

Summer 2021



Summer 2021

Alternative Arrangements: AS and A level

Further Mathematics Subject Guidance



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 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 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, teachers can consider evidence for both AS Units 1 and 2 or one of these units.

Subject	Current Arrangements	Unit For Omission	Specification Adaptations
GCE AS Further Mathematics	Unit 1 external assessment (50%) Unit 2 external assessment (50%)	Unit AS1 or AS2	N/A
GCE A2 Further Mathematics	Unit 1 external assessment (50%) Unit 2 external assessment (50%)	Unit A21 or A22	N/A

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 Further Mathematics, information on these aspects can be found in the specification and further illustrated in the specimen assessment materials, past papers¹ and exemplification of examination performance and Elaboration of specification document which are available on the CCEA website at 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 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.

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

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

Evidence
<p>CCEA assessment resources for all GCE Further Mathematics AS and A2 units – 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>Performance in any mock examinations taken – 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>Performance in CCEA past paper questions and mark schemes – 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 www.ccea.org.uk. 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 CCEA.Analytics@ccea.org.uk</p>
<p>Performance in class tests – 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>Records of each student’s performance throughout their study – This includes, for example, progress review/tracking data, classwork and any other bookwork assessed.</p>
<p>For resitting students, prioritise evidence generated during the 2020/21 academic year.</p>
<p>Performance in class assessments on previously unseen questions are likely to be a good indicator of performance, particularly if they are taken under high control conditions as they assess the skills, knowledge and understanding required by the CCEA specification and are taken from legacy CCEA question papers.</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 Further Mathematics are:

AO1	<p>Use and apply standard techniques, by:</p> <ul style="list-style-type: none"> • selecting and correctly carrying out routine procedures; and • accurately recalling facts, terminology and definitions;
AO2	<p>Reason, interpret and communicate mathematically, by:</p> <ul style="list-style-type: none"> • constructing rigorous mathematical arguments (including proofs); • making deductions and inferences; • assessing the validity of mathematical arguments; • explaining their reasoning; and • using mathematical language and notation correctly;
AO3	<p>Solve problems within mathematics and in other contexts, by:</p> <ul style="list-style-type: none"> • translating problems in mathematical and non-mathematical contexts into mathematical processes; • interpreting solutions to problems in their original context and, where appropriate, evaluate their accuracy and limitations; • translating situations in context into mathematical models; • using mathematical models; and • evaluating the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them.

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

The 3 assessment objectives are assessed throughout all GCE Further Mathematics AS and A2 units.

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. GCE general marking instructions will be sent to all centres after the Easter break.

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 GCE Further Mathematics A2 Unit 2 in line with the Education Minister's announcement in December 2020. Therefore, Centre Determined Grades may be based on evidence for GCE Further Mathematics A2 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 A2 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 Further Mathematics Content	
All Students	Student A
<ul style="list-style-type: none"> • evaluate improper integrals where either the integrand is undefined at a value in the range of integration or the range of integration extends to infinity; • integrate using partial fractions (extend to include Evaluate improper integrals where either the integrand is undefined at a value in the range of integration or the range of integration extends to infinity); • integrate using partial fractions (extend to include quadratic factors in the denominator); • differentiate inverse trigonometric functions; • use repeated integration by parts; • demonstrate understanding of and use simple reduction formulae in integration; 	<ul style="list-style-type: none"> • evaluate improper integrals where either the integrand is undefined at a value in the range of integration or the range of integration extends to infinity; • integrate using partial fractions (extend to include Evaluate improper integrals where either the integrand is undefined at a value in the range of integration or the range of integration extends to infinity); • integrate using partial fractions (extend to include quadratic factors in the denominator); • differentiate inverse trigonometric functions;

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 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/Principal Moderator 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

GCE Further Mathematics papers are not marked online so there is no Item level data available for this subject at AS or A2 level.

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 the Appendix.
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: Assess the candidate evidence at the descriptors over the 3 assessment objectives provided in the CCEA support. Compare performance to

- a) *that identified at the grade descriptors for the relevant papers in the CCEA AS and A2 Mathematics examinations in summer 2019 and*
- b) *the performance identified at the grade descriptors for the CCEA assessment resource (if taken)*
- c) *performance in past papers held in the CCEA Further Mathematics resources (archive) section*

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 best fit between the grade description and the student's work; or

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.

