Summer 2021

Rewarding Learning

Summer 2021
Alternative Arrangements: AS and A level
Software Systems Development
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 GCE AS or A level Software Systems Development.

Contents

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 either AS Units 1 or 2, or for both units.

Subject	Current Arrangements	Unit For Omission	Specification Adaptations
GCE AS Software Systems Development	AS 1: External assessment (50% of AS) AS 2: Internal assessment (50% of AS)	Centres can choose to omit either unit or neither	N/A
GCE A Level Software Systems Development	A2 1: External assessment (30% of A Level) A2 2: Internal assessment (30% of A Level)	Centres can choose to omit either unit or neither	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 Software Systems Development, information on these aspects can be found in the specification and further illustrated in the specimen assessment materials, past papers[1] and coursework assessment tasks 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.

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

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

3. Evidence to Inform Centre Determined Grades

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

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

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

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

Evidence
Performance in internally assessed units, AS 2: Event Driven Programming and A2 2: Implementing Solutions – This can be even if these have not been fully completed.
CCEA assessment resources for Unit AS 1 and Unit A2 1 – 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.
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.
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
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.
Records of each student's performance throughout their study – This includes, for example, progress review/tracking data, classwork or bookwork.
Performance in any class assessments taken throughout their study of the GCE Software Systems Development specification – 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.
For resitting students, prioritise evidence generated during the 2020/21 academic year.

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 Software Systems Development are:

AO1	demonstrate knowledge and understanding of concepts, systems approaches, and solutions relevant to software systems development
AO2	apply their knowledge and understanding to develop and implement solutions to the problems identified
AO3	analyse and evaluate the concepts of software systems development and candidates' own performance in problem solving

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

- Work or responses that require the candidate to recall, select and communicate their knowledge and understanding of concepts, systems approaches, and solutions relevant to software systems development.
- Evidenced in the User Requirements and Design section of the AS 2 and A2 2 coursework.
- Also evidenced in shorter questions in the CCEA assessment resources or mock examinations, past paper questions or class tests in units AS 1 and A2 1.

Assessment Objective 2

- Work or responses that require the candidate to apply their knowledge and understanding to develop solutions where problem solving skills are needed to solve complex problems.
- Evidenced while Building the Solution and in the Testing section of the AS 2 and A2 2 coursework.
- Also evidenced in longer response questions in the CCEA assessment resources or mock examinations, past paper questions or class tests in units AS 1 and A2 1. These questions will involve interpretation or application of knowledge.

Assessment Objective 3

- Work or responses that require the candidate to analyse and evaluate software systems development solutions to solve problems, make reasoned judgements and present conclusions.
- Evidenced in the Evaluation section of the AS 2 and A2 2 coursework.
- Also evidenced in extended writing questions in the CCEA assessment resource or mock examinations, past paper questions or class tests where candidates are asked to propose solutions and evaluate outcomes.

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

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. The CCEA assessment resources are optional. If a centre chooses to use an assessment resource, we would encourage them to be used under high control conditions, where it is safe to do so, to ensure they have the greatest value.

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

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

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

Assessments adapted/Evidence gathered and reviewed based on A2 Unit 1 Software Systems Development Content	
All Students	**Student A**
• Reasons for Systems Development • Systems Methodologies • Managing Projects • Testing • Database Concepts • Entity Relationship (ER) Models • Normalisation • Structured Query Language (SQL)	• Reasons for Systems Development • Systems Methodologies • Managing Projects • Testing • Database Concepts • Entity Relationship (ER) Models

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.

Agreement Trial Materials

The agreement trial for Summer 2021 is available at https://training.ccea.org.uk/course/view.php?id=131. Please note these agreement trials were produced before the cancellation of examinations for 2021. However, they will still be useful in providing guidance on the requirements of internally assessed units and the CCEA standard to be applied in marking them.

