

Summer 2021



# Summer 2021 Alternative Arrangements: AS and A level Physics Subject Guidance



Version 2.0



## Introduction

On 6 January 2021, the Minister of Education, Peter Weir MLA, cancelled all CCEA GCSE, AS and A2 examinations scheduled for January, February, May and June 2021. Instead, the approach to awarding grades in Summer 2021 will be based on teacher professional judgements, with moderation. CCEA has published *GCSE, AS and A Level Awarding Summer 2021 Alternative Arrangements – Process for Heads of Centre* to support teachers and school leaders in determining the appropriate Centre Determined Grades for each student.

In 2021, centres are asked to use a range of evidence to arrive at a professional and academic judgement of the standard at which each student is performing in the context of the specification for which they are entered and from this provide a grade to CCEA. This is different from 2020, when centres were asked to supply a centre assessment grade based on their judgement of the grade a student would likely have achieved if they had been able to complete examinations. It will require centres and CCEA to develop and use different processes from those used last year.

This document follows on from CCEA's *GCSE, AS and A Level Awarding Summer 2021 Alternative Arrangements – Process for Heads of Centre* and aims to provide further guidance to support teachers and Heads of Department in determining the appropriate Centre Determined Grade for each student entered for GCE AS or A level Physics.

## Contents

1. Overview
2. Preliminary Considerations
3. Evidence to Inform Centre Determined Grades
4. Support
5. Making Decisions about Centre Determined Grades
6. Further Advice and Information

Appendix 1: AS Grade Descriptions and Key Features

Appendix 2: A2 Grade Descriptions and Key Features

Appendix 3: Definitions of Levels of Control

## 1. Overview

Each Centre Determined Grade is a judgement of the final grade for a qualification. It must be based on a holistic review of a student's performance as indicated by assessment evidence, gathered and retained at centre level. In the interests of fairness within and across centres, each Centre Determined Grade must be a realistic, evidence-based judgement of the standard at which a student is performing, i.e. their demonstrated knowledge, understanding and skills in the content of the specification they have covered. This means students **do not** need to have completed a specified amount of content, or demonstrate skills, knowledge and understanding across every area of the specification, as they would normally. In this way, disruption to teaching and learning can be taken into account.

We must also acknowledge the decision taken in December 2020 by the Education Minister in respect of reducing the assessment burden in GCE AS and A level qualifications. The details in the table below will still be applicable in forming a Centre Determined Grade in Summer 2021. For example, at AS, teachers can consider evidence for either AS Unit 1 or 2 or any combination.

Subject	Current Arrangements	Unit For Omission	Specification Adaptations
<b>AS Physics</b>	Unit 1 external assessment (40% of AS)  Unit 2 external assessment (40% of AS)  Unit 3B external assessment (20% of AS)	<b>AS</b> Students could choose to sit Unit 1 (16%); Unit 2 (16%); Units 1 and 3 (24%)	Unit 3:  Practical skills <b>Booklet A</b> was removed due to Public Health requirements.
<b>A2 Physics</b>	Unit 1 external assessment (40% of A level)  Unit 2 external assessment (40% of A level)  Unit 3B external assessment (20% of A level)	Units 2 and 3 (24%); <b>or</b> Units 1 and 2 (32%)  <b>A2</b> Students could choose to sit Unit 1 (24%), Unit 2 (24%); Units 1 and 3 (36%)	Unit 3:  Practical skills <b>Booklet A</b> was removed due to Public Health requirements.

		Units 2 and 3 (36%); <b>or</b> Units 1 and 2 (48%)	
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## 2. Preliminary Considerations

In arriving at a Centre Determined Grade for a student, it is not necessary to assess every aspect of the specification exhaustively. A selection of key tasks or assessments carried out under appropriate conditions and with a suitable level of demand, which allows you to authenticate the work as the student's own, will give a good indication of the standard at which the student is performing in the qualification.

To make accurate judgements, you must have a clear understanding of:

- the range of skills, knowledge and understanding covered by the specification;
- the assessment requirements and the structure of the specification;
- the grade descriptions at key grades (see Section 5 and Appendix 1 and 2 in this document);
- the level of demand of the qualification assessments; and
- the weighting of each component/unit and the type of assessment.

For GCE Physics, information on these aspects can be found in the specification and further illustrated in the specimen assessment materials, past papers<sup>1</sup>, chief examiner's reports and exemplification of examination performance, which are available on the CCEA website at [www.ccea.org.uk](http://www.ccea.org.uk)

A piece of evidence has high validity and reliability if a student who performs well in the task would reasonably be expected to perform equally well in the qualification as a whole. Some considerations that may impact on evidence are noted below.

- **Specification Coverage**

A piece of evidence that covers a greater breadth of the specification content, knowledge, understanding and skills from a unit (or units) with a higher weighting may give a better indication of a student's standard of performance than a piece with lesser breadth or with a lower weighting. Evidence does not need to cover the entire specification content.