Any other mock examinations, class tests, end of module work and past paper exercises may be compared to these benchmarks to help confirm the teacher's judgement that each grade assigned is a fair, valid and reliable reflection of the assessed evidence available for that candidate.

The table below summarises this approach:

Grade	Description/Advice
A* (A2 only)	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'.
A	See Grade A Description.
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	See Grade C Description.
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	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: helpline@ccea.org.uk</u></p> <p>Telephone: 028 9026 1220. 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>centresupport@ccea.org.uk</u></p>
CCEA Entries	<u>entriesandresults@ccea.org.uk</u>
Subject Officer	Name Joe McGurk <u>jmcgurk@ccea.org.uk</u>
Specification Support Officer	Name Nuala Tierney <u>ntierney@ccea.org.uk</u>

Appendix 1

AS Grade Descriptions and Key Features - GCE Further Mathematics

Assessment Objective	AO1		
Grade Descriptions	A	C	E
	For AO1, candidates characteristically: <ul style="list-style-type: none"> select and accurately carry out almost all routine procedures correctly; and accurately recall almost all facts, terminology and definitions. 	For AO1, candidates characteristically: <ul style="list-style-type: none"> select and accurately carry out many routine procedures correctly; and accurately recall many facts, terminology and definitions. 	For AO1, candidates characteristically: <ul style="list-style-type: none"> select and accurately carry out some routine procedures correctly; and accurately recall some facts, terminology and definitions.
AO1 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
CCEA Assessment resource, Mock Exam End of unit test, Class test, Past paper questions	A candidate working at Grade A would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i> Q1(a) There will be clear evidence of knowledge of key definitions relating to inverses of matrices and calculations will be completed accurately. Q4(a) Routine arithmetic procedures will be carried out correctly for the product and quotient of complex numbers. Minor errors in the calculation of the square root may occur.	A candidate working at Grade C would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i> Q1(a) There will be clear evidence of knowledge of key definitions relating to inverses of matrices and most calculations will be completed accurately, with perhaps the exception of the inverse in (iii). Q4(a) Routine arithmetic procedures will be carried out correctly for the product of the complex numbers. Minor errors may occur in the calculation of the quotient and	A candidate working at Grade E would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i> Q1(a) There will be clear evidence of knowledge of key definitions relating to inverses of matrices and basic calculations will be correct. Calculation errors are likely in (ii) and (iii). Q4(a) Routine arithmetic procedures will be carried out correctly for the product of the complex numbers. Minor errors may occur in the calculation of the quotient, but it is unlikely that the square root will be successfully calculated.

	<p>Q6(i)&(ii) The definitions of determinant and unique solution will be clearly known and the correct procedures will be used to calculate them successfully.</p>	<p>there may be some difficulty in the calculation of the square root. Q6(i)&(ii) The definitions of determinant and unique solution will be clearly known and the correct procedures will be used with only the potential for very minor calculation errors.</p>	<p>Q6(i)&(ii) The definition of determinant and will be clearly known and only minor calculation errors are likely. There may be some confusion about the correct condition for a non-unique solution.</p>
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Assessment Objective	AO2		
Grade Descriptions	A	C	E
Grade Descriptions	For AO2, candidates characteristically: <ul style="list-style-type: none"> • independently construct rigorous mathematical arguments in almost all relevant contexts; • make valid deductions and inferences in almost all relevant contexts; • assess, critique and improve the validity of a mathematical argument in almost all relevant contexts; • construct extended chains of reasoning to achieve a given result, find and correct errors and explain their reasoning, evaluating evidence in almost all relevant contexts; and • use mathematical language and notation correctly in almost all relevant contexts. 	For AO2, candidates characteristically: <ul style="list-style-type: none"> • independently construct rigorous mathematical arguments in many relevant contexts; • make valid deductions and inferences in many relevant contexts; • assess, critique and improve the validity of a mathematical argument in many relevant contexts; • construct extended chains of reasoning to achieve a given result, find and correct errors and explain their reasoning, evaluating evidence in many relevant contexts; and • use mathematical language and notation correctly in many relevant contexts. 	For AO2, candidates characteristically: <ul style="list-style-type: none"> • independently construct rigorous mathematical arguments in some relevant contexts; • make valid deductions and inferences in some relevant contexts; • assess, critique and improve the validity of a mathematical argument in some relevant contexts; • construct extended chains of reasoning to achieve a given result, find and correct errors and explain their reasoning, evaluating evidence in some relevant contexts; and • use mathematical language and notation correctly in some relevant contexts.
AO2 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
CCEA Assessment resource, Mock Exam End of unit test, class test, past paper questions	A candidate working at Grade A would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i> Q3(a) (i) There will be clear and efficient reasoning used to find the inverse of A (ii) Careful	A candidate working at Grade C would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i> Q3(a)(i) There will be clear and efficient reasoning used to find	A candidate working at Grade E would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i> Q3(a)(i) Clear reasoning will be used to find the inverse of A , with only