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

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

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:

   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:

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	Email: helpline@ccea.org.uk 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. All other queries should be directed to centresupport@ccea.org.uk
CCEA Entries	entriesandresults@ccea.org.uk
Subject Officer	Andrew Douglas adouglas@ccea.org.uk
Specification Support Officer	Nuala Tierney ntierney@ccea.org.uk

Appendix 1

AS Grade Descriptions and Key Features – Software Systems Development

Assessment Objective	AO1 Candidates must demonstrate knowledge and understanding of concepts, systems approaches, and solutions relevant to software systems development		
	A	**C**	**E**
Grade Descriptions	For AO1, candidates characteristically: • demonstrate thorough knowledge and understanding of the concepts and underpinning principles of software systems development from an object oriented perspective; • demonstrate ability to design and determine the need to test event driven applications using appropriate methods; and • use accurate, appropriate technical language associated with software systems development.	For AO1, candidates characteristically: • demonstrate good knowledge and understanding of the concepts and underpinning principles of software systems development from an object oriented perspective; • demonstrate reasonable ability to design and understand the need to test event driven applications using appropriate methods; and • use satisfactory, relevant levels of technical language associated with software systems development.	For AO1, candidates characteristically: • demonstrate basic, sometimes incomplete knowledge and understanding of the concepts and underpinning principles of software systems development from an object oriented perspective; • demonstrate limited ability to design and understand the need to test event driven applications using appropriate methods; and • use basic levels of technical language associated with software systems development.
AO1 Evidence	**Grade A Key Features**	**Grade C Key Features**	**Grade E Key Features**
Coursework: Background and User Requirements	• A detailed opening section outlining the background to the task. • This is followed by an exhaustive, detailed list of user requirements. With excellent use of non-technical language. Terms like menu or avatar would be acceptable. • An excellent list of User Requirements stated that will carry throughout the project to Implementation, Testing and Evaluation.	• An opening section outlining the background to the task. • This is followed by a list of user requirements. • A list of User Requirements stated that will carry throughout the project to Implementation, Testing and Evaluation.	• A vague opening section outlining some of the background to the task. • This is followed by a list of user requirements. • Some User Requirements stated but these are lacking detail in terms of language used and relevance to the proposed project.

Coursework: Design Documentation	Detailed storyboards developed and should include the following: • Some outline drawings of the proposed solution. • Detailed elements documented for the proposed screens for the solution, which should be uniform and have a consistent look and feel to them. • Correct use of standards for naming of various controls • Link back to all user requirements where applicable. • Reference should be made to the functionality for each screen linked to the proposed events e.g. pseudocode snippet. • Initial storyboards should have clear and detailed feedback from the client. • Designs should be of sufficient quality that they could be given to a programmer for implementation – third party implementation.	Storyboards developed and should include the following: • Some outline drawings of the proposed solution. • Some elements documented for the proposed screens for the solution, which should be uniform and have a consistent look and feel to them. • Correct use of standards for naming of various controls • Link back to user requirements where applicable. • Some reference made to the functionality for some screens linked to the proposed events. • Initial storyboards should have feedback from the client. • Designs are clear and contain enough information in relation to the proposed system.	Basic storyboards developed and should include the following: • Some outline drawings of the proposed solution. • Some elements documented for the proposed screens for the solution. • Poor use of standards for naming of various controls • No link back to user requirements where applicable. • Limited reference made to the functionality for some screens linked using non-specific terminology. • No feedback from the client. • Designs are unclear and lack enough information in relation to the proposed system.
Coursework: Test Plan	• Test plan produced that will test all elements of the proposed solution. • This will be linked back to all the user requirements listed. • All aspects of the proposed solution should be tested for.	• Test plan produced that will test elements of the proposed solution. • This will be linked back to some of the user requirements listed. • Most of the proposed solution should be tested for.	• Test plan produced that will test a limited number of elements for the proposed solution. • No link back to the user requirements listed. • Some of the proposed solution should be tested for.

CCEA Assessment Resource **Mock examinations** **CCEA past paper questions** **Class tests** **Classwork** **Bookwork**	• The candidate can demonstrate **thorough** knowledge and understanding of the principles of software systems development from an object oriented perspective. • The candidate can **thoroughly** recall, select and communicate their knowledge and understanding of concepts, systems approaches, and solutions relevant to software systems development. • The candidate will use an **extensive** range of accurate and appropriate technical language.	• The candidate can demonstrate a **good** knowledge and understanding of the principles of software systems development from an object oriented perspective. • The candidate's ability to recall, select and communicate their knowledge and understanding of concepts, systems approaches, and solutions relevant to software systems development will be **good**. • The candidate will use a **reasonable** range of accurate and appropriate technical language.	• The candidate can demonstrate a **basic** knowledge and understanding of the principles of software systems development from an object oriented perspective. • The candidate's ability to recall, select and communicate their knowledge and understanding of concepts, systems approaches, and solutions relevant to software systems development will be **limited**. • The candidate will use a **basic** range of accurate and appropriate technical language.

