiers –
 - (a) ensure sufficient differentiation²⁰ between Learners;
 - (b) ensure sufficient discrimination²¹ between Learners; and
 - (c) ensure the accurate and consistent setting of grades across the full range of attainments demonstrated by Learners.
10. In designing assessments, an awarding organisation must take all reasonable steps to ensure, at each tier, that Learners achieving the lowest targeted grade have demonstrated attainment with regard to a sufficient range of the subject requirements, in terms of the subject content and the assessment objectives. Equally, an awarding organisation must take all reasonable steps to ensure, at each tier, that Learners achieving the higher targeted grades must have demonstrated attainment with regard to suitably stretching and challenging requirements, in terms of the subject content and the assessment objectives.

The overlap at grades 4-4 to 5-5

11. An awarding organisation must take all reasonable steps in the design and delivery of the assessments and awarding processes to secure that the level of attainment (in terms of the subject content and the assessment objectives) indicated by grades 4-4, 5-4 and 5-5 is comparable regardless of the tier for which a Learner is entered. Each awarding organisation must demonstrate in its assessment strategy the steps it has taken to secure such comparability between tiers, including on an ongoing basis.
12. In particular, an awarding organisation must ensure that –

²⁰ For the purposes of these requirements, 'differentiation' means the provision of opportunities in an assessment for Learners to generate evidence demonstrating different levels of attainment according to their knowledge, skills and understanding.

²¹ For the purposes of these requirements, 'discrimination' means the rank ordering of Learners on the basis of the different levels of attainment they have demonstrated in an assessment or set of assessments.

- (a) at least 20% of the marks available in the assessments for each tier are made available through questions that are
- (i) common to both tiers, and
 - (ii) targeted at a Level of Demand consistent with grades 4 and 5, and
- (b) an appropriate proportion of marks for each tier are targeted at a Level of Demand consistent with grades 4 and 5.

Assessment requirements and guidance

2.18 In line with our approach for single science GCSEs, we are proposing to introduce equivalent rules and guidance around the assessments for GCSEs in combined science. In order to do this, we are proposing to introduce a Condition which requires exam boards to comply with the rules and have regard to the guidance.

Condition
GCSE(Combined
Science)3

Assessment

GCSE(Combined
Science)3.1 **An awarding organisation must ensure that in respect of each assessment for a GCSE Qualification in Combined Science which it makes available it complies with any requirements, and has regard to any guidance, which may be published by Ofqual and revised from time to time.**

2.19 As with single science subjects:

- we have confirmed the proposal from our previous consultation that 15 per cent of the total marks available in each science GCSE should be dedicated to students' understanding of practical work;
- following consultation feedback, we have decided to change our approach to mathematical skills – we have decided to increase the weighting of mathematical skills in combined science from 15 per cent to 20 per cent (balanced to reflect the weightings specified in single science GCSEs); and
- we have decided to confirm our proposal in respect of working scientifically, but will not impose separate requirements around knowledge and understanding of practical and theoretical contexts, and students' ability to organise and communicate information and ideas coherently.

- 2.20 Again, we are proposing to introduce requirements in relation to the minimum length of assessments.
- 2.21 We are proposing that assessments for a GCSE in combined science must total at least 7 hours. This is deliberately set at twice the time for a single science GCSE. This reflects the relative amounts of content in single and combined science. Combined science counts as two GCSEs, and we want to avoid actual (or perceived) differences in demand between different combinations of science GCSEs.
- 2.22 All of these rules are included in the draft assessment requirements set out below.

Assessment requirements – GCSE Qualifications in Combined Science

Condition GCSE(Combined Science)3.1 allows us to specify requirements in relation to assessments for a GCSE Qualification in Combined Science.

We set out below our requirements for the purposes of Condition GCSE(Combined Science)3.1. Awarding organisations must comply with these requirements in relation to each GCSE Qualification in Combined Science they make available.

Minimum assessment times

In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must design and set the assessments for that qualification on the basis that the total amount of time spent by each Learner in taking those assessments will be no less than seven hours.

Assessment of mathematical skills

The Content Document sets out the mathematical skills which must form part of each GCSE Qualification in Combined Science (the 'Mathematical Skills') in the 'Use of Mathematics' sections and individual content statements for biology, chemistry and physics, the mathematical forms of Working Scientifically and the appendices addressing different aspects of the mathematical requirements.

