

Summer 2021



# Summer 2021

## Alternative Arrangements: GCSE

### Further Mathematics Subject Guidance



Version 1.0



## 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 GCSE **Further Mathematics**.

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## 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 October 2020 by the Education Minister in respect of reducing the assessment burden in GCSE qualifications. The details in the table below will still be applicable in forming a Centre Determined Grade in Summer 2021. For example, teachers can consider evidence for either Unit 1 and one optional unit or Unit 1 and two optional units.

Subject	Current Arrangements	Defined Unit For Omission	Specification Adaptations
<b>GCSE Further Mathematics</b>	<p><b>Unit 1: Pure Mathematics</b> (Mandatory) External assessment (50%)</p> <p><b>Unit 2 Mechanics</b> (Optional) External assessment (25%)</p> <p><b>Unit 3: Statistics</b> (Optional) External assessment (25%)</p> <p><b>Unit 4: Discrete and Decision Mathematics</b> (Optional) External assessment (25%)</p>	<p><b>Unit 2 or Unit 3 or Unit 4</b></p> <p><b>One</b> optional unit is <b>eligible</b> for omission for candidates cashing-in for qualification level grade in Summer 2021.</p> <p>Therefore, candidates can be assessed in only the mandatory unit and one optional unit.</p>	No adaptations

## 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 in this document);
- the level of demand of the qualification assessments; and
- the weighting of each component/unit and the type of assessment.

For GCSE Further Mathematics, information on these aspects can be found in the specification and further illustrated in the specimen assessment materials and past papers<sup>1</sup> 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.

- **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 2** for definitions.

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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.

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 GCSE Further Mathematics you may choose to use are included in the following table:

<b>Evidence</b>
<p><b>CCEA assessment resources for Unit 1, Unit 2, Unit 3 and Unit 4</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>. 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, classwork and bookwork.</p>
<p><b>Performance in any class assessments taken throughout their study of the GCSE Further Mathematics 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 GCSE Further Mathematics are:

<b>AO1</b>	Use and apply standard techniques.
<b>AO2</b>	Reason, interpret and communicate mathematically.
<b>AO3</b>	Solve problems in mathematics and other contexts.

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 following sources and/or types of evidence may be of greatest value in supporting a holistic review of a student's attainment.

### Assessment Objective 1

- Past papers
- Specimen papers
- CCEA 2021 Assessment resources
- Mock exams
- Class tests

Questions that require students to:

- accurately recall facts, terminology and definitions;
- use and interpret notation correctly; and
- accurately carry out routine procedures or set tasks requiring multi-step solutions.

### Assessment Objective 2

- Past papers
- Specimen papers
- CCEA 2021 Assessment resources
- Mock exams
- Class tests

Questions that require students to:

- make deductions, inferences and draw conclusions from mathematical information;
  - construct chains of reasoning to achieve a given result;
  - interpret and communicate information accurately;
  - present arguments and proofs; and
- assess the validity of an argument and critically evaluate a given way of presenting information.

### Assessment Objective 3

- Past papers
- Specimen papers
- CCEA 2021 Assessment resources
- Mock exams
- Class tests

Questions that require students to:

- translate problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes;
  - make and use connections between different parts of mathematics;
  - interpret results in the context of the given problem;
  - evaluate methods used and results obtained; and
- evaluate solutions to identify how they may have been affected by assumptions made.

## 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.<sup>2</sup> 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. These resources will be made available to centres from 29 March 2021.

We appreciate that decisions were taken in October 2020 in respect of unit omissions in GCSE 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

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<sup>2</sup> Assessment resources will not be provided for units/components where endorsement arrangements in lieu of assessments were in place for Summer 2021, for example GCSE Languages Unit 2: Speaking.

way, it can be taken into account that some students have suffered more disruption to their learning than others. For example:

- *A centre has decided to omit the GCSE Further Mathematics optional Unit 3 in line with the Education Minister’s announcements in October 2020. Therefore, Centre Determined Grades may be based on evidence for Unit 1 and Unit 2 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 and 2.*
- *Student A’s Centre Determined Grade should be based on assessment of only the content s/he has covered.*