	<p>algebraic manipulation will enable the successful calculation of the inverse of B</p> <p>Q5(a) In (iii) & (iv) there will be clear and efficient use of the results obtained in (i) & (ii) to find the product and quotient of the complex numbers in the correct mathematical format.</p> <p>Q7 (a)(i) There will be a clearly presented method used to show that the lines intersect, with a check on the validity of the answer completed as the final stage of the solution.</p> <p>(b) There will be a clearly presented method used to find the line of intersection and angle between the planes, with only the possibility of minor calculation errors.</p>	<p>the inverse of A, with only the possibility of very minor calculation errors.</p> <p>(ii) An attempt at algebraic manipulation will be made but is unlikely to fully succeed in finding the inverse of B</p> <p>Q5(a) In (iii) & (iv) there will be some use of the results obtained in (i) & (ii) to try to find the product and quotient of the complex numbers in the correct mathematical format.</p> <p>Q7 (a)(i) The standard method will be used to show that the lines intersect, but it is unlikely that a check on the validity of the answer will be completed as the final stage of the solution.</p> <p>(b)(i) There will be a clear method used to find the line of intersection of the planes, but some algebraic errors may occur.</p> <p>(b)(ii) An attempt to find the angle between the planes will be made but there may be some confusion relating to the use of normals.</p>	<p>the possibility of minor calculation errors.</p> <p>(ii) An attempt at algebraic manipulation will be made but is unlikely to fully succeed in finding the inverse of B</p> <p>Q5(a) In (iii) & (iv) there will be an attempt to use the results obtained in (i) & (ii) to try to find the product and quotient of the complex numbers in the correct mathematical format, although it is unlikely the final correct solution will be obtained.</p> <p>Q7 (a) (i) There will be some attempt to show that the lines intersect, but it is unlikely that this will be fully completed.</p> <p>(b) There will be some attempt to find the line of intersection and angle between the planes, although it is unlikely that solutions will be successfully completed.</p>
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Assessment Objective	AO3		
Grade Descriptions	A	C	E
Grade Descriptions	For AO3, candidates characteristically: <ul style="list-style-type: none"> • translate problems in mathematical or non-mathematical contexts into mathematical processes in almost all relevant contexts; • interpret solutions to problems in their original context and, where appropriate, evaluate their accuracy and limitations in almost all relevant contexts; • translate situations in context into mathematical models in almost all relevant contexts; • use mathematical models in almost all relevant contexts; and • evaluate the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them in almost all relevant contexts. 	For AO3, candidates characteristically: <ul style="list-style-type: none"> • translate problems in mathematical or non-mathematical contexts into mathematical processes in many relevant contexts; • interpret solutions to problems in their original context and, where appropriate, evaluate their accuracy and limitations in many relevant contexts; • translate situations in context into mathematical models in many relevant contexts; • use mathematical models in many relevant contexts; and • evaluate the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them in many relevant contexts. 	For AO3, candidates characteristically: <ul style="list-style-type: none"> • translate problems in mathematical or non-mathematical contexts into mathematical processes in some relevant contexts; • interpret solutions to problems in their original context and, where appropriate, evaluate their accuracy and limitations in some relevant contexts; • translate situations in context into mathematical models in some relevant contexts; • use mathematical models in some relevant contexts; and • evaluate the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them in some relevant contexts.
AO3 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
CCEA Assessment resource, Mock Exam	A candidate working at Grade A would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i>	A candidate working at Grade C would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i>	A candidate working at Grade E would typically achieve the marks below in the following types of questions as exemplified in the Summer 2019 Paper <i>Summer 2019 AS Paper 1</i>