On page 6 of the Content Document it is stated –

The mathematics [outlined in the Content Document] should be at levels up to, but not beyond, the requirements specified in GCSE mathematics for the appropriate tier.

In designing and setting the assessments for each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must ensure that, taking the assessments for that qualification together –

- (a) the number of marks used to credit the relevant mathematical skills is no less than 20% of the total marks for the qualification allocated to questions and tasks related to biology, chemistry and physics in a ratio of 1:2:3,
- (b) the questions and tasks used to target Mathematical Skills are at a Level of Demand which –
 - (i) is appropriate to the subject,

- (ii) will allow effective differentiation between a range of attainments by Learners in relation to the subject content being assessed,
 - (iii) in respect of assessments for the foundation tier, is not lower than that which is expected of Learners at Key Stage 3²² as outlined in the Department for Education’s document ‘Mathematics programmes of study: key stage 3’ document reference DFE-00179-2013²³, and
 - (iv) in respect of assessments for the higher tier, is not lower than that of questions and tasks in assessments for the foundation tier in a GCSE Qualification in Mathematics.
- (c) without prejudice to the above requirements and those outlined in the Content Document, mathematical skills are assessed at an appropriate range of Levels of Demand in each set of assessments²⁴ and over the lifetime of the qualification.

Assessment of Learners in relation to practical work

In designing and setting the assessments for each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must ensure that, taking the assessments for that qualification together –

- (a) Learners’ knowledge, skills and understanding in relation to practical work is assessed across assessment objectives AO1 to AO3,
- (b) the number of marks used to credit such knowledge, skills and understanding is no less than 15 per cent of the sum of all of the marks allocated to assessment objectives AO1 to AO3,
- (c) the questions and tasks which test Learners’ knowledge, skills and understanding in relation to practical work draw on, and combine as appropriate, the theoretical and practical aspects of experimentation, and

²² As defined in section 82(1)(c) of the Education Act 2002.

²³

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239058/SECONDARY_national_curriculum - Mathematics.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239058/SECONDARY_national_curriculum_-_Mathematics.pdf)

²⁴ For the purposes of these requirements, a ‘set of assessments’ means the assessments to be taken by a particular Learner for a GCSE Qualification in Combined Science. For clarity, the assessments taken by Learners may vary, depending on any possible routes through the qualification.

(d) Learners are required to –

- (i) show and apply knowledge and understanding of practical activities, and
- (ii) apply scientific thinking, use experimental skills and strategies, and analyse and evaluate information.

Assessment of ‘working scientifically’

The Content Document states that –

Specifications should encourage the development of knowledge and understanding in science through opportunities for working scientifically. Awarding organisations should identify in their assessment strategy how, over a cycle of assessments, they will ensure that working scientifically is developed and assessed through the subject content.

Pages 7 to 8 of the Content Document go on to set out ‘the main ways in which working scientifically should be developed and assessed’.

In relation to working scientifically, an awarding organisation must design and set the assessments for each GCSE Qualification in Combined Science which it makes available, or proposes to make available, to ensure that, taking the assessments for that qualification together, Learners’ knowledge, skills and understanding is assessed across assessment objectives AO1 to AO3.

Practical work

2.23 Following our earlier consultation *Assessing practical work in GCSE science*,²⁵ we have decided that:

- New GCSEs in combined science will include a minimum of 16 practical activities. Individual specifications may require more than the minimum, and schools will also be free to do more practical work than is in the specification.
- The defined practical activities will set out the apparatus that students should use and the techniques they should develop.

²⁵ www.gov.uk/government/consultations/assessing-practical-work-in-gcse-science

- Schools will be required to confirm that they have taken reasonable steps to secure that their students to do the full range of practical work.
- Students will be required to keep contemporaneous records of their practical work.

2.24 To bring this about, we propose to introduce a new Condition, which will apply to GCSEs in combined science. Building on our previous decisions – and in line with the approach proposed for single science subjects – we are proposing that this Condition will:

- Require GCSEs in combined science to include at least 16 practical activities which, taken together, cover all the apparatus and techniques set out in the subject content for combined science.
- Require exam boards to require schools (or any other body that delivers GCSEs on their behalf) to provide an annual statement about practical work. If any school fails to provide this statement, exam boards must treat this as malpractice and/or maladministration, and take appropriate action.