Assessments adapted/Evidence gathered and reviewed based on GCSE Further Mathematics Content	
All Students	Student A
<p><b>Unit 1</b></p> <ul style="list-style-type: none"> <li>• Algebraic fractions</li> <li>• Algebraic manipulation</li> <li>• Completing the square</li> <li>• Simultaneous equations</li> <li>• Quadratic inequalities</li> <li>• Trigonometric equations</li> <li>• Differentiation</li> <li>• Integration</li> <li>• Logarithms</li> <li>• Matrices</li> </ul> <p><b>Unit 2</b></p> <ul style="list-style-type: none"> <li>• Kinematics</li> <li>• Vectors</li> <li>• Forces</li> <li>• Newton’s laws of motion</li> <li>• Moments</li> </ul>	<p><b>Unit 1</b></p> <ul style="list-style-type: none"> <li>• Algebraic fractions</li> <li>• Algebraic manipulation</li> <li>• Completing the square</li> <li>• Simultaneous equations</li> <li>• Quadratic inequalities</li> <li>• Differentiation</li> <li>• Integration</li> </ul> <p><b>Unit 2</b></p> <ul style="list-style-type: none"> <li>• Kinematics</li> <li>• Forces</li> <li>• Newton’s laws of motion</li> </ul>

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.

### 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 GCSE 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 2019 papers, exemplar answers by students and a senior examiner commentary on the answers.

### **Chief Examiner/Principal Moderator Reports**

The reports for 2018–2019 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**, **C** and **F** in the GCSE specification, to give a general indication of the standards of achievement likely to have been shown by students awarded these grades. 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 Appendix 1 for the Grade Descriptions at A, C and F for GCSE.** 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 the Appendix.
5. Using the descriptions for Grades A, C and F, 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:

*A student is able to effectively perform routine single- and multi-step procedures by recalling, applying and interpreting notation, terminology, facts, definitions and formulae. They also generate strategies to solve complex mathematical and non-mathematical problems but lack consistency and do not always fully interpret results in the context of the given problem.*

- a) *if you are of the view that the candidate'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 candidate'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:

<b>Grade</b>	<b>Description/Advice</b>
A*	Candidates 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>	<i>See Grade A Description.</i>
B	Candidates 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'.
C*	Candidates at grade C* clearly demonstrate all of the features associated with performance at grade 'C' but in many areas the evidence presented contains elements showing that the candidate is working at a grade beyond that which would reasonably be expected of a candidate working at grade 'C'.
<b>C</b>	<i>See Grade C Description.</i>
D	Candidates 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'.
E	Candidates at grade 'E' clearly demonstrate all of the features associated with performance at 'F' but in many areas the evidence presented contains elements showing that the candidate is working at a grade beyond that which would reasonably be expected of a candidate working at grade 'F'.
<b>F</b>	<i>See Grade F Description.</i>
G	Candidates at grade 'G' may demonstrate some elements of grade 'F' 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 'F'.

## 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><a href="mailto:helpline@ccea.org.uk">Email: 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 Graham <u><a href="mailto:ggraham@ccea.org.uk">ggraham@ccea.org.uk</a></u>
Specification Support Officer	Nuala Tierney <u><a href="mailto:ntierney@ccea.org.uk">ntierney@ccea.org.uk</a></u>

## Appendix 1

### GCSE Grade Descriptions and Key Features – Further Mathematics

Assessment Objective	AO1		
Grade Descriptions	A	C	F
	Candidates characteristically:	Candidates characteristically:	Candidates characteristically:
	<ul style="list-style-type: none"> <li>perform procedures accurately.</li> </ul>	<ul style="list-style-type: none"> <li>perform routine single- and multi-step procedures effectively by recalling, applying and interpreting notation, terminology, facts definitions and formulae.</li> </ul>	<ul style="list-style-type: none"> <li>recall and use notation, terminology, facts and definitions; and</li> <li>perform routine procedures, including some multi-step procedures.</li> </ul>
AO1 Evidence	Grade A Key Features	Grade C Key Features	Grade F Key Features
	Candidates at this grade should:	Candidates at this grade should:	Candidates at this grade should:
<b>Unit 1:</b> Past papers Specimen papers Assessment resources Class tests	<ul style="list-style-type: none"> <li>Accurately solve a set of simultaneous equations.</li> <li>Accurately find the equation of a tangent to a given curve at a given point.</li> <li>Accurately complete a table of completed logarithms.</li> </ul>	<ul style="list-style-type: none"> <li>Apply correct notation when solving an inequality.</li> <li>Accurately determine where a quadratic curve crosses the x-axis.</li> <li>Perform simple matrix operations such as addition.</li> </ul>	<ul style="list-style-type: none"> <li>Use appropriate notation to differentiate a simple expression.</li> <li>Use appropriate notation to integrate a simple expression.</li> <li>Recall simple trigonometry facts and solve a simple trigonometry equation.</li> </ul>
<b>Unit 2:</b> Past papers Specimen papers Assessment resources Class tests	<ul style="list-style-type: none"> <li>Apply Newton's second law to set up equations for forces on an inclined plane.</li> <li>Apply the Principle of Moments.</li> </ul>	<ul style="list-style-type: none"> <li>Accurately resolve forces on an inclined plane into components.</li> <li>Apply Newton's second law to set up equations for connected particles.</li> <li>Accurately set up and solve an equation using vertical forces acting on objects on a rod.</li> </ul>	<ul style="list-style-type: none"> <li>Use an appropriate method to find the resultant of a set of vectors.</li> <li>Use information given in a question to draw an appropriate velocity/time graph.</li> <li>Use information in a question to accurately draw forces on a diagram.</li> </ul>
<b>Unit 3:</b> Past papers Specimen papers	<ul style="list-style-type: none"> <li>Accurately calculate a z score.</li> <li>Accurately complete a table of rank orders.</li> </ul>	<ul style="list-style-type: none"> <li>Perform a multi-step procedure to find the mean.</li> <li>Use a term from a Binomial expansion to calculate a probability.</li> </ul>	<ul style="list-style-type: none"> <li>Recall and use Pascal's triangle to write out a Binomial expansion.</li> <li>Calculate the mean of a list of numbers.</li> </ul>

