

AS and A Level Science (Biology, Chemistry and Physics)

Consultation on Conditions and Guidance



June 2015

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About this consultation

We are seeking views on the additional rules and guidance that we propose to put in place for the new A level qualifications in biology, chemistry and physics which are to be taught in England from September 2015.

These new rules relate to the assessment of A level students' practical skills and associated requirements on marking, results and certification.

We have already accredited all the new AS and A level qualifications in biology, chemistry and physics which will be taught from September 2015. The specifications for these new qualifications currently include provisional information about the practical skills assessments. We are now consulting on the detailed rules and guidance that we propose to put in place for these assessments.

We are also consulting on the consolidation of the rules and guidance in relation to biology, chemistry and physics into one single set of documents which will apply to all three subjects.

After this consultation, when we have put in place the final rules and guidance, exam boards will make appropriate changes to the practical skills sections of their specifications (as needed). The exam boards will not need to resubmit their amended specifications for accreditation.

This consultation follows on from our earlier consultation on new AS and A level regulatory requirements.¹ We do not repeat the policy proposals we consulted on in that earlier consultation, or the options we considered when we did so.

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

Further information about the reform of AS and A level qualifications 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/a-level-regulatory-requirements-october-2013/>

Summary of our proposals

Earlier decisions

We are consulting on new Conditions and requirements to implement the following decisions which we have taken following our policy consultation on AS and A level science:

- Exam boards must require that A level students undertake at least 12 practical activities.
- Students who demonstrate the required skills in the practical activities will get a Pass grade which will be reported alongside the separate grade for their written exams.²
- The A level exams will include questions set in the context of the practical activities and will reward students who show the knowledge and understanding they gained from undertaking practical work.
- Students taking AS science will not be required to undertake a separate practical assessment but their knowledge and understanding of practical skills will be assessed in the exams.

Current proposals:

Consolidation of rules and guidance for biology, chemistry and physics

- The rules and guidance for biology, chemistry and physics will be consolidated into a single set of documents that apply to all three sciences.

Assessment arrangements

- Students' practical skills will be directly assessed by teachers (although we propose to make provision for students to be directly assessed by the exam boards where desirable or necessary).
- The assessment criteria for the practical assessment will be common across all exam boards.
- In order to achieve a Pass in the practical assessment, a student must consistently and routinely demonstrate all of the required competencies by the end of the course.

Monitoring

- Exam boards will monitor how schools provide students with opportunities to develop and demonstrate the required practical skills and how they mark the assessments.

- Exam boards must make sure that every school is monitored at least once in a two-year period in respect of at least one of biology, chemistry and physics.
- Exam boards may choose to coordinate their monitoring activities and to communicate their findings with each other, so as to reduce both the number of monitoring visits a school receives and costs.
- Each exam board must require schools to provide it with a statement confirming they have taken reasonable steps to secure that students:
 - undertook the 12 practical activities, and
 - made a contemporaneous record of their work.
- If a school fails to provide a statement, or provides a false statement, the exam board must treat that as malpractice and/or maladministration.

Marking and results

- There will be two separate results reported in respect of each A level qualification in biology, chemistry and physics – one for the practical assessment and one for the written exams.
- No account should be taken of the result for one part of the qualification when assessing the outcome of the other part of the qualification.
- A student may carry their practical assessment result forward for the lifetime of the qualification, if they resit their written exams.
- Students will only get a certificate if they achieve at least a grade E in the examined part of the qualification.
- Students who do not pass the practical assessment will have a 'Not Classified' outcome included on their certificate unless they were exempt from the assessment because of their disability.
- If a disabled student is exempt from the practical assessment, his or her certificate will be designed in line with our approach to exemptions generally

² The practical science assessment is an assessment of a student's competency in the skills and their use of the apparatus and techniques outlined in the Secretary of State's content document for AS and A level biology, chemistry, physics and psychology: www.gov.uk/government/publications/gce-as-and-a-level-for-science

(which is set out in our *Specifications in Relation to the Reasonable Adjustment of General Qualifications*³).

How to respond to this consultation

The closing date for responses is 6th July 2015.

Please respond to this consultation in one of three ways:

- Complete the online response at www.surveygizmo.co.uk/s3/2176080/A-level-reform-regulations-for-biology-chemistry-and-physics.
- Email your response to consultations@ofqual.gov.uk. Please include the consultation title (*A Level Practical Science Consultation 2015*) in the subject line of the email and make clear who you are and in what capacity you are responding.
- Post your response to A Level Practical 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 6th July 2015.

³ www.gov.uk/government/publications/specifications-in-relation-to-the-reasonable-adjustment-of-general-qualifications

1. Proposed rules for new A levels in Science (Biology, Chemistry and Physics)

- 1.1 We are proposing to introduce additional rules and guidance for new A levels in biology, chemistry and physics. These provisions relate primarily to the practical science assessment, including the marking of the assessment, exam board monitoring of schools and how the outcome of the assessment will be reported on the certificate.
- 1.2 At present, our Conditions, requirements and guidance in relation to GCE qualifications in biology,⁴ chemistry⁵ and physics⁶ are contained in separate sets of documents for each of those subjects, even though those rules and guidance are, for the most part, the same. In line with the approach we have taken with modern foreign language subjects (in French, German and Spanish), we are proposing to bring the three sets of documents for biology, chemistry and physics together into one set that applies to all three subjects.
- 1.3 In doing so, neither the current first Condition, which states that exam boards must adhere to the content developed by the Secretary of State and the assessment objectives specified by Ofqual, nor the assessment objectives and associated guidance will change. We include the proposed new Condition GCE(Science)1, the assessment objectives and the associated guidance at Appendices C, D and E to this consultation.
- 1.4 In addition to bringing the three sets of documents together into one single set of rules and guidance for biology, chemistry and physics, we also propose to add to these rules by putting in place requirements in relation to practical science assessments.