2.25 As with single science subjects, we propose that exam boards should require schools to confirm they have taken reasonable steps to secure that each student they have entered for a GCSE in combined science has:

- completed the practical activities set by the exam board; and
- made contemporaneous records of both the work the student has undertaken during the practical activities, and what the student has learned from them.

2.26 The Condition also requires exam boards to set out the required practical activities in the specification for the qualification, and to update their practical activities if the required apparatus and techniques change.

2.27 We set out our proposed new Condition below.

Condition	Practical work
GCSE(Combined Science)4	In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must –
GCSE(Combined Science)4.1	(a) require each Learner to complete at least sixteen practical activities set by the awarding organisation, and

- (b) ensure that, taken together, those practical activities provide opportunities for each Learner to use all of the apparatus and techniques set out in the document published by the Secretary of State entitled ‘Combined Science GCSE subject content’²⁶, document reference DFE-00352-2014.

- GCSE(Combined Science)4.2** In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must –
- (a) review the practical activities which it has set following any revision by the Secretary of State of the apparatus or techniques specified in respect of that qualification, and
 - (b) revise those practical activities if appropriate.
- GCSE(Combined Science)4.3** In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must –
- (a) set out in the specification for that qualification the practical activities which each Learner must complete,
 - (b) promptly amend that specification when the awarding organisation makes any revision to those practical activities, and
 - (c) where such an amendment has been made to the specification, publish that specification as amended.
- GCSE(Combined Science)4.4** In respect of each assessment cycle for a GCSE Qualification in Combined Science which it makes available, an awarding organisation must –
- (a) require each Centre to provide a practical science statement to the awarding organisation, and
 - (b) treat any failure by a Centre to provide a practical science statement to the awarding organisation in a timely manner as malpractice and/or maladministration (under General Condition A8 (*Malpractice and maladministration*)).

²⁶ www.gov.uk/government/publications/gcse-single-science

- GCSE(Combined Science)4.5** For the purposes of this condition, a ‘practical science statement’ is a true and accurate written statement made by a Centre to an awarding organisation which confirms that it has taken reasonable steps to secure that each Learner to which that Centre has delivered the assessments to be taken in a particular assessment cycle for a GCSE Qualification in Combined Science which the awarding organisation makes available –
- (a) has completed the practical activities set by the awarding organisation, and
 - (b) has made a contemporaneous record of –
 - (i) the work which that Learner has undertaken during those practical activities, and
 - (ii) the knowledge, skills and understanding which that Learner has derived from those practical activities.

Assessment objectives

2.28 We have previously consulted on our proposed assessment objectives for GCSEs in combined science. As with the single science subjects, we have made a small change to the weighting of those assessment objectives (reducing the weighting of AO3 by 5 per cent and increasing the weighting of AO1 by 5 per cent) following consultation – this is to ensure our assessment objectives reflect the relative weightings of the different skills in the subject content.

2.29 As set out above for single science, we believe we need to allow exam boards limited flexibility to deviate from the prescribed assessment objective weightings. Our proposed approach is to allow assessments in any given year to vary assessment objective weightings by ± 3 per cent – but to require assessments to (on average) meet the specified weightings over a four-year period.

	Objective	Weighting
AO1	Demonstrate knowledge and understanding of: <ul style="list-style-type: none"> ■ scientific ideas ■ scientific techniques and procedures 	40%
AO2	Apply knowledge and understanding of:	40%

	<ul style="list-style-type: none"> ■ scientific ideas ■ scientific enquiry, techniques and procedures 	
AO3	<p>Analyse information and ideas to:</p> <ul style="list-style-type: none"> ■ interpret and evaluate ■ make judgements and draw conclusions ■ develop and improve experimental procedures 	20%
<p>In respect of each GCSE Qualification in Combined Science which it makes available, or proposes to make available, an awarding organisation must design and set the assessments on the basis that –</p> <p>(a) in each set of assessments the weightings in respect of the assessment objectives outlined above may vary by +/- 3%, and</p> <p>(b) taking together those assessments over each consecutive four-year period the weightings outlined above are achieved.</p>		

Guidance on assessment objectives

2.30 Since the assessment objectives are the same for combined and single science, we are consulting on the same guidance on assessment objectives for both combined and single science.