<p>End of unit test, class test, past paper questions</p>	<p>Q1(b) The context is successfully translated into an algebraic model which is correctly solved to find the gradients of the required lines</p> <p>Q3(b) The given mathematical context is converted into a suitable model which is successfully solved to create the new equation in the correct format.</p> <p>Q5(b) The mathematical context is interpreted geometrically, with the correct region clearly identified.</p>	<p>Q1(b) The context is translated into an algebraic model which is solved to find the gradients of two lines. There may be some misinterpretation relating to invariant points as opposed to invariant lines.</p> <p>Q3(b) The given mathematical context is converted into a suitable model. This is solved to create a new equation. Common errors may be routine algebraic mistakes or a failure to write the final answer in the required format.</p> <p>Q5(b) The mathematical context is interpreted geometrically, with the correct region identified. A common error may be a failure to label all the key points in the diagram.</p>	<p>Q1(b) The context is translated into an algebraic model which is solved to find the gradients of two lines. There may be some misinterpretation relating to invariant lines and/or algebraic errors.</p> <p>Q3(b) The given mathematical context is converted into a suitable model. This is solved to create a new equation. Common errors may be routine algebraic mistakes or a failure to write the final answer in the required format.</p> <p>Q5(b) The mathematical context is interpreted geometrically, with the correct region identified. A common error may be a failure to label the key points in the diagram.</p>
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Appendix 2

A2 Grade Descriptions and Key Features – GCE Further Mathematics

Assessment Objective	AO1		
Grade Descriptions	A	C	E
	For AO1, candidates characteristically: <ul style="list-style-type: none"> • select and accurately carry out almost all routine procedures correctly; and • accurately recall almost all facts, terminology and definitions. 	For AO1, candidates characteristically: <ul style="list-style-type: none"> • select and accurately carry out many routine procedures correctly; and • accurately recall many facts, terminology and definitions. 	For AO1, candidates characteristically: <ul style="list-style-type: none"> • select and accurately carry out some routine procedures correctly; and • accurately recall some facts, terminology and definitions.
AO1 Evidence	Grade A Features	Grade C Key Features	Grade E Key Features
CCEA Assessment resource, Mock Exam End of unit test, class test, past paper questions	A candidate working at Grade A would typically demonstrate the standard described below in the types of questions as exemplified in the Legacy Summer 2018 and 2019 papers. <i>2018 F2 Q3</i> There will be clear evidence of knowing and correctly applying the appropriate procedures for the use of partial fractions in relation to integration. <i>2018 F2 Q4</i> The standard procedures for deriving a series using Maclaurin’s Theorem will be correctly used. <i>2019 F3 Q3</i> The procedure for differentiating an inverse trig. function and applying the result to the equation of a tangent will	A candidate working at Grade C would typically demonstrate the standard described below in the types of questions as exemplified in the Legacy Summer 2018 and 2019 papers. <i>2018 F2 Q3</i> There will be clear evidence of knowing and applying the appropriate procedures for the use of partial fractions in relation to integration. There may be some minor calculation errors. <i>2018 F2 Q4</i> The standard procedures for deriving a series using Maclaurin’s Theorem will be correctly used. However, early calculation errors may hinder further progress.	A candidate working at Grade E would typically demonstrate the standard described below in the types of questions as exemplified in the Legacy Summer 2018 and 2019 papers <i>2018 F2 Q3</i> There will be some evidence of knowing and applying the appropriate procedures for the use of partial fractions in relation to integration. However, there may be a significant number of algebraic or calculation errors. <i>2018 F2 Q4</i> The standard procedures for deriving a series using Maclaurin’s Theorem will be attempted. However, it is unlikely that much progress may be made.