⁴ www.gov.uk/government/publications/gce-subject-level-conditions-and-requirements-for-biology and www.gov.uk/government/publications/gce-subject-level-guidance-for-biology

⁵ www.gov.uk/government/publications/gce-subject-level-conditions-and-requirements-for-chemistry and www.gov.uk/government/publications/gce-subject-level-guidance-for-chemistry

⁶ www.gov.uk/government/publications/gce-subject-level-conditions-and-requirements-for-physics and www.gov.uk/government/publications/gce-subject-level-guidance-for-physics

Rules for A level practical science assessments

1.5 Following our October 2013 *Consultation on New A Level Regulatory Requirements*⁷ we have decided the following:

- Exam boards must require that A level science students undertake at least 12 practical activities in order to develop and demonstrate the practical skills required by the subject content.
- Students who demonstrate the required skills will get a Pass grade which will be reported alongside the separate grade for their written exams.
- The A level exams will include questions set in the context of the practical activities and will reward students who show the knowledge and understanding they gained from undertaking the practical work.
- Students taking AS science qualifications will not be required to undertake a separate practical assessment but their knowledge and understanding of practical skills will be assessed in the exams.⁸

1.6 To implement these decisions, we are proposing to introduce new Conditions for GCE Science (Biology, Chemistry and Physics), supported by more detailed rules.

1.7 Our proposed Conditions would require exam boards to:

- include practical activities and the assessment of students' practical skills in their specifications;
- require schools to provide them with an annual statement confirming that those schools have taken reasonable steps to secure that students:
 - have undertaken at least 12 practical activities, and
 - made a contemporaneous record of their work;
- determine the outcomes of a learner's exam assessments and practical assessments each in isolation from the other;

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<http://webarchive.nationalarchives.gov.uk/20141031163546/http://ofqual.gov.uk/documents/consultation-on-new-a-level-regulatory-requirements/>

⁸ See our April 2014 update on reforms:

www.gov.uk/government/uploads/system/uploads/attachment_data/file/375890/2014-04-08-an-update-on-the-reforms-being-made-to-as-qualifications-and-a-levels.pdf

- comply with our requirements on reporting the outcome of the practical science assessments on certificates; and
 - allow students to carry forward the outcome of their practical assessment in the event that they resit their exam assessments, to avoid unnecessary repetition and cost.
- 1.8 In addition, we propose to lift General Condition H2 (of our *General Conditions of Recognition*⁹), which requires exam boards to moderate marks whenever an assessment is marked by a school. We propose to lift this rule to make provision instead for a more tailored monitoring regime. Practical science assessments could only be effectively moderated by exam boards if schools made an audiovisual recording of all students undertaking the practical assessments. Such a requirement would be unduly burdensome. We propose instead to require exam boards to monitor how schools are providing and marking the assessments, thus ensuring that an appropriate quality assurance mechanism is in place.
- 1.9 We also propose to lift GCE 4.1 (one of our GCE Qualification Level Conditions which apply to all reformed AS and A levels). This Condition requires all assessment to be by exam. By lifting this Condition, we will allow the practical assessments to take place.
- 1.10 As set out above, we are proposing a Condition that obliges exam boards to require schools to provide them with an annual statement confirming that they have taken reasonable steps to secure that students have both completed 12 practical activities, and made a contemporaneous record of their work. This reflects both the approach that we have taken, or that we are proposing to take in other subjects (for example practical skills in GCSE science, and the spoken language assessment in GCSE English language), and the importance of the practical science assessment in A level biology, chemistry and physics.
- 1.11 In the event that a practical science statement is not submitted by a school, then this could be treated as maladministration or malpractice depending on reason behind the school's failure to submit the statement. If it was an unintentional error (for example the statement was completed but sent to the incorrect email address) then it is likely that this would be treated as an incident of maladministration. However, if the failure to submit an accurate statement was intentional, then this is likely to be treated as an incident of malpractice.

⁹ www.gov.uk/government/uploads/system/uploads/attachment_data/file/371266/2014-11-03-general-conditions-of-recognition-november.pdf

1.12 We set out our proposed new Conditions below.

GCE(Science)2 Practical skills

GCE(Science)2.1 In respect of each GCE A level 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 12 practical activities, and
- (b)** ensure that, taken together, those practical activities provide opportunities for each Learner to use and be assessed in relation to all of the skills, apparatus and techniques specified in relation to the qualification in appendices 5a to 5c to the document published by the Secretary of State entitled ‘GCE AS and A level subject content for biology, chemistry, physics and psychology’¹⁰ document reference DFE-00356-2014.

GCE(Science)2.2 In respect of each GCE A level 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 requires each Learner to complete following any revision by the Secretary of State of the skills, apparatus or techniques specified in respect of that qualification, and
- (b)** revise those practical activities if appropriate.