- **Similarity to Actual Qualification Assessments**

Evidence that is similar to a CCEA assessment for the qualification will be more useful in determining a student's grade than evidence that is considerably different from the qualification assessment in terms of question structure, content and/or assessment arrangements.

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<sup>1</sup> Past papers and mark schemes will be available for all CCEA GCSE, AS and A level qualifications subject to copyright clearance.

- **Controls**

If evidence is generated under less controlled conditions than a qualification assessment, its value may be less than a piece generated under conditions that are similar. Centres should keep a record of the conditions under which an assessment was completed, i.e. high, medium or limited levels of control – see **Appendix 3** for definitions.

However, CCEA understands the difficult public health context in which schools have been working since March 2020, which has included two extended periods of remote learning. Schools may, therefore, need to utilise evidence generated within more limited levels of control, where they can authenticate this as the student's own.

- **Level of Demand**

The evidence you gather must be set at an appropriate level of demand for it to be a good indicator of a student's standard of performance.

- **When Evidence Is Generated**

It should be borne in mind that a student's knowledge, understanding and skills may develop over the period of a course of study; you should consider when any piece of evidence was generated and ensure, if possible, that evidence generated recently is taken into account.

### 3. Evidence to Inform Centre Determined Grades

This section provides guidance on the information that centres should use in confirming Centre Determined Grades.

You should consider all the key evidence you have for each student and reflect on how much it tells you about the student's standard of performance, as measured against the requirements of the relevant specification. For example, this could be, but is not limited to:

- the consistency of a student's practical or performance evidence;
- their depth or breadth of knowledge and understanding in relation to questions on key topics;
- their degree of analytical or evaluative skills demonstrated on key topics; and/or
- quality of student responses to discriminating questions or tasks.

Centres should be clear in their Centre Determined Grades policy what types of evidence will be used in determining the grade. Centres should also be clear with students the evidence that will be used to determine their grades. Where possible, centres should aim to use consistent sources of evidence for a qualification cohort. Some examples of evidence suitable for GCE AS and A level Physics you may choose to use are included in the following table:

Evidence
<p><b>CCEA assessment resources for AS units 1,2,3A,3B and A2 units 1,2,3A,3B</b> – When taken under high control conditions, where the public health situation allows, these assessments will be a good indicator of the standard of student performance as they are fully aligned to specification content and the level of demand of past papers. See Section 4 for more details.</p>
<p><b>Performance in any mock examinations taken</b> – These are likely to be a good indicator of performance, particularly if they are taken under high control conditions and assess the skills, knowledge and understanding required by the CCEA specification or are similar to CCEA question papers.</p>
<p><b>Performance in CCEA past paper questions and mark schemes</b> – These assessments are in the public domain and can be readily accessed by students. Therefore, in their entirety, they do not form strong evidence. However, elements of these can be incorporated into mock exams or class tests. You may wish to access grade boundaries and/or Chief Examiner’s reports which relate to these papers, available at <a href="http://www.ccea.org.uk">www.ccea.org.uk</a>. If the examinations in the qualifications you deliver are marked online, you can also avail of the data held in the CCEA Analytics application. Further information can be obtained by contacting CCEA at <a href="mailto:CCEA.Analytics@ccea.org.uk">CCEA.Analytics@ccea.org.uk</a></p>
<p><b>Performance in class tests</b> – If class tests only assess specific content, you should use a series of marked class tests. A series of such assessments, done under high control conditions and sampling the key aspects of the specification, should provide good evidence of student performance. Many class tests will be recorded as a mark or percentage, and centres should ensure there is a consistent approach in mapping these to a grade.</p>
<p><b>Records of each student’s performance throughout their study</b> – This includes, for example, progress review/tracking data and classwork.</p>
<p><b>Performance in any class assessments taken throughout their study of the GCE Physics specification</b> – This may consist of a variety of evidence types, produced under different conditions. Evidence of this kind is unlikely to form a strong evidence base on its own, but it may supplement other evidence types.</p>
<p><b>For resitting students</b>, prioritise evidence generated during the 2020/21 academic year.</p>

## Assessment Objectives

Assessment objectives are the skills that are normally assessed through the completion of examinations or internally assessed tasks. They are the foundations on which a specification is developed, and a weighting is applied to each individual assessment objective to show the weighting of assessment associated with it. They may also prove to be a useful indicator of the level of demand of a task or assessment. As such, you should consider the assessment objectives that will be assessed when selecting evidence to form a holistic judgement of a student's performance. This information will be recorded in the Departmental Assessment Evidence Grid which is set out in Appendix 6 of CCEA's *GCSE, AS and A Level Awarding Summer 2021 Alternative Arrangements – Process for Heads of Centre*.