Assessment Objective	**AO2:** Candidates must apply their knowledge and understanding to develop and implement solutions to the problems identified		
Grade Descriptions	**A**	**C**	**E**
	For AO2, candidates characteristically: • effectively apply knowledge and understanding of the concepts and underpinning principles of software systems development from an object oriented perspective to the solution of complex problems in an object oriented environment; • apply object oriented approaches to problem solving and effectively apply testing techniques; and • articulate solutions to problems using technical language appropriately and accurately.	For AO2, candidates characteristically: • apply good knowledge and understanding of the concepts and underpinning principles of software systems development from an object oriented perspective to the solution of problems in an object oriented environment; • apply suitable object oriented approaches to problem solving and appropriately apply testing techniques; and • outline solutions to problems using relevant technical language.	For AO2, candidates characteristically: • apply basic knowledge and understanding of the concepts and underpinning principles of software systems development from an object oriented perspective to the solution of simple problems in an object oriented environment; • apply basic object oriented approaches to problem solving and limited application of testing techniques; and • suggest solutions to problems using basic technical language.
AO2 Evidence	**Grade A Key Features**	**Grade C Key Features**	**Grade E Key Features**
Coursework: Building the Solution	• The candidate has produced a fully working event driven application without any major bugs or issues. • The candidate has used a range of excellent OOP programming techniques throughout the application. • The interface is well laid out and adheres to HCI principles for all screens. • The candidate has used external text and binary files for the permanent storage of records required in the implementation of the solution. • The Candidate has used comments in the code especially around each class/method or complex programming	• The candidate has produced a working event driven application with minimal bugs or issues. • The candidate has used some OOP programming techniques throughout the application. • The interface adheres to some HCI principles for most screens. • The candidate has used files for the storage of information required in the implementation of the solution. • The candidate has some comments in the code demonstrating a good level of understanding of the coding process.	• The candidate has produced an event driven application with some bugs or issues. • The candidate has used basic OOP programming techniques throughout the application. • The interface adheres to some HCI principles for some screens. • The candidate has not used files for the storage of information. • The candidate has a limited amount of comments in the code demonstrating a basic understanding of the coding process.

	technique implemented, demonstrating an excellent understanding of the coding process. • The candidate has made use of validation in their application to allow the application to catch errors e.g. the wrong data types are used or when multiple selections are used, instead of the application crashing. • The candidate has implemented try catch and custom exception handling and used validation within the field Set method/Property of a class and throw back error messages where relevant. It is expected that a validation process calls methods from a static class. • The candidate has implemented a log on section that allows new or returning users to access the application. • The candidate has included an element of randomisation within the application, so that the user experience is different each time used. • The candidate has implemented a high score table and this has been ordered correctly.	• The candidate has attempted to use validation in their application. • The candidate has implemented some try catch and custom exception handling. • The candidate has implemented a log on section that allows new or returning users to access the application. • The candidate has included a basic element of randomisation within the application. • The candidate has implemented a high score table.	• The candidate has not attempted to use validation in their application. • The candidate has implemented a basic log on section that allows access to the application. • The candidate has not included any element of randomisation within the application. • The candidate has not implemented a high score table.
Coursework: Testing	• The candidate has implemented the test plan. • The test plan contains relevant test data. • The results from all tests are recorded. • All corrective action is documented and/or implemented.	• The candidate has implemented the test plan. • The test plan contains some test data. • The results from some tests are recorded. • Some corrective action is documented and/or implemented.	• The candidate has implemented some of the test plan. • The test plan contains a limited amount or no test data. • No corrective action is documented and/or implemented.

CCEA Assessment Resource **Mock examinations** **CCEA past paper questions** **Class tests** **Classwork** **Bookwork**	• The candidate can **effectively** apply their knowledge and understanding to develop solutions where problem solving skills are needed to solve complex problems. • The candidate will use an **extensive** range of accurate, appropriate technical language and concepts to solve complex problems.	• The candidate can apply **good** knowledge and understanding to develop solutions where problem solving skills are needed to solve problems. • The candidate will use a **reasonable** range of accurate, appropriate technical language and concepts to solve complex problems.	• The candidate can apply **basic** knowledge and understanding to develop solutions where problem solving skills are needed to solve problems. • The candidate will use a **basic** range of accurate, appropriate technical language and concepts to solve complex problems.