	<p>be correctly carried out. Any errors are likely to be very minor.</p>	<p><i>2019 F3 Q3</i> The procedure for differentiating an inverse trig. function and applying the result to the equation of a tangent will be correctly carried out. There may be some errors in the algebraic simplification of the derivative in (i).</p>	<p><i>2019 F3 Q3</i> The procedure for differentiating an inverse trig. function and applying the result to the equation of a tangent will be attempted. It is possible that only the work on the equation of the tangent in (ii) may achieve any marks.</p>
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Assessment Objective	AO2		
Grade Descriptions	A	C	E
Grade Descriptions	For AO2, candidates characteristically: <ul style="list-style-type: none"> • independently construct rigorous mathematical arguments in almost all relevant contexts; • make valid deductions and inferences in almost all relevant contexts; • assess, critique and improve the validity of a mathematical argument in almost all relevant contexts; • construct extended chains of reasoning to achieve a given result, find and correct errors and explain their reasoning, evaluating evidence in almost all relevant contexts; and • use mathematical language and notation correctly in almost all relevant contexts. 	For AO2, candidates characteristically: <ul style="list-style-type: none"> • independently construct rigorous mathematical arguments in many relevant contexts; • make valid deductions and inferences in many relevant contexts; • assess, critique and improve the validity of a mathematical argument in many relevant contexts; • construct extended chains of reasoning to achieve a given result, find and correct errors and explain their reasoning, evaluating evidence in many relevant contexts; and • use mathematical language and notation correctly in many relevant contexts. 	For AO2, candidates characteristically: <ul style="list-style-type: none"> • independently construct rigorous mathematical arguments in some relevant contexts; • make valid deductions and inferences in some relevant contexts; • assess, critique and improve the validity of a mathematical argument in some relevant contexts; • construct extended chains of reasoning to achieve a given result, find and correct errors and explain their reasoning, evaluating evidence in some relevant contexts; and • use mathematical language and notation correctly in some relevant contexts.
AO2 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
CCEA Assessment resource, Mock Exam End of unit test, class test, past paper questions	A candidate working at Grade A would typically demonstrate the standard described below in the types of questions as exemplified in the Legacy Summer 2018 and 2019 papers. <i>2019 F2 Q5</i> A clearly presented argument will be evident in the re-write of the partial	A candidate working at Grade C would typically demonstrate the standard described below in the types of questions as exemplified in the Legacy Summer 2018 and 2019 papers. <i>2019 F2 Q5</i> A reasonably clear argument will be evident in the re-write of the partial	A candidate working at Grade E would typically demonstrate the standard described below in the types of questions as exemplified in the Legacy Summer 2018 and 2019 papers. <i>2019 F2 Q5</i> A clear argument will be attempted in the re-write of the partial fractions and