The assessment objectives for GCE Physics are:

<b>AO1</b>	demonstrate knowledge and understanding of physics ideas, processes, techniques and procedures
<b>AO2</b>	apply knowledge and understanding of physics ideas, processes techniques and procedures: <ul style="list-style-type: none"> <li>- in a range of theoretical and practical contexts;</li> <li>- when handling qualitative and quantitative data; and</li> <li>- to solve scientific problems</li> </ul>
<b>AO3</b>	analyse, interpret and evaluate a range of physics information, ideas and evidence to: <ul style="list-style-type: none"> <li>- make judgements and reach conclusions (including in relation to issues);</li> <li>- refine practical design and procedures; and</li> <li>- make, record and communicate reliable and valid observations and measurements with appropriate precision and accuracy</li> </ul>

Further information on assessment objectives, including weightings associated with individual units, can be found in Section 4: Scheme of Assessment in the subject specification.

When considered alongside the assessment objectives set out above, the types of evidence listed in the table on page six, along with the contents of Appendices 1 and 2, may be of greatest value in supporting a holistic review of a student's attainment.

Please note that where a unit omission has impacted on an assessment objective, it is *not necessary* to consider evidence for this objective; however, where reliable evidence exists, centres may still wish to consider it in forming a holistic judgement.

For Physics, it is recognised that not all aspects of AO3 can be assessed due to the restriction on practical work and the omission of practical skills Unit 3A.

## Using AS Evidence at A Level

For A level, AS evidence may be considered alongside A2 evidence; however, the differences between AS and A2 should be borne in mind. For example, the AS qualification is weighted at 40% of the overall A level and has different grade descriptions. There is also no A\* grade at AS. If AS evidence is used, it must be

assessed against the grade descriptions at A2 (see Appendix 2 for more details). If you do decide to use AS evidence to support judgements at A2, this should be reflected in the Centre Determined Grades policy for your centre and in the Candidate Assessment Record, and it should be included in evidence submitted to CCEA for sampling in the CCEA review stage.

## 4. Support

A range of subject-specific support is available on the CCEA website and can assist teachers in arriving at a fair and consistent judgement for students.

### **CCEA 2021 Assessment Resources**

In 2020, many students seeking a GCSE or GCE qualification grade had been awarded notional unit grades or uniform mark scores in previous examination series, to use as evidence in determining centre assessment grades; however, this is not the case in 2021. In the absence of this information, CCEA will supply assessment resources to your centre. These will be quality assured question papers and mark schemes for **all** units that normally have examinations. They will contain new questions and tasks not previously released to centres and must therefore be stored securely. These materials are not to be seen as high stakes assessments but rather viewed as materials which could form part of the evidence used to inform Centre Determined Grades. Centres do not have to use all the assessment resources, but we advise centres to use at least one per qualification. We would encourage centres to use the assessment resources under high control conditions, where it is safe to do so, to ensure they have the greatest value.

CCEA will provide mark schemes to centres. To support a standardised approach in the use of the assessment resources, we will provide guidance to accompany the mark scheme.

We appreciate that decisions were taken in December 2020 in respect of unit omissions in AS and A level qualifications. We also acknowledge disruption to teaching and learning may mean that even in the context of these omissions, certain content may not have been covered. In such cases, the assessment resources may be adapted accordingly. In this way, it can be taken into account that some students have suffered more disruption to their learning than others. For example:

*A centre decided to omit Unit 2 in line with the Education Minister's announcement in December 2020. Therefore, Centre Determined Grades may be based on evidence for Unit 1 only.*

- *Student A has missed a significant amount of learning due to COVID self-isolation and disruptions and has not covered all of the content for Unit 1.*
- *Student A's Centre Determined Grade should be based on assessment of only the content he has covered.*

Assessments adapted/Evidence gathered and reviewed based on A2 Unit 1 Physics Content	
All Students	Student A
<ul style="list-style-type: none"> <li>• Deformation of solids</li> <li>• Thermal physics</li> <li>• Uniform circular motion</li> <li>• Simple harmonic motion</li> <li>• The nucleus</li> <li>• Nuclear decay</li> <li>• Nuclear energy</li> <li>• Nuclear fission and fusion</li> </ul>	<ul style="list-style-type: none"> <li>• Deformation of solids</li> <li>• Thermal physics</li> <li>• Uniform circular motion</li> <li>• Simple harmonic motion</li> </ul>

### Summer 2021 Support Webinar

We will produce subject-specific support webinars for teachers to accompany this guidance document. These will include an overview of arriving at a Centre Determined Grade and additional guidance in using the CCEA assessment resources and existing support materials. Subject-specific webinars will be uploaded to the CCEA website from 26 March 2021.

### Specimen Assessment Materials and Past Papers

Specimen assessment materials and past papers are available in the Support section of the qualification web page and are provided to give centres guidance on the structure and character of CCEA examination papers and assessments. Please note that if a past paper or mark scheme does not appear in this section, it is for copyright reasons.