Assessment Objective	**AO3:** Candidates must analyse and evaluate the concepts of software systems development and candidates' own performance in problem solving		
Grade Descriptions	**A**	**C**	**E**
	For AO3, candidates characteristically: • appreciate the value of developing applications in an object oriented environment; • discuss the concepts and underpinning principles of software systems development from an object oriented perspective; • comprehensively justify strategies, articulate and evaluate solutions to problems in an object oriented environment; and • critically analyse and evaluate test strategies and test results.	For AO3, candidates characteristically: • demonstrate reasonable understanding of the value of developing applications in an object oriented environment; • provide adequate discussion of the concepts and underpinning principles of software systems development from an object oriented perspective; • competently justify strategies, articulate and evaluate solutions to problems in an object oriented environment; and • provide good analysis and evaluation of test strategies and test results.	For AO3, candidates characteristically: • demonstrate basic understanding of the value of developing applications in an object oriented environment; • provide limited discussion of the concepts and underpinning principles of software systems development from an object oriented perspective; • provide basic justification of strategies and ability to articulate and evaluate solutions to problems in an object oriented environment; and • demonstrate limited analysis and evaluation of test strategies and test results.
AO3 Evidence	**Grade A Key Features**	**Grade C Key Features**	**Grade E Key Features**
Coursework: Evaluation	• The candidate has evaluated the project using appropriate evaluative language throughout the evaluation. • The candidate has referenced all user requirements if they were met or not met, giving valid reasons why they were not met. • The evaluation should reference future developments or improvements for the solution. • Reference to updated design or functionality not included in the user requirements should also be listed.	• The candidate has evaluated the project using a good level of evaluative language throughout the evaluation. • The candidate has referenced most user requirements if they were met or not met, with limited reasons why they were not met. • The evaluation has briefly referenced the future developments or improvements for the solution. • Limited emphasis on performance and robustness issues documented.	• The candidate has evaluated the project using a basic level of language. • The candidate has referenced some of the user requirements. • The evaluation briefly shows a limited understanding of developments or improvements. • Limited emphasis on performance documented. • The candidate has produced a limited evaluation of their own performance, with brief reference to development of personal skills.

	• Emphasis should be on performance and robustness issues, with refinements/improvements clearly identified. • The candidate has comprehensively evaluated their own performance in terms of time management and development of personal skills. • The candidate has comprehensively identified how their own performance could be improved. • Relevant material is succinct, well organised and presented with a high degree of clarity and coherence. • The candidate has used specialist vocabulary and spelling, punctuation and grammar are excellent.	• The candidate has evaluated their own performance with reference to management and development of personal skills. • The candidate has identified how their own performance could be improved. • Relevant material is organised and presented with a degree of clarity and coherence. • The candidate has used a good standard of vocabulary, with some spelling, punctuation and grammar issues documented.	• Relevant material is presented with a poor level of clarity and coherence. • The candidate has used a poor standard of vocabulary, with spelling, punctuation and grammar issues documented throughout the evaluation.
CCEA Assessment Resource **Mock examinations** **CCEA past paper questions** **Class tests** **Classwork** **Bookwork**	• The candidate can **effectively** discuss the concepts and underpinning principles of software system development. The candidate can **critically** analyse and evaluate solutions. • The candidate will use an **extensive** range of accurate, appropriate technical language and concepts when **critically** analysing and evaluating solutions to problems.	• The candidate can provide **adequate** discussion of the concepts and underpinning principles of software system development. The candidate can provide **good** analysis and evaluation for solutions. • The candidate will use a **reasonable** range of accurate, appropriate technical language and concepts when providing **good** analysis and evaluation for solutions.	• The candidate can provide **limited** discussion of the concepts and underpinning principles of software system development. The candidate can provide **limited** analysis and evaluation for solutions. • The candidate will use a **basic** range of accurate, appropriate technical language and concepts when providing **limited** analysis and evaluation for solutions.