2.31 As with the single science subjects, we have particular concerns that assessments for combined science might focus too heavily on assessing superficial subject knowledge, rather than on deeper understanding of scientific ideas and concepts. In turn, this could lead to actual, or perceived, differences in demand across different specifications.

2.32 We have considered two approaches to addressing this issue:

- limiting the proportion of total marks available for questions/tasks that focus solely on rewarding recall of facts and other knowledge; and
- limiting the proportion of total marks that are used to reward recall of facts and other knowledge.

2.33 As explained in more detail in paragraphs 1.39 to 1.47 above, our view is that the second approach (a limit on the total marks which reward recall) is less likely to compromise comparability, or to have harmful impacts on assessment design. It

is also slightly simpler. However, we would welcome views on both the options we have considered.

- 2.34 We would also welcome views on what limit we should place on the proportion of total marks that reward recall of facts and other knowledge. Again, our view (set out below) is that 15 per cent of total marks would be sufficient to allow exam boards to sample the full range of knowledge requirements in the subject content effectively.

AO1: Demonstrate knowledge and understanding of:			40%
<ul style="list-style-type: none"> ■ scientific ideas ■ scientific techniques and procedures. 			
Strands	Elements	Coverage	Interpretations and definitions
1 – Demonstrate knowledge and understanding of scientific ideas.	This strand is a single element.	<ul style="list-style-type: none"> ■ Full coverage in each set of assessments²⁷ (but not every assessment). 	<ul style="list-style-type: none"> ■ Scientific ideas are aspects of the subject content. They include the subject-specific requirements and the requirements for Working Scientifically as set out in the Content Document – for example, theories, models, methods and how these develop over time, as well as recall of mathematical formulae and units. ■ Scientific techniques and procedures encompasses, but is broader than, knowledge and understanding of the core practical activities. In the context of this assessment objective, it involves the knowledge and understanding of such techniques and procedures. ■ The emphasis in this assessment objective is on Learners recalling and communicating relevant knowledge and understanding from the course of study, for example, facts, definitions, explanations, how to do something and why it should be done in a particular way.
2 – Demonstrate knowledge and understanding of scientific techniques and procedures.	This strand is a single element.	<ul style="list-style-type: none"> ■ No more than 15% of the total marks for the qualification should reward demonstrating knowledge in isolation.²⁸ 	

²⁷ For the purposes of this guidance, a ‘set of assessments’ means the assessments to be taken by a particular Learner for a GCSE Qualification in Combined Science. For clarity, the assessments taken by Learners may vary, depending on any possible routes through the qualification.

²⁸ Marks which ‘reward demonstrating knowledge in isolation’ means any marks awarded solely for recalling facts or other knowledge that is part of the specification. It does not include marks awarded for selecting appropriate knowledge (for example to evidence an argument), or for applying knowledge to a particular context.

AO2: Apply knowledge and understanding of:			40%
<ul style="list-style-type: none"> ■ scientific ideas ■ scientific enquiry, techniques and procedures. 			
Strands	Elements	Coverage	Interpretations and definitions
1 – Apply knowledge and understanding of scientific ideas.	This strand is a single element.	<ul style="list-style-type: none"> ■ Full coverage in each set of assessments (but not every assessment). 	<ul style="list-style-type: none"> ■ Scientific ideas are aspects of the subject content. They include the subject-specific requirements and the requirements for Working Scientifically as set out in the Content Document – for example, theories, models and the use of relevant mathematics. ■ Scientific enquiry, techniques and procedures encompasses, but is broader than, knowledge and understanding of the core practical activities. In the context of this assessment objective, it involves applying such knowledge and understanding to a given context. ■ The emphasis in this assessment objective is on Learners applying their knowledge and understanding to provide meaning or explanation, for instance to connect theory with particular contexts, stimuli or materials. This application should relate principally to: <ul style="list-style-type: none"> □ novel situations that are not clearly indicated in the specification; □ developing further material that is covered in the specification; □ making links between such types of material, which are not signalled in the specification. ■ Application of knowledge should also involve determining how to make sense of connections and linkages within data, information and detail; though not to the extent of drawing conclusions or making judgements.
2 – Apply knowledge and understanding of scientific enquiry, techniques and procedures.	This strand is a single element.		