You may also wish to create a question paper that is of a similar standard to a CCEA GCE question paper. In doing so, you should refer to the specimen question paper and mark schemes, and the past papers and mark schemes, available on the CCEA qualification web page. These illustrate the standard, structure and requirements of the question paper.

You can generate the most valid evidence by using assessments that replicate, as far as possible, the standard, duration, format and security of CCEA question papers.

### Exemplification of Examination Performance (EEP)

EEP booklets are available in the Support section of the qualification web page and include exam questions from the Summer 2017 and 2018 papers, exemplar answers by students and a senior examiner commentary on the answers.

### Chief Examiner Reports

The reports for 2017–2019 Summer series are available in the Reports section of the qualification web page and outline the performance of students in all aspects of this qualification.

## CCEA Grade Boundaries

Raw to uniform mark boundaries for past Summer series are available in the Support section of the qualification web page and may provide a reference point to support Centre Determined Grades.

## CCEA Analytics

You can also avail of the data held in the CCEA Analytics application. Further information can be obtained by contacting CCEA at [CCEA.Analytics@ccea.org.uk](mailto:CCEA.Analytics@ccea.org.uk)

## 5. Making Decisions about Centre Determined Grades

Before deciding Centre Determined Grades you should agree as a department the evidence you will review (see Section 3 for some examples). Once the decision has been made, this should be set out in your centre's Centre Determined Grades policy and be included in the Departmental Assessment Evidence Grid, referenced in Section 3, that will form part of the evidence base.

When making decisions, take into consideration the amount of specification coverage and if this applies to all students. Adapt as necessary for individual students the evidence you will review, to account for those students who may have encountered more significant disruption. Evidence does not have to be in the same format for every student, but teachers should be satisfied that the evidence is reliable to make an informed holistic judgement of that student's attainment.

### Internal Standardisation

In subjects where there is more than one teacher and/or class in the department, it is a requirement to carry out internal standardisation. The purpose of internal standardisation is to provide teachers with confidence in the Centre Determined Grades they have assigned, to ensure fairness and objectivity of decisions, and to ensure consistency in the application of assessment criteria and standards.

Where more than one teacher is involved in marking the assessment, the application of the mark scheme must be agreed before marking begins.

When marking is complete, internal standardisation must be conducted to ensure all markers have applied the mark scheme consistently and accurately.

Internal standardisation should include cross-marking samples of work across the full range of attainment and include students' work from each class **to ensure a common standard within a department is applied.**

### Grade Descriptions

Grade descriptions set out the characteristics of performance at key grades in the grade range for a qualification, in terms of both content covered and the skills developed (assessment objectives) over the course of study. These should be used to form the basis of your decisions on the Centre Determined Grades that will be awarded to your students in Summer 2021.

Grade descriptions are provided at Grades **A** and **E** in the GCE specification for both AS and A2 level, to give a general indication of the standards of achievement likely to have been shown by students awarded these grades. To support teachers in Summer 2021, we are providing an additional grade description at Grade C. Teachers should refer to these descriptions to support their judgements when arriving at their Centre Determined Grades for students.

Please note that shortcomings in some aspects of students' performance in assessments may be balanced by better performances in others.

**Please see Appendices 1 and 2 for the Grade Descriptions at A, C and E for both AS and A level.** These also include the type of assessment objective evidence you may wish to use and the key features associated with each grade.

### **Practical Application of Grade Descriptions**

To select the most appropriate grade for a student, teachers may use the following approach:

1. Familiarise yourself with the grade descriptions for the subject.
2. Consider support materials such as those set out in Section 4 of this document.
3. Before you arrive at a holistic grade for a student's performance, review the evidence available. At this stage you may wish to make notes to record the qualities that are being looked for.
4. Consider the positive features of the evidence, based on the key features described in Appendices 1 and 2.
5. Using the descriptions for Grades A, C and E, based on the principle of 'best fit', select the grade you believe comes closest to encapsulating the overall achievement of the student as demonstrated by the evidence. Using this grade as a benchmark, work **either up or down** using the table below to find the final grade.