GCE(Science)2.3 In respect of each GCE A level 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 –
 - (i)** its requirements in relation to the practical activities which each Learner must complete, and
 - (ii)** in particular, the skills and techniques which those practical activities must allow each Learner to

¹⁰ www.gov.uk/government/publications/gce-as-and-a-level-for-science

demonstrate and the apparatus which those practical activities must allow each Learner to use, and

(b) promptly amend that specification when the awarding organisation makes any revision to those skills, techniques or apparatus, or those practical activities, and

(c) where such an amendment has been made to the specification, publish that specification as amended.

GCE(Science)2.4 In respect of each assessment cycle for a GCE A level 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)).

GCE(Science)2.5 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 each A level qualification in Biology, Chemistry or Physics which the awarding organisation makes available has –

(a) completed at least 12 practical activities as required by the awarding organisation, and

(b) made a contemporaneous record of the work which that Learner has undertaken during those practical activities.

GCE(Science)3 Practical science assessments

GCE(Science)3.1 In respect of a practical science assessment for each GCE A level qualification in Biology, Chemistry or Physics that an

awarding organisation makes available or proposes to make available –

(a) Condition H2 does not apply,

(b) Condition GCE4.1 does not apply, and

(c) that assessment must not be an Assessment by Examination.

GCE(Science)3.2 An awarding organisation must ensure that in respect of each practical science assessment for each GCE A level qualification in Biology, Chemistry or Physics 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.

GCE(Science)3.3 For the purposes of this condition, a practical science assessment is an assessment –

(a) of a Learner’s competency in the skills outlined in appendix 5b, and the use of the apparatus and techniques outlined in the relevant section of appendix 5c, to the document published by the Secretary of State entitled ‘GCE AS and A level subject content for biology, chemistry, physics and psychology’,¹¹ document reference DFE-00356-2014,

(b) as evidenced by the Learner’s performance in at least 12 practical activities as required by the awarding organisation under Condition GCE(Science)2.1.

GCE(Science)4 Marking and results

GCE(Science)4.1 In respect of each GCE A level qualification in Biology, Chemistry or Physics which it makes available an awarding organisation must calculate and publish the following two separate results for each Learner –

¹¹ www.gov.uk/government/publications/gce-as-and-a-level-for-science

(a) a result for the Assessments by Examination to be taken for that qualification, and

(b) a result for the practical science assessment.

GCE(Science)4.2 In respect of each GCE A level qualification in Biology, Chemistry or Physics which it makes available, an awarding organisation must ensure that an Assessor does not have any regard to a Learner's –

(a) result for the practical science assessment in calculating that Learner's final mark and result for the Assessments by Examination, and/or

(b) final mark or result for the Assessments by Examination in determining that Learner's result for the practical science assessment.

GCE(Science)4.3 In respect of each practical science assessment an awarding organisation must ensure that it complies with any Certificate Requirements in relation to that assessment which may be published by Ofqual and revised from time to time.

GCE(Science)4.4 In respect of each GCE A level qualification in Biology, Chemistry or Physics which it makes available, an awarding organisation must ensure that –

(a) a Learner may use the result for a practical science assessment which he or she has taken for a GCE A level qualification in the same science subject made available by the awarding organisation or another awarding organisation, and

(b) that Learner is not required to take a further practical science assessment before being awarded the qualification.

GCE(Science)4.5 For the purposes of this condition, a practical science assessment has the same meaning as in Condition **GCE(Science)3.3**.

1.13 To support these Conditions, we are also proposing to introduce more detailed requirements in relation to the practical science assessments, the monitoring by

exam boards of the way schools conduct the assessments and the certificate requirements.

Requirements in relation to practical science assessments

- 1.14 We propose to require exam boards to make sure that the practical science assessments taken by students allow them to demonstrate the required skills.
- 1.15 Students are likely to take their practical assessments at different times throughout the course. In view of the number of different skills they must demonstrate and the number of students who will be taking the assessments, it would be unmanageable for the exam boards to mark the assessments directly. Our draft requirements therefore provide for teachers to mark the assessments. However, it might occasionally be necessary for alternative marking arrangements to be made – for example, if a teacher in a small school is unexpectedly absent. The draft requirements therefore permit the exam boards to mark the assessments too.
- 1.16 We propose that exam boards should set out in their assessment strategies the steps they will take to reduce the risk that the assessments will not be properly conducted or marked.
- 1.17 We also set out in the proposed requirements the competencies that students must demonstrate in order to be awarded a Pass and the assessment criteria that markers must use when determining whether a student has demonstrated the required competencies. This will ensure that all students are assessed using the same criteria regardless of the exam board that is awarding the qualification. It will also enable students to carry forward their practical science result if they decide to resit their written exams either with the same or with a different exam board.
- 1.18 We are proposing that in order to be awarded a Pass, a student must consistently and routinely demonstrate all of the competencies by the end of the course. The reason we are proposing to require that all of the competencies must be met, rather than allowing for students meeting just some, or even most of them to be awarded a pass, is that this assessment is competence-based. There are a number of things that students must be able to do at an acceptable level. It would not be suitable within this assessment to allow strengths in some areas to counterbalance weaknesses in others; except where relative weaknesses are still of a Pass standard or above. For example, if a student cannot work safely, that would be a significant issue, and it would not be appropriate to allow for this to be compensated for by another competency, such as their ability to use appropriate software and/or tools to process data, carry out research and report findings.