AO3: Analyse information and ideas to:			20%
<ul style="list-style-type: none"> ■ Interpret and evaluate ■ Make judgements and draw conclusions ■ Develop and improve experimental procedures. 			
Strands	Elements	Coverage	Interpretations and definitions
1 – Analyse information and ideas to interpret and evaluate.	1a – Analyse information and ideas to interpret	<ul style="list-style-type: none"> ■ Full coverage in each set of assessments (but not every assessment) ■ Balanced coverage of all strands. 	<ul style="list-style-type: none"> ■ Develop and improve covers a range of approaches to assessment, including questions related to adapting, modifying and enhancing experimental procedures. Learners should not be expected to develop their own procedures. ■ Experimental procedures encompasses, but is broader than, the core practical activities. In the context of this assessment objective, questions/tasks should take an analytical form such as suggesting the limitations of a particular method. ■ The emphasis in this assessment objective is on the outcome that Learners produce through the analysis of information – for instance, the interpreting, evaluating, judgement, conclusion or modification/improvement of procedures that stems from their reasoning and synthesis of skills. The abilities to interpret and evaluate in this context are both linked and complementary. ■ Questions/tasks should address a range of sources here: for example, written, numerical, theoretical, practical, ethical, social, economic and environmental.
	1b – Analyse information and ideas to evaluate		
2 – Analyse information and ideas to make judgements and draw conclusions.	2a – Analyse information and ideas to make judgements		
	2b – Analyse information and ideas to draw conclusions		
3 – Analyse information and ideas to develop and improve experimental procedures.	3a – Analyse information and ideas to develop experimental procedures		
	3b – Analyse information and ideas to improve experimental procedures.		

3. Equality impact analysis

Ofqual's role, objectives and duties

- 3.1 We are subject to the public sector equality duty. We have set out in Appendix B how this duty interacts with our statutory objectives and other duties.

Equality impact analysis relating to proposed changes to GCSE qualifications

- 3.2 We have considered the potential impact on students who share protected characteristics²⁹ of the application of the principles and features that will apply to all new GCSE qualifications. Our equality impact analysis for our earlier consultation on GCSE reform³⁰ is therefore of interest and we encourage you to read it.
- 3.3 Any issues concerning the proposed content have been considered by the Department of Education, who have published their own Equalities Impact Analysis on their subject content proposals.³¹
- 3.4 We have also previously considered the potential impact on students who share protected characteristics of the policy proposals we are implementing for GCSE science.³²
- 3.5 We do not repeat here all of the evidence we have considered, as this can be found in our earlier reports. We focus instead on the specific issues that arise from the way in which we are implementing our previous policy decisions.
- 3.6 We have not identified any additional negative impacts on students who share protected characteristics which would result from our proposed approach to implementing assessment arrangements in GCSE science (beyond those that we have already identified in our earlier reports).

²⁹ For the purposes of the public sector equality duty, the protected characteristics are disability, racial group, age, religion or belief, pregnancy or maternity, sex, sexual orientation, gender reassignment.

³⁰ <http://webarchive.nationalarchives.gov.uk/20141110161323/http://comment.ofqual.gov.uk/gcse-reform-june-2013/category/8-equality-impact-analysis/>

³¹ www.gov.uk/government/publications/gcses-reformed-content

³² www.gov.uk/government/consultations/assessing-practical-work-in-gcse-science

- 3.7 During this consultation, we will continue to seek and consider evidence and feedback to our proposals that might help us identify any potential subject-specific impacts on students who share a protected characteristic.
- 3.8 Exam boards are required to consider the accessibility of their qualifications at the design stage and to remove any unjustifiable barriers.

Responding to the consultation

Your details

To evaluate responses properly, we need to know who is responding to the consultation and in what capacity. We will therefore only consider your response if you complete the following information section.

We will publish our evaluation of responses. Please note that we may publish all or part of your response unless you tell us (in your answer to the confidentiality question) that you want us to treat your response as confidential. If you tell us you wish your response to be treated as confidential, we will not include your details in any published list of respondents, although we may quote from your response anonymously.