*For example: for AO2, grade C students characteristically explain and interpret phenomena with some errors and present arguments and evaluations reasonably clearly.*

- a) *if you are of the view that the student's evidence meets the description for grade C, consider this first; if the supporting evidence is strong, you may then wish to go up to the grade above and decide if the evidence meets this, and so on, until you have a best fit between the grade description and the student's work; or*
- b) *if you are of the view that the student's evidence does not meet the description for grade C, then go down to the grade below and decide if it meets this, and so on, until you have a best fit between the grade description and the student's work.*

The table below summarises this approach:

Grade	Description/Advice
<b>A*</b> <i>(A2 only)</i>	Students at grade A* clearly demonstrate all of the features associated with performance at 'A' but in many areas elements of the evidence presented are exceptional, i.e. beyond that which would reasonably be expected of a candidate working at grade 'A'.
<b>A</b>	See Grade A Description.
<b>B</b>	Students at grade 'B' may demonstrate some elements of grade 'A' performance in the evidence presented but, because of limitations in other aspects of their work, not to the extent that an assessor could confidently award a grade 'A'.
<b>C</b>	See Grade C Description.
<b>D</b>	Students at grade 'D' may demonstrate some elements of grade 'C' performance in the evidence presented but, because of limitations in other aspects of their work, not to the extent that an assessor could confidently award a grade 'C'.
<b>E</b>	See Grade E Description.

## 6. Further Advice and Information

Summer 2021 presents us with significant challenges, particularly teachers and students, and we hope the information set out in this document supports you through the process of awarding Centre Determined Grades this year. The information in this document will be supplemented with a webinar, which amongst other things will provide additional guidance on how to apply grade descriptions to the process of arriving at Centre Determined Grades for each of your students.

If in the interim you require further information, please contact:

CCEA Helpline	<p><u>Email: <a href="mailto:helpline@ccea.org.uk">helpline@ccea.org.uk</a></u></p> <p>Telephone: <b>028 9026 1220</b>. The helpline is operational each day from 9am to 5pm, Monday to Friday, for centres with queries in relation to Summer 2021.</p> <p>All other queries should be directed to <u><a href="mailto:centresupport@ccea.org.uk">centresupport@ccea.org.uk</a></u></p>
CCEA Entries	<u><a href="mailto:entriesandresults@ccea.org.uk">entriesandresults@ccea.org.uk</a></u>
Subject Officer	Gavin Gray <u><a href="mailto:ggray@ccea.org.uk">ggray@ccea.org.uk</a></u>
Specification Support Officer	Nola Fitzsimons <u><a href="mailto:nfitzsimons@ccea.org.uk">nfitzsimons@ccea.org.uk</a></u>

## Appendix 1

### AS Grade Descriptions and Key Features

Assessment Objective	AO1		
Grade Descriptions	A	C	E
	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>demonstrate knowledge of most principles, concepts and facts from the AS units;</li> <li>show understanding of most principles, concepts and facts from the AS units;</li> <li>select relevant information from the AS units; and</li> <li>organise and present information clearly in appropriate forms using scientific terminology.</li> </ul>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>demonstrate knowledge of a range of principles, concepts and facts from the AS units;</li> <li>show understanding of a range of principles, concepts and facts from the AS units;</li> <li>select a range of relevant information from the AS units; and</li> <li>organise and present information clearly in mainly appropriate forms using some scientific terminology.</li> </ul>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>demonstrate knowledge of some principles and facts from the AS units;</li> <li>show understanding of some principles, concepts and facts from the AS units;</li> <li>select some relevant information from the AS units; and</li> <li>present information using basic terminology from the AS units.</li> </ul>
AO1 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
<p>AO1 is assessed throughout the structured questions of AS1 and AS2.</p> <p>Primarily AO1 is assessed in the early stages of each structured question where the candidate is expected to demonstrate their</p>	<p>Grade A candidates have no difficulty in recalling definitions, key facts and relevant equations.</p> <p>Their work is presented in a clear, logical manner which results in obtaining most of the marks available in qualitative explanations using selected relevant knowledge within the specification.</p> <p>Units, significant figures and powers are well handled by grade A candidates.</p>	<p>Grade C candidates can recall most definitions, facts and relevant equations.</p> <p>Their work may be presented in a clear fashion, but the sequence may not be logical</p> <p>Few errors are made due to arithmetic slips relating to powers in calculations.</p> <p>They are less likely to make mistakes with derived units than grade E candidates, for example from <math>\text{mm}^3</math> to <math>\text{m}^3</math>.</p>	<p>Grade E candidates have difficulty in recalling definitions accurately and using the appropriate scientific terminology.</p> <p>Their work is presented in an unclear, unsequenced manner which results in arithmetic slips and the omission of points in qualitative answers.</p> <p>Units, significant figures and powers can also prove problematic for grade E candidates, resulting in a loss of marks.</p>