1.19 We propose that exam boards must monitor how schools provide their students with opportunities to take the practical science assessments and how they mark¹² them. Such monitoring will provide an extra safeguard that students are being given appropriate opportunities to develop their practical skills. The frequency of monitoring and the number of each of the science subjects looked at during a monitoring visit will affect the resources that both schools and exam boards devote to monitoring. We propose in our draft requirements that each exam board must make sure that at least some of a school's practical science assessments are monitored at least once in a two-year period.

1.20 We also propose that exam boards should not have to monitor each school individually. Instead, they should be able to coordinate their monitoring activities. This would allow them to spread and contain the costs of monitoring and avoid schools being monitored on multiple occasions by different exam boards.

1.21 We set out below our requirements in relation to practical science assessments:

Requirements in relation to practical science assessments

Condition GCE(Science)3.2 allows us to specify requirements and guidance in relation to practical science assessments (as defined in Condition GCE(Science)3.3) for GCE Science qualifications in Biology, Chemistry and Physics.

We set out our requirements for the purposes of Condition GCE(Science)3.2 below.

Form of the practical science assessment

An awarding organisation must ensure that each practical science assessment is designed and set in such a way as to allow a Learner who has demonstrated the competencies outlined in Table 1 below to reach a Pass.

Marking of practical science assessments

¹² We are using the term 'mark' in its broader sense here. Students will not be given a specific mark, in terms of a number on a scale, for the practical science assessment. They will be judged either to have passed the assessment or not, based on an overall judgement of their competence by the end of the course, and taking into account their performance in all relevant practical activities.

Evidence generated by a Learner in a practical science assessment may be marked –

- (a) by the awarding organisation or a person connected to the awarding organisation,
- (b) by a Centre, or
- (c) through a combination of (a) and (b).

In any event, the awarding organisation must demonstrate to Ofqual's satisfaction in its assessment strategy that –

- (a) it has taken all reasonable steps to identify the risk of any Adverse Effect which may result from its approach to marking practical science assessments, and
- (b) where such a risk is identified, it has taken all reasonable steps to prevent that Adverse Effect or, where it cannot be prevented, to mitigate that Adverse Effect.

The specified level of attainment in practical science assessments

In relation to each practical science assessment, an awarding organisation must ensure that –

- (a) the only specified level of attainment is a Pass,
- (b) the criteria used by Assessors to determine whether each Learner will be awarded a Pass are those set out in Table 1 below, and
- (c) a Learner who does not meet the criteria to be awarded a Pass, or who has not been exempted on grounds of disability from the assessment but who does not take that assessment, is issued a result of Not Classified.

Under Condition H1.1, an awarding organisation must have in place arrangements to ensure that, as far as possible, the criteria set out in Table 1 are –

- (a) understood by Assessors and accurately applied, and
- (b) applied consistently by Assessors, regardless of the identity of the Assessor, Learner or Centre.

Table 1: The criteria for a Pass

In order to be awarded a Pass a Learner must, by the end of the practical science assessment, consistently and routinely meet the criteria in respect of
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each competency listed below. A Learner may demonstrate the competencies in any practical activity undertaken as part of that assessment throughout the course of study.

Learners may undertake practical activities in groups. However, the evidence generated by each Learner must demonstrate that he or she independently meets the criteria outlined below in respect of each competency. Such evidence –

- (a) will comprise both the Learner's performance during each practical activity and his or her contemporaneous record of the work that he or she has undertaken during that activity, and
- (b) must include evidence of independent application of investigative approaches and methods to practical work.

Competency	Assessment criteria
1 – Follows written procedures	a) Correctly follows written instructions to carry out experimental techniques or procedures.
2 – Applies investigative approaches and methods when using instruments and equipment	<ul style="list-style-type: none"> a) Correctly uses appropriate instrumentation, apparatus and materials (including ICT) to carry out investigative activities, experimental techniques and procedures with minimal assistance or prompting. b) Carries out techniques or procedures methodically, in sequence and in combination, identifying practical issues and making adjustments where necessary. c) Identifies and controls significant quantitative variables where applicable, and plans approaches to take account of variables that cannot readily be controlled. d) Selects appropriate equipment and measurement strategies in order to ensure suitably accurate results.
3 – Safely uses a range of practical equipment and materials	<ul style="list-style-type: none"> a) Identifies hazards and assesses risks associated with these hazards, making safety adjustments as necessary, when carrying out experimental techniques and procedures in the lab or field. b) Uses appropriate safety equipment and approaches to minimise risks with minimal prompting.

4 – Makes and records observations	<p>a) Makes accurate observations relevant to the experimental or investigative procedure.</p> <p>b) Obtains accurate, precise and sufficient data for experimental and investigative procedures and records this methodically using appropriate units and conventions.</p>
5 – Researches, references and reports	<p>a) Uses appropriate software and/or tools to process data, carry out research and report findings.</p> <p>b) Cites sources of information demonstrating that research has taken place, supporting planning and conclusions.</p>

Monitoring of practical science assessments

In respect of each GCE A level qualification in Biology, Chemistry or Physics which it makes available, an awarding organisation must have in place clear and effective arrangements to monitor the delivery and, where relevant, the marking of practical science assessments by Centres.

As part of those arrangements, an awarding organisation must ensure that each Centre which delivers practical science assessments receives a monitoring visit at least every two years (a 'Monitoring Visit').