Please answer all questions marked with a star*

Name*

Position*

Organisation name (if applicable)*

Address

Email

Telephone

Would you like us to treat your response as confidential?*

If you answer yes, we will not include your details in any list of people or organisations that responded to the consultation.

- Yes No

Is this a personal response or an official response on behalf of your organisation?*

Personal response (please answer the question “If you ticked ‘Personal response’...”)

Official response (please answer the question “If you ticked ‘Official response’...”)

If you ticked “Personal response”, which of the following are you?

- Student
- Parent or carer
- Teacher (but responding in a personal capacity)
- Other, including general public (please state below)

If you ticked “Official response ”, please respond accordingly:

Type of responding organisation*

- Awarding organisation
- Local authority
- School or college (please answer the question below)
- Academy chain
- Private training provider
- University or other higher education institution
- Employer
- Other representative or interest group (please answer the question below)

School or college type

- Comprehensive or non-selective academy
 - State selective or selective academy
 - Independent
 - Special school
 - Further education college
 - Sixth form college
 - Other (please state below)
-

Type of representative group or interest group

- Group of awarding organisations
 - Union
 - Employer or business representative group
 - Subject association or learned society
 - Equality organisation or group
 - School, college or teacher representative group
 - Other (please state below)
-

Nation*

- England
- Wales
- Northern Ireland
- Scotland
- Other EU country: _____
- Non-EU country: _____

How did you find out about this consultation?

Our newsletter or another one of our communications

Our website

Internet search

Other

May we contact you for further information?

Yes No

Questions

Single Science

Question 1

Do you have any comments on our approach to securing awarding organisations' compliance with subject content for new biology, chemistry and physics GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 2

Do you have any comments on our proposed requirements for interpreting the subject content for new biology, chemistry and physics GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 3

Do you have any comments on our proposed Condition and requirements for tiering in new biology, chemistry and physics GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 4

Do you have any comments on our proposed Condition and requirements for assessments in new biology, chemistry and physics GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 5

Do you have any comments on our proposed Condition covering practical work in new biology, chemistry and physics GCSEs?

Yes No

If yes, please provide them here:

.....
.....
.....
.....
.....
.....

Question 6

Do you have any comments on what we propose must be covered by the 'practical science statement' to be made by schools in new biology, chemistry and physics GCSEs?

Yes No

If yes, please provide them here:

.....
.....
.....
.....
.....
.....

Question 7

Do you have any comments on our proposed approach to targeting assessment objectives in new biology, chemistry and physics GCSEs?

Yes No

If yes, please provide them here:

.....
.....
.....
.....
.....
.....

Question 8

Do you have any comments on the draft guidance on assessment objectives for new biology, chemistry and physics GCSEs?

Yes No

If yes, please provide them here:

.....
.....
.....
.....
.....
.....

Question 9

Do you have any comments on our proposed approach to limiting the amount of recall rewarded by new biology, chemistry and physics GCSEs, including the proposed limit of 15 per cent of the marks?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Combined Science

Question 10

Do you have any comments on our approach to securing awarding organisations' compliance with subject content for new combined science GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 11

Do you have any comments on our proposed requirements for interpreting the subject content for new combined science GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 12

Do you have any comments on our proposed Condition and requirements for tiering in new combined science GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 13

Do you have any comments on our proposed Condition and requirements for assessments in new combined science GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 14

Do you have any comments on our proposed Condition covering practical work in new combined science GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 15

Do you have any comments on what we propose must be covered by the ‘practical science statement’ to be made by schools in new combined science GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 16

Do you have any comments on our proposed approach to targeting assessment objectives in new combined science GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 17

Do you have any comments on the draft guidance on assessment objectives for new combined science GCSEs?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 18

Do you have any comments on our proposed approach to limiting the amount of recall rewarded by new combined science GCSEs, including the proposed limit of 15 per cent of the marks?

Yes No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

General questions

Question 19

We have not identified any ways in which our proposals for new single and combined science GCSEs would impact (positively or negatively) on persons who share a protected characteristic.³³ Are there any potential impacts we have not identified?

() Yes () No

If yes, please provide them here:

.....

.....

.....

.....

.....

.....

Question 20

Are there any additional steps we could take to mitigate any negative impact resulting from these proposals on persons who share a protected characteristic?