recall of the principles, concepts and facts from the specification.			
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Assessment Objective	AO2		
Grade Descriptions	A	C	E
	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>• apply principles and concepts in familiar and new contexts involving only a few steps in the argument;</li> <li>• describe significant trends and patterns shown by data presented in tabular or graphical form;</li> <li>• explain and interpret phenomena with few errors and present arguments and evaluations clearly; and</li> <li>• carry out structured calculations with few errors and demonstrate good understanding of the underlying relationships between physical quantities.</li> </ul>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>• apply principles and concepts in familiar and some new contexts involving only a few steps in the argument;</li> <li>• describe a range of trends and patterns shown by data presented in tabular or graphical form;</li> <li>• explain and interpret phenomena with some errors and present arguments and evaluations reasonably clearly; and</li> <li>• carry out structured calculations with some errors and demonstrate reasonable understanding of the underlying relationships between physical quantities.</li> </ul>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>• apply a given principle to material presented in familiar or closely related contexts, involving only a few steps in the argument;</li> <li>• describe some trends or patterns shown by data presented in tabular or graphical form;</li> <li>• provide basic explanations and interpretations of some phenomena, presenting very limited evaluations; and</li> <li>• carry out some steps in calculations</li> </ul>
AO2 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
<p>AO2 is assessed mostly in the later parts of the structured questions in AS1, AS2 and AS3B.</p> <p>In some questions this will involve explanations and extended writing.</p>	<p>Grade A candidates will often be able to apply their knowledge to unfamiliar situations but will show some errors in developing their ideas.</p> <p>Their extended calculations will have a correct starting point, selecting the appropriate method and equations, but only top grade A candidates will carry the calculation through all the stages to a correct answer.</p>	<p>Grade C candidates should have some knowledge of all areas of the specification. There will be no obvious gaps in their knowledge of basic physics concepts.</p> <p>They will perform most calculations well but may have difficulty with those involving percentages and ratios.</p>	<p>Grade E candidates will display gaps in their knowledge and understanding across the specification, performing exceptionally poorly in this area of content.</p> <p>Grade E candidates will struggle to apply their knowledge to unfamiliar situations and may be unable to select the appropriate equations to allow progress in the later parts of some calculations.</p>

AS3B allows for the assessment of trends and patterns in tabular and graphical form.			
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Assessment Objective	AO3		
Grade Descriptions	A	C	E
<b>Grade Descriptions</b>	Candidates characteristically: <ul style="list-style-type: none"> <li>• devise and refine experimental and investigative activities, selecting appropriate techniques;</li> <li>• demonstrate safe and skilful practical techniques;</li> <li>• make observations and measurements with appropriate precision and record these methodically; and</li> <li>• interpret, explain, evaluate and communicate the results of their own and others' experimental and investigative activities, in appropriate contexts.</li> </ul>	Candidates characteristically: <ul style="list-style-type: none"> <li>• devise and refine a range of experimental and investigative activities, selecting mainly appropriate techniques;</li> <li>• demonstrate safe and mostly skilful practical techniques;</li> <li>• make observations and measurements with mainly appropriate precision and record these methodically; and</li> <li>• interpret, explain, evaluate and communicate the results of their own and others' experimental and investigative activities, in appropriate contexts.</li> </ul>	Candidates characteristically: <ul style="list-style-type: none"> <li>• devise and refine some aspects of experimental and investigative activities;</li> <li>• demonstrate safe practical techniques;</li> <li>• make observations and measurements, and record them; and</li> <li>• interpret, explain and communicate some aspects of the results of their own and others' experimental and investigative activities, in appropriate contexts.</li> </ul>
AO3 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
AO3 is assessed primarily in AS3, but within AS1 and AS2 there are some questions based on experiments that are in the content of the specifications.  AS3A will specifically test the practical techniques and skills whilst AS3B	Grade A candidates can explain the steps of an experiment clearly and in a sensible sequence.  All aspects of their practical work are carried out to a high level of competence and they obtain accurate, reliable data with little difficulty. The presentation of tables of results and graphs is to a high standard.  Within the AS3B paper the grade A candidate will be challenged in parts. While scoring highly, there will be some aspects of the evaluation of methodology that only a top grade A candidate would be expected to answer correctly.	Grade C candidates can explain the steps of an experiment in a reasonably clear manner.  Most aspects of their practical work are carried out to a good level of competence and they obtain accurate, reliable data.  The presentation of tables of results and graphs is to a good standard.  Within the AS3B paper the grade C candidate will be challenged. They can combine simple uncertainties correctly but may be unable to deal with	Grade E candidates do not explain the steps of an experiment in a clear manner.  Some aspects of their practical work are carried out to a reasonable level of competence and they may obtain some accurate and reliable data. The presentation of tables of results may show errors with regard to units and significant figures. Graphs are drawn to a reasonable standard.  Within the AS3B paper the grade E candidate will find a considerable portion of the work challenging, for example in

<p>will focus on the handling of experimental data.</p> <p>Evaluation of experimental methodology and refinement will also be addressed.</p>		<p>more complex examples such as dealing with quantities raised to a power.</p>	<p>evaluating the overall uncertainty in a quantity</p>
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## Appendix 2