This requirement may be met by way of a Monitoring Visit conducted by another awarding organisation which makes available a GCE A level qualification in Biology, Chemistry or Physics. Such a Monitoring Visit conducted by another awarding organisation may relate to practical science assessments in any of Biology, Chemistry or Physics save that an awarding organisation must ensure that, over time, the practical science assessments for the GCE A level qualification in Biology, Chemistry or Physics which it makes available are the subject of a Monitoring Visit.

An awarding organisation must ensure that each Monitoring Visit, whether conducted by it or another awarding organisation, includes the following –

- (a) Observation of one or more practical activities being undertaken.
- (b) Steps to ensure that, where evidence generated by a Learner in the practical science assessment is marked by the Centre, Teachers are applying the criteria outlined above accurately and consistently.

- (c) Steps to ensure that Learners have been provided with opportunities to undertake practical activities.
- (d) A review of samples of records of Learners' practical activities and Centres' documentation in relation to those activities to ensure that all relevant requirements in relation to the practical activities and practical science assessments are being met.
- (e) Where appropriate, the provision of advice and guidance to the Centre.

Where, during a Monitoring Visit, an awarding organisation identifies an Adverse Effect, or a risk of an Adverse Effect, relating to the delivery or marking of practical science assessments, it must inform all other awarding organisations for whom that Centre delivers practical assessments for GCE A level qualifications in Biology, Chemistry or Physics.

An awarding organisation must set out its approach to monitoring, and in particular how it will meet the above requirements, in its assessment strategy for each GCE A level qualification in Biology, Chemistry or Physics which it makes available, or proposes to make available.

Certificate requirements

1.22 Conditions I3 and I4 of our *General Conditions of Recognition*¹³ require exam boards to issue certificates which comply with any certificate requirements that we publish and which are accurate, complete, clear and readily capable of being understood by users of qualifications. We already publish certificate requirements that apply to all qualifications.¹⁴ We are proposing to publish additional specific requirements that set how outcomes for A level practical science assessments are to be reported on certificates.

1.23 Our proposed certificate requirements mean that:

- students will only get a certificate if they achieve at least a grade E in the examined part of the qualification;

¹³ www.gov.uk/government/publications/general-conditions-of-recognition

¹⁴ www.gov.uk/government/uploads/system/uploads/attachment_data/file/371129/2011-09-12-additional_certificate_requirements.pdf

- the result of the practical science assessment will be reported on certificates, as either ‘Pass’ or ‘Not Classified’; and
- if a disabled student is exempt from the practical science assessment, the information on his or her certificate will be presented in line with our approach to exemptions in other qualifications (which is set out in our *Specifications in Relation to the Reasonable Adjustment of General Qualifications*¹⁵).

1.24 We set out below our proposed certificate requirements:

Certificate Requirements

Condition GCE(Science)4.3 allows us to specify Certificate Requirements in relation to the way in which a Learner’s attainment in a practical science assessment is reflected on that Learner’s certificate for the qualification.

In addition, under Condition I3.1, an awarding organisation is required to ensure that the design of each certificate in relation to a qualification which it makes available complies with the Certificate Requirements which may be published by Ofqual and revised from time to time.

We set out our Certificate Requirements for the purposes of Condition GCE(Science)4.3 and Condition I3.1 below.

These requirements must be followed together with the *Additional Certificate Requirements*¹⁶ which apply to all qualifications.

Certificate requirements for practical science assessments

A certificate will only be issued for a GCE A level Science qualification in Biology, Chemistry or Physics where a Learner has been awarded a grade A*–E in respect of the level of attainment he or she has demonstrated in the Assessments by Examination to be taken for that qualification.

Where a Learner has not been awarded a grade A*–E in respect of those Assessments by Examination, an awarding organisation must ensure that no certificate is issued in respect of that Learner’s practical science assessment, regardless of the result for that assessment.

¹⁵ www.gov.uk/government/publications/specifications-in-relation-to-the-reasonable-adjustment-of-general-qualifications

¹⁶ www.gov.uk/government/uploads/system/uploads/attachment_data/file/371129/2011-09-12-additional_certificate_requirements.pdf

For clarity, the result for that Learner's practical science assessment must still be issued, together with the Learner's result for the Assessments by Examination, under Condition H6.1.

Where a certificate will be issued to a Learner in respect of the Assessments by Examination, an awarding organisation must ensure that it meets the following requirements in recording the outcome of the practical science assessment on that certificate –

- (a) Where the Learner has been awarded a Pass, that outcome must be recorded on the certificate.
- (b) Where the Learner –
 - (i) has taken the practical science assessment but has not been awarded a Pass, or
 - (ii) has not been granted an exemption on grounds of disability from taking the practical science assessment, but has not taken that assessment,
 - (iii) the outcome reported on the certificate must be Not Classified.
- (c) Where the Learner has been granted an exemption from taking the practical science assessment on grounds of disability, the outcome reported on the certificate must be in line with any requirements which may be published by Ofqual and revised from time to time.

In all cases an awarding organisation must ensure that it is clear that the above outcomes are in relation to the practical science assessment.