	<p>fractions and in the expansion of the series. Only very minor errors are likely to occur. <i>2019 F2 Q8</i> The reasoning used in the solution of the differential equation will be clear and concise. It is likely that marks will only be lost in the proof in (iii). <i>2019 F3 Q7</i> A rigorous argument will be used to derive the reduction formula and apply it to the integral given in (iii). It is possible that some minor arithmetic errors may occur in (iii).</p>	<p>fractions and in the expansion of the series. Some minor errors are likely to occur. <i>2019 F2 Q8</i> Clear reasoning will be used in the solution of the differential equation. It is likely that some marks will be lost in the final stages of obtaining the particular solution and in the proof in (iii). <i>2019 F3 Q7</i> A clear argument will be used to derive the reduction formula and apply it to the integral given in (iii). The arithmetic manipulation required in (iii) may cause some difficulty.</p>	<p>in the expansion of the series. There are likely to be some errors in the algebraic manipulation of the terms in (ii). <i>2019 F2 Q8</i> There will be an attempt to provide a clear argument in finding the general solution of the differential equation. However, errors in trig, differentiation and algebraic manipulation may hinder further progress. <i>2019 F3 Q7</i> There will be an attempt to provide a clear argument in deriving the reduction formula. The level of algebraic manipulation towards the end of (ii) may hinder further progress.</p>
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Assessment Objective	AO3		
Grade Descriptions	A	C	E
	For AO3, candidates characteristically: <ul style="list-style-type: none"> • translate problems in mathematical or non-mathematical contexts into mathematical processes in almost all relevant contexts; • interpret solutions to problems in their original context and, where appropriate, evaluate their accuracy and limitations in almost all relevant contexts; • translate situations in context into mathematical models in almost all relevant contexts; • use mathematical models in almost all relevant contexts; and • evaluate the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them in almost all relevant contexts. 	For AO3, candidates characteristically: <ul style="list-style-type: none"> • translate problems in mathematical or non-mathematical contexts into mathematical processes in many relevant contexts; • interpret solutions to problems in their original context and, where appropriate, evaluate their accuracy and limitations in many relevant contexts; • translate situations in context into mathematical models in many relevant contexts; • use mathematical models in many relevant contexts; and • evaluate the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them in many relevant contexts. 	For AO3, candidates characteristically: <ul style="list-style-type: none"> • translate problems in mathematical or non-mathematical contexts into mathematical processes in some relevant contexts; • interpret solutions to problems in their original context and, where appropriate, evaluate their accuracy and limitations in some relevant contexts; • translate situations in context into mathematical models in some relevant contexts; • use mathematical models in some relevant contexts; and • evaluate the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them in some relevant contexts.
AO3 Evidence	Grade A Key Features	Grade C Key Features	Grade E Key Features
CCEA Assessment resource, Mock Exam End of unit test, class test, past	A candidate working at Grade A would typically achieve the marks below in the following types of questions as exemplified in the Summer 2018 and 2019 Papers <i>2019 F2 Q6(b)</i> (i) The given equation will be correctly translated into the standard	A candidate working at Grade C would typically achieve the marks below in the following types of questions as exemplified in the Summer 2018 and 2019 Papers <i>2019 F2 Q6(b)</i> (i) The given equation will be correctly translated into the standard	A candidate working at Grade E would typically achieve the marks below in the following types of questions as exemplified in the Summer 2018 and 2019 Papers <i>2019 F2 Q6(b)</i> There will be an attempt to translate the given equation into the standard

<p>paper questions</p>	<p>mathematical process involving complex numbers, thus enabling its solution. (ii) & (iii) The solution to (i) will be correctly interpreted in geometrical form in an Argand diagram. 2018 F2 Q7 (i) (ii) (iii) The statement given in (i) is interpreted so that a suitable substitution is made to enable the required proof. The significance of the result proved in (ii) is used to enable the proof required in (iii). 2018 F3 Q2 (i) The standard procedure for re-writing hyperbolic functions in exponential form is used to derive the inverse hyperbolic expression and the limitation on the feasible value of a logarithmic expression is recognised in order to provide the correct solution. (ii) The relationship between the squares of sinh and cosh is identified and used to enable the correct solution of the given equation.</p>	<p>mathematical process involving complex numbers. There may be some errors in the solution. (ii) & (iii) There may be some attempt at a geometrical interpretation. 2018 F2 Q7 (i) (ii) (iii) The statement given in (i) is interpreted so that a suitable substitution is made to enable the required proof. 2018 F3 Q2 (i) The standard procedure for re-writing hyperbolic functions in exponential form is used to derive the inverse hyperbolic expression but the limitation on the feasible value of a logarithmic expression is not recognised. (ii) The relationship between the squares of sinh and cosh is identified and used to enable the solution of the given equation.</p>	<p>mathematical process involving complex numbers. There may not be much further progress. 2018 F2 Q7 (i) (ii) (iii) It is unlikely that much progress will be made in this question. 2018 F3 Q2 (i) The standard procedure for re-writing hyperbolic functions in exponential form is attempted but little progress is made. (ii) The relationship between the squares of sinh and cosh is identified and used to start the solution of the given equation.</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.

High	<p>The use of resources is tightly prescribed. The centre must ensure that:</p> <ul style="list-style-type: none"> • all students are within direct sight of the teacher/supervisor throughout the session(s); • display materials which might provide assistance are removed or covered; • there is no access to email, the internet or mobile phones; • students complete their work independently; • interaction with other students does not occur; and • no assistance of any description is provided.
Medium	<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"> • there is sufficient evidence to ensure that the individual work can be authenticated; and • the work an individual student submits for assessment is their own. <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>
Limited	<p>Work is completed without any direct supervision and would not normally contribute to assessable outcomes.</p>



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