### A2 Grade Descriptions and Key Features

Assessment Objective	AO1		
Grade Descriptions	A	C	E
	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>demonstrate detailed knowledge of most principles, concepts and facts from this specification;</li> <li>show understanding of most principles, concepts and facts from this specification;</li> <li>select relevant information from this specification; and</li> <li>organise and present information clearly in appropriate forms using scientific terminology</li> </ul>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>demonstrate detailed knowledge of a reasonable range of principles, concepts and facts from this specification;</li> <li>show understanding of a range of principles, concepts and facts from this specification;</li> <li>select a range of relevant information from this specification; and</li> <li>organise and present information clearly in appropriate forms using mainly scientific terminology</li> </ul>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>demonstrate knowledge of some principles and facts from this specification;</li> <li>show understanding of some principles and facts from this specification;</li> <li>select some relevant information from this specification; and</li> <li>present information using basic terminology from this specification.</li> </ul>
AO1 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
<p>AO1 is assessed throughout the structured questions of A21 and A22.</p> <p>Primarily AO1 is assessed in the early stages of each structured question where the candidate is expected to demonstrate their</p>	<p>Grade A candidates have no difficulty in recalling definitions, key facts and relevant equations.</p> <p>Their work is presented in a clear, logical manner which results in obtaining most of the marks available in qualitative explanations using selected relevant knowledge within the specification.</p> <p>Units, significant figures and powers are well handled by grade A candidates and few mistakes are made with arithmetic slips.</p>	<p>Grade C candidates can recall most definitions, key facts and relevant equations.</p> <p>Their work may be presented in a clear fashion, but the sequence may not be logical.</p> <p>They are less likely to make mistakes with derived units than grade E candidates, for example from <math>\text{mm}^3</math> to <math>\text{m}^3</math>.</p>	<p>Grade E candidates have difficulty in recalling definitions accurately and using the appropriate scientific terminology.</p> <p>Their work is presented in an unclear, unsequenced manner which results in arithmetic slips and the omission of points in qualitative answers.</p> <p>Units, significant figures and powers can also prove problematic for grade E candidates, resulting in a loss of marks.</p>

recall of the principles, concepts and facts from the specification.			
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Assessment Objective	AO2		
	A	C	E
<b>Grade Descriptions</b>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>• apply principles and concepts in familiar and new contexts, involving several steps in the argument;</li> <li>• describe significant trends and patterns shown by complex data presented in tabular or graphical form;</li> <li>• interpret phenomena with few errors, and present arguments and evaluations clearly and logically;</li> <li>• carry out extended calculations, with little or no guidance, and demonstrate good understanding of the underlying relationships between physical quantities;</li> <li>• select a wide range of facts, principles and concepts from this specification; and</li> <li>• link together appropriate facts, principles and concepts from different areas of this specification.</li> </ul>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>• apply principles and concepts in familiar and new contexts, involving a few steps in the argument;</li> <li>• describe significant trends and patterns reasonably shown by complex data presented in tabular or graphical form;</li> <li>• interpret phenomena with few errors, and present arguments and evaluations reasonably clearly and logically;</li> <li>• carry out extended calculations, with some limited guidance, and demonstrate reasonable understanding of the underlying relationships between physical quantities;</li> <li>• select a reasonable range of facts, principles and concepts from this specification; and</li> <li>• link together some appropriate facts, principles and concepts from different areas of this specification.</li> </ul>	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> <li>• apply given principles or concepts in familiar or closely related contexts, involving a few steps in the argument;</li> <li>• describe, and provide a limited explanation of, trends or patterns shown by complex data presented in tabular or graphical form;</li> <li>• provide basic explanations and interpretations of some phenomena, presenting very limited arguments and evaluations;</li> <li>• carry out routine calculations, where guidance is given;</li> <li>• select some facts, principles and concepts from this specification; and</li> <li>• link together some facts, principles and concepts from different areas of this specification.</li> </ul>

AO2 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
<p>AO2 is assessed mostly in the later parts of the structured questions in A21, A22 and A23B.</p> <p>In some questions this will involve explanations and extended writing.</p> <p>A23B allows for the assessment of trends and patterns in tabular and graphical form.</p> <p>The synoptic element of papers provides assessment of the linking of facts, principles and concepts from different areas of the specification.</p>	<p>Grade A candidates will often be able to apply their knowledge to unfamiliar situations but will show some errors in developing their ideas.</p> <p>Their extended, stretch and challenge calculations will have a correct starting point, selecting the appropriate method and equations, but only top grade A/A* candidates will carry the calculation through all the stages to a correct answer.</p> <p>They will successfully be able to recall and apply knowledge from the AS units in synoptic questions, applying knowledge and understanding of more than one area to any situation.</p>	<p>Grade C candidates should have some knowledge of all areas of the specification. There will be no obvious gaps in their knowledge of basic physics concepts.</p> <p>They will perform most calculations well but may have difficulty with those involving logarithmic or exponential functions.</p> <p>They will be able to recall and apply knowledge from the AS units in most synoptic questions, applying knowledge and understanding of more than one area to a familiar situation.</p>	<p>Grade E candidates will display gaps in their knowledge and understanding across the specification, performing exceptionally poorly in this area of content.</p> <p>Grade E candidates will struggle to apply their knowledge to unfamiliar situations and may be unable to select the appropriate equations to allow progress in the later parts of some calculations.</p> <p>They may be able to recall some knowledge from the AS units in synoptic questions but may not be able to make connections between sections of the specification.</p>