2. Accreditation of AS and A level science (biology, chemistry and physics)

- 2.1 All AS and A levels must be accredited before they can be awarded. We have already accredited all the new AS and A level biology, chemistry and physics qualifications that exam boards are introducing for first teaching in England in September 2015.
- 2.2 We decide whether to accredit AS and A levels using the criterion set out in our *Accreditation Criterion*.¹⁷ This states that the exam boards must demonstrate that they are capable of complying on an ongoing basis with the Conditions that apply in respect of the qualification for which they are seeking accreditation.
- 2.3 As a consequence, any change to the regulatory requirements that apply to an AS or A level qualification will, in effect, be a revision to that qualification's accreditation criterion. We are also consulting on that revision to the accreditation criterion for GCE qualifications in biology, chemistry and physics.
- 2.4 Whenever we make such a change, we need to decide whether or not exam boards need to resubmit their existing qualifications for accreditation. In this case, we are proposing that we should not require exam boards to submit for re-accreditation their existing AS or A level science qualifications. This would mean that existing qualifications would need to comply with our new rules, but would remain accredited.

¹⁷ www.gov.uk/government/publications/accreditation-criterion

3. Equality 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 AS and A level qualifications

- 3.2 We have considered the potential impact on students who share protected characteristics¹⁸ of the application of the principles and features that will apply to all new AS and A levels.
- 3.3 We judge that our proposal that practical skills in biology, chemistry and physics should continue to be assessed, with the outcome of the assessment reported separately from the grade for the exams, is likely to have a mainly positive impact for students whose disability makes it difficult for them to handle science equipment in an assessment context. Some disabled students will not be able to take the practical assessments because they do not have the manipulative and/or visual skills required to do so. Such students should be able to observe and/or learn from others undertaking the practical work or complete the work themselves using a practical assistant. This will help them prepare for their exams. Such students should be exempted from the practical science assessment. The separate reporting will make sure that the grade they receive from their written exam is not depressed by their performance in the practical assessment.
- 3.4 We will consult separately on how an exemption should be reported on the student's certificate and will consider what equality impacts this may have.
- 3.5 However, we are also aware that the separate reporting of practical skills may have a negative impact on some students who find written exams difficult because of their disability. For these students, the removal of practical assessments from incorporation within the overall A level grade may be unwelcome as the opportunity to improve one overall grade through their performance in the practical assessment will be lost. We have considered these two competing factors in the light of our wider considerations of the purpose and nature of practical skills assessments as we have finalised our approach.

¹⁸ 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.

- 3.6 We have not identified anything in our planned approach to non-exam assessment in biology, chemistry and physics that would have a negative impact on students because of their racial group, sex, age, religion or belief, pregnancy or maternity or sexual orientation, or as a result of gender reassignment.
- 3.7 Any issues concerning the proposed content have been considered by the Department for Education, which has published its own Equality Impact Analysis on their subject content proposals.¹⁹
- 3.8 During this consultation, we will continue to seek and consider evidence and feedback on our proposals that might help us identify any potential subject-specific impacts on students who share a protected characteristic.
- 3.9 Exam boards are required to consider the accessibility of their qualifications at the design stage and to remove any unjustifiable barriers.

¹⁹

www.gov.uk/government/uploads/system/uploads/attachment_data/file/310548/A_level_equality_analysis.pdf

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 that 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

Question 1

Do you have any comments on our proposal to consolidate the Conditions, requirements and guidance relating to GCE qualifications in biology, chemistry or physics into one set of documents?

Yes No

If yes, please provide them here:

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Question 2

Do you have any comments on our proposed Conditions and requirements relating to the practical science assessments in new A levels in biology, chemistry or physics?

Yes No

If yes, please provide them here:

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Question 3

Do you have any comments on our proposed requirements on exam board monitoring of schools' provision of practical science assessments?

Yes No

If yes, please provide them here:

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Question 4

Do you have any comments on our proposed certificate requirements for new A levels in biology, chemistry and physics?

Yes No

If yes, please provide them here:

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Question 5

Do you have any comments arising from the fact that the new Conditions and requirements proposed in this consultation will, if adopted, have the effect of revising the accreditation criterion for GCE science (biology, chemistry and physics)?

Yes No

If yes, please provide them here:

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Question 6

We have summarised how we believe the proposals for the assessment of practical science skills impact (positively or negatively) on persons who share a protected characteristic.²⁰ Are there any potential impacts we have not identified?

Yes No

If yes, please provide them here:

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²⁰ '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.

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Question 7

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:

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Question 8

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:

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Question 9

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

Yes **No**

If yes, please provide them here:

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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 AS and A levels (together 'the Conditions'):

- (i) the published *General Conditions of Recognition*²¹ that apply to all regulated qualifications;

²¹ www.gov.uk/government/publications/general-conditions-of-recognition

- (ii) *GCE Qualification Level Conditions and Requirements*²² that apply to all new AS and A levels; and
- (iii) GCE Subject Level Conditions and Requirements that apply to a new AS or A level in a specific subject – we are consulting now on changes to the GCE Subject Level Conditions that apply to biology, chemistry and physics.

Regulatory documents

In some Conditions we refer to published regulatory requirements with which exam boards are required to comply.

We are proposing two separate sets of regulatory requirements relating to:

- Practical Science Assessments
- Certificates.

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 practice 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 a set of draft guidance on practical science assessments.

²² www.gov.uk/government/publications/gce-qualification-level-conditions-and-requirements

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, 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.²³ 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; and
- (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.

²³ 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; and
- (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 Equality Act, we are not required to have due regard to impacts on those who are married or in a civil partnership.