() Yes () No

If yes, please comment on the additional steps we could take to mitigate negative impacts:

.....

.....

.....

.....

³³ 'Protected characteristic' is defined in the Equality Act 2010. Here, it means disability, racial group, age, religion or belief, pregnancy or maternity, sex, sexual orientation and gender reassignment.

.....
.....

Question 21

Have you any other comments on the impacts of the proposals on students who share a protected characteristic?

Yes No

If yes, please provide them here:

.....
.....
.....
.....
.....
.....

Question 22

Do you have any comments on the impacts of our proposals on schools and/or awarding organisations?

Yes No

If yes, please provide them here:

.....
.....
.....
.....
.....
.....

Appendix A: Regulatory tools

Comparability and innovation

Exam boards operate in a market. They can design and deliver their qualifications in different ways, within the parameters we set. This provides some choice to schools or colleges, which is one of the benefits of a qualifications market. Exam boards must, however, make sure that the levels of attainment indicated by their qualifications are comparable to those of other exam boards' versions of the qualifications. The exam boards cooperate in a range of ways to make sure that the standards of their respective qualifications are comparable. To make sure standards are maintained and comparability is secured, we review GCSE, AS and A levels before they can be made available, by applying an accreditation requirement to the qualifications, and we oversee the awarding of GCSE, AS and A levels.

We do not wish to close down opportunities for exam boards to design and deliver their qualifications in different ways. Indeed, we have a statutory duty to have regard to the desirability of facilitating innovation in connection with the provision of regulated qualifications and a statutory objective with regard to the efficiency with which the qualifications market works. If we adopt a regulatory approach in which all aspects of a qualification are very tightly defined, we could effectively remove scope for exam boards to distinguish their qualifications from others and stop choice for schools or colleges. On the other hand, if exam boards have too much scope to vary their approach their qualifications might not be comparable.

In striking a balance, we use a range of tools to regulate qualifications and the exam boards that provide them. The main regulatory tools we use for the qualifications in this consultation are explained below.

Conditions of Recognition

Exam boards must comply at all times with our Conditions of Recognition. These are the main regulatory rules that we use. We can take regulatory action against an exam board that breaches or is likely to breach a Condition.

There are three sets of Conditions that will apply to new GCSEs (together 'the Conditions'):

- (i) the published *General Conditions of Recognition*³⁴ that apply to all regulated qualifications;

³⁴ www.gov.uk/government/publications/general-conditions-of-recognition

- (ii) GCSE (9 to 1) Qualification Level Conditions and Requirements³⁵ that apply to all new GCSEs;
- (iii) GCSE Subject Level Conditions that apply to a new GCSE in a specific subject – we are consulting now on draft GCSE Subject Level Conditions that will apply to science subjects. There will be two separate sets of Subject Level Conditions – one for GCSEs in biology, chemistry and physics, and one for GCSEs in combined science.

Regulatory documents

In some Conditions we refer to published regulatory requirements. We publish these in regulatory documents. The Conditions require exam boards to comply with such documents.

We are proposing two separate sets of regulatory documents – one set for biology, chemistry and physics, and one for combined science. These documents cover our requirements in relation to:

- tiering of assessments;
- assessments; and
- apparatus and techniques.

The requirements will have effect as if they were part of a Condition. The requirements will be set out in a stand-alone section of the Conditions document, simply because they are technical and detailed so they sit better as separate to, rather than within, the Condition itself.

Statutory guidance

We publish guidance to help exam boards identify the types of behaviour or practices they could use to meet a Condition. Exam boards must have regard to such guidance, but they do not have to follow this guidance in the same way that they must comply with the Conditions; they are free to meet the outcomes of the Conditions in their own ways. An exam board that decides to take a different approach to that set out in guidance must still be able to show that it is meeting the Condition or Conditions to which the guidance relates.

We are consulting now on two separate sets of draft guidance – one for biology, chemistry and physics, and one for combined science.

³⁵ www.gov.uk/government/publications/gcse-9-to-1-qualification-level-conditions

Appendix B: Ofqual's role, objectives and duties

Our statutory objectives include the qualifications standards objective, which is to secure that the qualifications we regulate:

- (a) give a reliable indication of knowledge, skills and understanding; and
- (b) indicate:
 - (i) a consistent level of attainment (including over time) between comparable regulated qualifications; and
 - (ii) a consistent level of attainment (but not over time) between qualifications we regulate and comparable qualifications (including those awarded outside of the UK) that we do not regulate.