Assessment Objective	AO3		
Grade Descriptions	A	C	E
<b>Grade Descriptions</b>	Candidates characteristically: <ul style="list-style-type: none"> <li>• devise and plan experimental and investigative activities, selecting appropriate techniques;</li> <li>• demonstrate safe and skilful practical techniques;</li> <li>• make observations and measurements with appropriate precision and record these methodically; and</li> <li>• interpret, explain, evaluate and communicate the results of their own and others' experimental and investigative activities, in appropriate contexts.</li> </ul>	Candidates characteristically: <ul style="list-style-type: none"> <li>• devise and plan some experimental and investigative activities, selecting appropriate techniques;</li> <li>• demonstrate safe and mostly skilful practical techniques;</li> <li>• make observations and measurements with reasonable precision and record these methodically; and</li> <li>• interpret, explain, evaluate and communicate reasonably, the results of their own and others' experimental and investigative activities, in appropriate contexts.</li> </ul>	Candidates characteristically: <ul style="list-style-type: none"> <li>• devise and plan some aspects of experimental and investigative activities;</li> <li>• demonstrate safe practical techniques;</li> <li>• make observations and measurements and record them; and</li> <li>• interpret, explain and communicate some aspects of the results of their own and others' experimental and investigative activities, in appropriate contexts.</li> </ul>
AO3 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
AO3 is assessed primarily in A23, but within A21 and A22 there are some questions based on experiments that are in the content of the A21 and A22 specifications.  A23A will specifically test the practical techniques and	Grade A candidates can explain the steps of an experiment clearly and in a sensible sequence.  All aspects of their practical work are carried out to a high level of competence and they obtain accurate, reliable data with little difficulty. The presentation of tables of results and graphs is to a high standard.  Within the A23B paper the grade A candidate will be challenged in parts. While scoring highly, there will be some aspects of data handling where only a grade A* candidate would be expected to succeed.	Grade C candidates can explain the steps of an experiment in a reasonably clear manner.  Most aspects of their practical work are carried out to a good level of competence and they obtain accurate, reliable data.  The presentation of tables of results and graphs is to a good standard.  Within the A23B paper the grade C candidate will be challenged. They can combine simple uncertainties correctly but may be unable to deal with	Grade E candidates do not explain the steps of an experiment in a clear manner.  Some aspects of their practical work are carried out to a reasonable level of competence and they may obtain some accurate and reliable data. The presentation of tables of results may show errors with regard to units and significant figures. Graphs are drawn to a reasonable standard.  Within the A23B paper the grade E candidate will find a considerable portion of the work challenging, for example in

<p>skills whilst A23B will focus on the handling of experimental data.</p> <p>Evaluation of experimental methodology and refinement will also be addressed.</p>		<p>more complex examples such as dealing with quantities raised to a power.</p>	<p>evaluating the overall uncertainty in a quantity</p>
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## Appendix 3

### Definitions of Levels of Control

Levels of control for the conditions under which students have completed assessments that are internally marked in school are defined as High, Medium and Limited at GCSE. These definitions also align with the conditions of control for GCE and other CCEA qualifications. In recording the levels of control for evidence to be used in Centre Determined Grades for Summer 2021, the following should be used.

<b>High</b>	<p>The use of resources is tightly prescribed. The centre must ensure that:</p> <ul style="list-style-type: none"> <li>• all students are within direct sight of the teacher/supervisor throughout the session(s);</li> <li>• display materials which might provide assistance are removed or covered;</li> <li>• there is no access to email, the internet or mobile phones;</li> <li>• students complete their work independently;</li> <li>• interaction with other students does not occur; and</li> <li>• no assistance of any description is provided.</li> </ul>
<b>Medium</b>	<p>Students do not need to be directly supervised at all times. The use of resources, including the internet, is not tightly prescribed. Centres should ensure that:</p> <ul style="list-style-type: none"> <li>• there is sufficient evidence to ensure that the individual work can be authenticated; and</li> <li>• the work an individual student submits for assessment is their own.</li> </ul> <p>If work has been completed in groups, teachers must ensure that they can determine and assess the individual student's contribution to the work.</p> <p>If work has been completed remotely, it may be useful to ask questions about what they did and how/why they did it, to help authenticate the work.</p>
<b>Limited</b>	<p>Work is completed without any direct supervision and would not normally contribute to assessable outcomes.</p>





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