Appendix C: GCE Subject Level Conditions for Science (Biology, Chemistry and Physics)

Condition	Compliance with content requirements
GCE(Science)1	
GCE(Science)1.1	<p>In respect of each GCE Qualification in Biology, Chemistry or Physics 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 ‘GCE AS and A level subject content for biology, chemistry, physics and psychology’²⁴ DFE-00356-2014,(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.
GCE(Science)1.2	<p>In respect of each GCE 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.</p>

²⁴ www.gov.uk/government/publications/gce-as-and-a-level-for-science

Appendix D: Assessment objectives – GCE qualifications in Science (Biology, Chemistry and Physics)

Condition GCE(Science)1.2 allows us to specify requirements relating to the objectives to be met by any assessment for GCE Science Qualifications in Biology, Chemistry or Physics.

The assessment objectives set out below constitute requirements for the purposes of Condition GCE(Science)1.2. Exam boards must comply with these requirements in relation to all GCE AS and A level Science qualifications in Biology, Chemistry or Physics they make available.

		<i>A level</i>	<i>AS</i>
AO1	Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures	30– 35%	35– 40%
AO2	Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: <ul style="list-style-type: none"> ■ in a theoretical context ■ in a practical context ■ when handling qualitative data ■ when handling quantitative data 	40– 45%	40– 45%
AO3	Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: <ul style="list-style-type: none"> ■ make judgements and reach conclusions ■ develop and refine practical design and procedures 	25– 30%	20– 25%

The ability to use mathematical skills at a level appropriate for GCE Qualifications in Biology, Chemistry or Physics must be tested across the assessment objectives. The weighting of mathematical skills must be at least:

- in respect of GCE Qualifications in Biology, 10 per cent
- in respect of GCE Qualifications in Chemistry, 20 per cent
- in respect of GCE Qualifications in Physics, 40 per cent

The ability to select, organise and communicate information and ideas coherently using appropriate scientific conventions and vocabulary must be tested across the assessment objectives. The following definitions apply in relation to the assessment objectives:

- **Knowledge** includes facts, specialist vocabulary, principles, concepts, theories, models, practical techniques, studies and methods.
- **Processes** include collecting evidence, explaining, theorising, modelling, validating, interpreting, planning to test an idea and peer reviewing.
- **Issues** include those that are ethical, social, economic, environmental, cultural, political and technological.

Appendix E: Guidance

Guidance on the assessment of practical skills through Assessments by Examination in GCE Qualifications in Science (Biology, Chemistry and Physics)

Condition GCE(Science)1.1(a) states that an awarding organisation must comply with the requirements outlined by the Secretary of State in the document entitled *GCE AS and A level subject content for biology, chemistry, physics and psychology*²⁵ (the 'Content Document').

Condition GCE(Science)1.1(c) allows us to specify guidance relating to the interpretation of that document.

Appendix 5 to the Content Document states that in order to be able to develop their skills, knowledge and understanding in science, Learners need to develop key skills and behaviours and that specifications must encourage such practical skills through opportunities for regular hands-on practical work. Appendix 5b lists the practical skills identified for direct assessment. These skills will be assessed by the practical science assessment as defined in Condition GCE(Science)3.3.

Appendix 5a lists the practical skills identified for indirect assessment. We expect that at least 15 per cent of the marks available for the Assessments by Examination for such an A level qualification in Biology, Chemistry and Physics will be made available in respect of questions or tasks which indirectly assess a Learner's practical skills as described in Appendix 5a to the Content Document.

²⁵ Department for Education (April 2014) *GCE AS and A level subject content for biology, chemistry, physics and psychology*, DFE-00357-2014, www.gov.uk/government/publications/gce-as-and-a-level-for-science

Guidance on assessment objectives for GCE Qualifications in Science (Biology, Chemistry and Physics)

Condition GCE(Science)1.2 allows us to specify requirements and guidance relating to assessment objectives for GCE Qualifications in Biology, Chemistry or Physics.

We published our requirements in relation to assessment objectives in *GCE Subject Level Conditions and Requirements for Biology*, and reproduce them in the table below.

		<i>A level</i>	<i>AS</i>
AO1	Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures	30–35%	35–40%
AO2	Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: <ul style="list-style-type: none"> ■ in a theoretical context ■ in a practical context ■ when handling qualitative data ■ when handling quantitative data 	40–45%	40–45%
AO3	Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: <ul style="list-style-type: none"> ■ make judgements and reach conclusions ■ develop and refine practical design and procedures 	25–30%	20–25%

We set out below our guidance for the purposes of Condition GCE(Science)1.2. This guidance explains how we expect awarding organisations to interpret these assessment objectives in terms of:

- the different ‘strands’ within each of the assessment objectives;
- the further discrete ‘elements’ within each assessment objective and its strands which questions and tasks could target and/or seek to credit – our expectation is that each and every question/task should target or seek to credit at least one of these elements, and may target or seek to credit multiple elements across one or more assessment objectives;
- the coverage expectations, such as in relation to the different strands and elements within each assessment objective and how those strands and 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.

In line with the obligations set out in Condition GCE(Science)1.2, we expect awarding organisations to be able to demonstrate how they have had regard to this guidance. For example, an awarding organisation 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.