We must therefore regulate so that qualifications properly differentiate between students who have demonstrated that they have the knowledge, skills and understanding required to attain the qualification and those who have not.

We also have a duty under the Apprenticeship, Skills, Children and Learning Act 2009 to have regard to the reasonable requirements of relevant students, including those with special educational needs and disabilities, of employers and of the higher education sector, among others, and to aspects of government policy when so directed by the Secretary of State.

As a public body, we are subject to the public sector equality duty.³⁶ This duty requires us to have due regard to the need to:

- (a) eliminate discrimination, harassment, victimisation and any other conduct that is prohibited under the Equality Act 2010;
- (b) advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it;
- (c) foster good relations between persons who share a relevant protected characteristic and persons who do not share it.

The exam boards that design, deliver and award GCSE, AS and A levels are required by the Equality Act, among other things, to make reasonable adjustments for disabled people taking their qualifications, except where we have specified that such adjustments should not be made.

³⁶ Equality Act 2010, section 149.

When we decide whether such adjustments should not be made, we must have regard to:

- (a) the need to minimise the extent to which disabled persons are disadvantaged in attaining the qualification because of their disabilities;
- (b) the need to secure that the qualification gives a reliable indication of the knowledge, skills and understanding of a person upon whom it is conferred;
- (c) the need to maintain public confidence in the qualification.

Legislation therefore sets out a framework within which we must operate. We are subject to a number of duties and we must aim to achieve a number of objectives. These different duties and objectives can, from time to time, conflict with each other. For example, if we regulate to secure that a qualification gives a reliable indication of a student's knowledge, skills and understanding, a student who has not been able to demonstrate the required knowledge, skills and/or understanding will not be awarded the qualification. A person may find it more difficult, or impossible, to demonstrate the required knowledge, skills and/or understanding because they have a protected characteristic. This could put them at a disadvantage relative to others who have been awarded the qualification. It is not always possible for us to regulate so that we can both secure that qualifications give a reliable indication of knowledge, skills and understanding and advance equality between people who share a protected characteristic and those who do not. We must review all the available evidence and actively consider all the available options before coming to a final, rational decision.

Qualifications cannot be used to mitigate inequalities or unfairness in the education system or in society more widely than might affect, for example, students' preparedness to take the qualification and the assessments within it. While a wide range of factors can have an impact on a student's ability to achieve a particular mark in an assessment, our influence is limited to the way the qualification is designed and assessed.

We require the exam boards to design qualifications to give a reliable indication of the knowledge, skills and understanding of those on whom they are conferred. We also require the exam boards to avoid, where possible, features of a qualification that could, without justification, make a qualification more difficult for a student to achieve because they have a particular protected characteristic. We require exam boards to monitor whether any features of their qualifications have this effect.

In setting the overall framework within which exam boards will design, assess and award the reformed GCSE, AS and A levels, we want to understand the possible impacts of the proposals on persons who share a protected characteristic.

The protected characteristics under the Equality Act 2010 are:

- age;
- disability;
- gender reassignment;
- marriage and civil partnerships;
- pregnancy and maternity;
- race;
- religion or belief;
- sex;
- sexual orientation.

It should be noted that with respect to the public sector equality duty under section 149 of the 2010 Act, we are not required to have due regard to impacts on those who are married or in a civil partnership.

We wish to make our publications widely accessible. Please contact us at publications@ofqual.gov.uk if you have any specific accessibility requirements.



© Crown copyright 2015

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit <http://nationalarchives.gov.uk/doc/open-government-licence/version/3> or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: publications@ofqual.gov.uk.

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

This publication is available at www.gov.uk/ofqual.

Any enquiries regarding this publication should be sent to us at:

Office of Qualifications and Examinations Regulation

Spring Place
Coventry Business Park
Herald Avenue
Coventry CV5 6UB

2nd Floor
Glendinning House
6 Murray Street
Belfast BT1 6DN

Telephone 0300 303 3344

Textphone 0300 303 3345

Helpline 0300 303 3346