<p>Assessment resources Class tests</p>	<ul style="list-style-type: none"> <li>• Accurately use rank orders to calculate Spearman's coefficient of rank correlation.</li> </ul>		<ul style="list-style-type: none"> <li>• Draw a line of best fit.</li> </ul>
<p><b>Unit 4:</b> Past papers Specimen papers Assessment resources Class tests</p>	<ul style="list-style-type: none"> <li>• Calculate compound expressions in Boolean algebra, and complete truth tables involving compound expressions, proving the equivalence of compound statements.</li> </ul>	<ul style="list-style-type: none"> <li>• Know how to calculate basic combinations of objects and apply the multiplication principle.</li> </ul>	<ul style="list-style-type: none"> <li>• Recall definition of a 4-point moving average.</li> <li>• Perform routine procedures – calculating and plotting moving averages.</li> </ul>

Assessment Objective	AO2		
Grade Descriptions	A	C	F
<b>Grade Descriptions</b>	Candidates characteristically: <ul style="list-style-type: none"> <li>interpret and communicate information accurately;</li> <li>make deductions and inferences and draw conclusions; and</li> <li>construct substantial chains of reasoning, including convincing arguments and formal proofs.</li> </ul>	Candidates characteristically: <ul style="list-style-type: none"> <li>interpret and communicate information effectively;</li> <li>make deductions, inferences and draw conclusions; and</li> <li>construct chains of reasoning, including arguments.</li> </ul>	Candidates characteristically: <ul style="list-style-type: none"> <li>interpret and communicate basic information; and</li> <li>make deductions and use reasoning to obtain results.</li> </ul>
AO2 Evidence	Grade A Key Features	Grade C Key Features	Grade F Key Features
	Candidates at this grade should:	Candidates at this grade should:	Candidates at this grade should:
<b>Unit 1:</b> Past papers Specimen papers Assessment resources Class tests	<ul style="list-style-type: none"> <li>Accurately determine the equation of a normal to a curve.</li> <li>Accurately find the expression for a relationship from a log-log graph.</li> <li>Accurately set up mathematical expressions from given physical data.</li> </ul>	<ul style="list-style-type: none"> <li>Accurately set up a quadratic equation and solve it by completing the square.</li> <li>Accurately simplify an algebraic expression by factorizing and cancelling.</li> </ul>	<ul style="list-style-type: none"> <li>Know to include a constant of integration in indefinite integration.</li> <li>Extend solution of a simple trigonometry equation to a slightly more complicated one.</li> </ul>
<b>Unit 2:</b> Past papers Specimen papers Assessment resources Class tests	<ul style="list-style-type: none"> <li>Accurately set up and solve a quadratic equation from a given magnitude of a vector.</li> <li>Accurately set up and solve a moments equation.</li> </ul>	<ul style="list-style-type: none"> <li>Accurately resolve a force in a horizontal plane into components.</li> <li>Accurately calculate distances in a velocity time graph.</li> <li>Recall the method to calculate a correct moment about a point.</li> </ul>	<ul style="list-style-type: none"> <li>Solve a simple trigonometry equation.</li> <li>Apply a correct kinematic equation to a given situation.</li> </ul>
<b>Unit 3:</b> Past papers Specimen papers Assessment resources Class tests	<ul style="list-style-type: none"> <li>Accurately calculate a probability using a z-score.</li> <li>Construct a method and accurately calculate a complex probability using a Venn diagram.</li> </ul>	<ul style="list-style-type: none"> <li>Construct a method for calculating P (at most 2).</li> </ul>	<ul style="list-style-type: none"> <li>Communicate information on a Venn diagram.</li> </ul>