AO1: Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures.		30–35% (A level) 35–40% (AS)	
Strands	Elements	Coverage	Agreements and definitions
n/a	<p>1a – Demonstrate knowledge and understanding of scientific ideas.</p> <p>1b – Demonstrate knowledge and understanding of scientific processes, techniques and procedures.</p>	<ul style="list-style-type: none"> ■ Balanced coverage of all elements in each set of assessments (but not in every assessment). ■ Up to 10% (approximately one-third of AO1) for ‘recall-only items’. 	<ul style="list-style-type: none"> ■ The emphasis here is on Learners recalling and communicating relevant knowledge and understanding from the course of study – for instance, of facts, definitions, explanations, how to do something and why it should be done in a particular way. ■ This knowledge and understanding should be based principally on the requirements that are detailed in the specification or on what might be considered assumed prior knowledge. ■ Generally, questions/tasks would target and/or permit Learners to show knowledge and understanding in combination – for instance, the requirement to define or explain a term in their own words. ■ However, there should also be the potential for a small proportion of items to focus on recall only – these items would comprise, for instance, standard definitions of terms/concepts as opposed to explanations of these. ■ There is no intrinsic difference in the Levels of Demand between ‘processes, techniques and procedures’, and they are a linked set of operations, so are not separated here, though there are different, legitimate ways of defining each of them; the focus in ‘ideas’ may be different, so these are included separately.

AO2: Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: <ul style="list-style-type: none"> ▪ in a theoretical context ▪ in a practical context ▪ when handling qualitative data ▪ when handling quantitative data. 			40–45% (A level) 40–45% (AS)
Strands	Elements	Coverage	Agreements and definitions
The four strands below should be targeted in combination: <ul style="list-style-type: none"> ▪ in a theoretical context ▪ in a practical context ▪ when handling qualitative data ▪ when handling quantitative data. 	1a – Apply knowledge and understanding of scientific ideas in a theoretical context when handling qualitative data.	<ul style="list-style-type: none"> ▪ Balanced coverage of all elements in each set of assessments (but not in every assessment). 	<ul style="list-style-type: none"> ▪ The emphasis here 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; or □ making links between such types of material, which are not signalled in the specification. ▪ The application should also involve determining how to make sense of connections and linkages within data, information and detail – although not to the extent of reaching conclusions or making judgements.
	1b – Apply knowledge and understanding of scientific ideas in a theoretical context when handling quantitative data.		
	1c – Apply knowledge and understanding of scientific ideas in a practical context when handling qualitative data.		
	1d – Apply knowledge and understanding of scientific ideas in a practical context when handling quantitative data.		

AO2: Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: <ul style="list-style-type: none"> ▪ in a theoretical context ▪ in a practical context ▪ when handling qualitative data ▪ when handling quantitative data. 			40–45% (A level) 40–45% (AS)
Strands	Elements	Coverage	Agreements and definitions
	1e – Apply knowledge and understanding of scientific processes, techniques and procedures in a theoretical context when handling qualitative data.		<ul style="list-style-type: none"> ■ The balance of qualitative and quantitative data that is appropriate is likely to vary across the subjects in the suite. This issue is linked to the additional requirements relating to mathematical skills specified for each science subject. ■ Items should require evidence-based responses to assess active processing of knowledge and understanding.
	1f – Apply knowledge and understanding of scientific processes, techniques and procedures in a theoretical context when handling quantitative data.		
	1g – Apply knowledge and understanding of scientific processes, techniques and procedures in a practical context when handling qualitative data.		
	1h – Apply knowledge and understanding of scientific processes,		

AO2: Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: <ul style="list-style-type: none"> ▪ in a theoretical context ▪ in a practical context ▪ when handling qualitative data ▪ when handling quantitative data. 			40–45% (A level) 40–45% (AS)
Strands	Elements	Coverage	Agreements and definitions
	techniques and procedures in a practical context when handling quantitative data.		

AO3: Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:		25–30% (A level) 20–25% (AS)	
<ul style="list-style-type: none"> ▪ make judgements and reach conclusions ▪ develop and refine practical design and procedures 			
Strands	Elements	Coverage	Agreements and definitions
1 – Make judgements and reach conclusions.	1a – By analysing scientific information, ideas and evidence, including in relation to issues.	<ul style="list-style-type: none"> ▪ Balanced coverage of all elements in each set of assessments (but not in every assessment). 	<ul style="list-style-type: none"> ▪ The emphasis here is on the outcome that Learners produce through the analysis of evidence for instance the judgement or conclusion or development/refinement of design/procedures that stems from their reasoning and synthesis of skills. ▪ The abilities to interpret and evaluate in this context are both linked and complementary. ▪ There is a requirement to address a range of material here. This means that relevant assessment tasks should involve different types of information sources across questions in a set of assessments. However, an individual item could address a single type of information source. ▪ When addressing this assessment objective, Learners would be required to reach conclusions which would therefore incorporate the requirement to make judgements. Where Learners' conclusions relate to practical work, they would involve either refining practical design and procedures or developing/planning practical procedures to solve problems. ▪ The balance of requirement for judgement, conclusion and development/refinement of design/procedures that is appropriate is likely to vary across the subjects in the suite.
	1b – By interpreting and evaluating scientific information, ideas and evidence, including in relation to issues.		
2 – Develop and refine practical design and procedures.	2a – By analysing scientific information, ideas and evidence, including in relation to issues.		
	2b – By interpreting and evaluating scientific information, ideas and evidence, including in relation to issues.		

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