<p><b>Unit 4:</b> Past papers Specimen papers Assessment resources Class tests</p>	<ul style="list-style-type: none"> <li>• Calculate complex combination and arrangement problems in intricate scenarios, expressing their results in context.</li> </ul>	<ul style="list-style-type: none"> <li>• Know how to plot a solution space for a group of inequalities.</li> <li>• Recall how to use a trend line for a time series to estimate additional time series values.</li> </ul>	<ul style="list-style-type: none"> <li>• Recall how to complete a truth table expressing the validity of Boolean variables.</li> <li>• Know how to use the <b>not</b> operator and the <b>and</b> and <b>or</b> operators to combine two columns of a truth table.</li> </ul>
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Assessment Objective	AO3		
	A	C	F
<b>Grade Descriptions</b>	Candidates characteristically: <ul style="list-style-type: none"> <li>generate efficient strategies to solve complex mathematical and non-mathematical problems by translating them into a series of mathematical processes;</li> <li>make and use connections, which may not be immediately obvious, between different parts of mathematics; and</li> <li>interpret results in the context of the given problem.</li> </ul>	Candidates characteristically: <ul style="list-style-type: none"> <li>generate strategies to solve mathematical and non-mathematical problems by translating them into mathematical processes, realising connections between different parts of mathematics;</li> <li>interpret results in the context of the given problem; and</li> <li>evaluate methods and results.</li> </ul>	Candidates characteristically: <ul style="list-style-type: none"> <li>solve problems by translating simple mathematical and non-mathematical problems into mathematical processes;</li> <li>provide basic evaluation of methods or results; and</li> <li>interpret results in the context of the given problem.</li> </ul>
<b>AO3 Evidence</b>	<b>Grade A Key Features</b>	<b>Grade C Key Features</b>	<b>Grade F Key Features</b>
	Candidates at this grade should:	Candidates at this grade should:	Candidates at this grade should:
<b>Unit 1:</b> Past papers Specimen papers Assessment resources Class tests	<ul style="list-style-type: none"> <li>Manipulate rules for logarithms to find a relationship between variables.</li> <li>Interpret results from a log-log graph.</li> <li>Know to use calculus to accurately determine a maximum and relate this to the given physical situation.</li> </ul>	<ul style="list-style-type: none"> <li>Recall how to perform matrix operations and apply to matrices with unknown elements.</li> <li>Know how to determine the area under a curve and use correct limits of integration.</li> <li>Interpret results from the solution to a set of equations.</li> </ul>	<ul style="list-style-type: none"> <li>Interpret solutions from a quadratic equation to choose the one which is in the context of the given problem.</li> <li>Know when to use an inverse matrix to solve a matrix equation.</li> </ul>
<b>Unit 2:</b> Past papers Specimen papers Assessment resources Class tests	<ul style="list-style-type: none"> <li>Manipulate changes in the context of a moments question to calculate new reactions.</li> <li>Know how to recalculate a new acceleration of an object on a slope after the context in the question changes.</li> </ul>	<ul style="list-style-type: none"> <li>Interpret the result of a distance in a velocity time graph and apply it to a new context.</li> <li>Interpret a value found using kinematics and attempt to apply it to another context.</li> </ul>	<ul style="list-style-type: none"> <li>Show a method for solving a horizontal force.</li> </ul>

<p><b>Unit 3:</b> Past papers Specimen papers Assessment resources Class tests</p>	<ul style="list-style-type: none"> <li>• Accurately calculate the equation of a line of best fit.</li> <li>• Use a Venn diagram to accurately calculate a conditional probability.</li> <li>• Accurately solve an algebraic equation from given probabilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Generate an algebraic equation from given probabilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Interpret the answer to Spearman's coefficient of rank correlation.</li> </ul>
<p><b>Unit 4:</b> Past papers Specimen papers Assessment resources Class tests</p>	<ul style="list-style-type: none"> <li>• Draw complex conclusions about an objective function from a solution space, interpreting results in context.</li> </ul>	<ul style="list-style-type: none"> <li>• Complete a critical path diagram, listing the critical activities and determining the length of the critical path.</li> </ul>	<ul style="list-style-type: none"> <li>• Know how to form inequalities to express conditions expressed in the context.</li> </ul>

## Appendix 2

### 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.

<p><b>High</b></p>	<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>
<p><b>Medium</b></p>	<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>
<p><b>Limited</b></p>	<p>Work is completed without any direct supervision and would not normally contribute to assessable outcomes.</p>



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