Appendix 2

A2 Grade Descriptions and Key Features – Software Systems Development

Assessment Objective	AO1: Candidates must demonstrate knowledge and understanding of concepts, systems approaches, and solutions relevant to software systems development		
Grade Descriptions	**A**	**C**	**E**
	For AO1, candidates characteristically: • demonstrate advanced knowledge and understanding of the concepts of the systems development process and in the solution of advanced problems; • define user requirements using accurate, appropriate technical language; and • demonstrate detailed knowledge of project management, testing procedures and database concepts in the systems development process.	For AO1, candidates characteristically: • demonstrate good knowledge and understanding of the concepts of the systems development process and in the solution of advanced problems; • define user requirements using relevant technical language; and • demonstrate good knowledge of project management, testing procedures and database concepts in the systems development process.	For AO1, candidates characteristically: • demonstrate basic knowledge and understanding of the concepts and a sometimes incomplete knowledge of systems approaches in the solution of advanced problems; • define user requirements using limited technical language; and • demonstrate basic, sometimes incomplete knowledge of project management testing procedures and database concepts in the systems development process.
AO1 Evidence	**Grade A Key Features**	**Grade C Key Features**	**Grade E Key Features**
Coursework	• The candidate will demonstrate excellent knowledge and understanding of development methodologies, these will include a high level of detail and be applied to the relevant case study. • The candidate will demonstrate excellent knowledge and understanding of project management techniques by including a comprehensive project plan showing the full range of tasks, resources and timescales using relevant software.	• The candidate will demonstrate some knowledge and understanding of development methodologies with some attempt made to apply methods to the case study. • The candidate will demonstrate some understanding of project management techniques by including a project plan. The plan will show most tasks and make reference to time scales. • The candidate will demonstrate a good knowledge and understanding of the requirements of the system. These will	• The candidate will demonstrate limited knowledge and understanding of development methodologies with a basic attempt made to apply methods to the case study. • The candidate will show a basic understanding of project management techniques. Project plans will lack sufficient detail of tasks, time scales and resources. • The candidate will demonstrate a basic knowledge and understanding of the

	• The candidate will demonstrate an excellent knowledge and understanding of the requirements of the system. These will be derived from the case study and specific to their selected area. Detailed storyboards developed and should include the following: • Clear reference to user requirements • Be logically ordered and contain highly detailed explanations of events and triggers and links to external files. • The candidate will acknowledge and addresses modifications in the design process through the inclusion of enhanced wireframe designs. The candidate will include a valid data model, structure through the inclusion of • An ER diagram showing relationships and notations • Explain the normalisation process they undertook. • Input specifications, processes, output specifications will be detailed and focused on the selected area of the case study.	be derived from the case study and some will be specific to their selected area. Storyboards developed and should include the following: • Some reference to user requirements. • Designs may not be in a logical order. • Contain some explanation of events, triggers and links to external files. • The candidate should acknowledge some modifications in the design process through the inclusion of enhanced wireframe designs. Candidates will make an attempt at valid data model structure through the inclusion of • An ER diagram that may be missing correct relationships and/or notations. • The normalisation process will be explained in a more general terms, the candidate may not show full normalisation process of their solution. • Input specifications, processes, output specifications will be included with some detail that references the selected area of the case study.	requirements of the system. These maybe derived from the case study. Basic storyboards developed and should include the following: • Basic designs with no clear reference to events, triggers and external files. • No attempt to make modifications on original designs made. The candidate will make a basic attempt at valid data model structure through the inclusion of • An ER diagram with some attempt to identify entities and relationships. • A basic understanding of the normalisation process will be provided.
CCEA Assessment Resource **Mock examinations**	• The candidate can demonstrate **advanced** knowledge and understanding of the concepts of the systems development process and in the solution of advanced problems. • The candidate can **thoroughly** recall, select and communicate their	• The candidate can demonstrate **good** knowledge and understanding of the concepts of the systems development process and in the solution of advanced problems. • The candidate's ability to recall, select and communicate their knowledge and	• The candidate demonstrates **limited** knowledge and understanding of the concepts of the systems development process and in the solution of advanced problems. • The candidate's ability to recall, select and communicate their knowledge and

CCEA past paper questions **Class tests** **Classwork** **Bookwork**	knowledge and understanding of concepts, systems approaches, and solutions relevant to software systems development. • The candidate will use an **extensive** range of accurate and appropriate technical language.	understanding of concepts, systems approaches, and solutions relevant to software systems development will be **good**. • The candidate will use a **reasonable** range of accurate and appropriate technical language.	understanding of concepts, systems approaches, and solutions relevant to software systems development will be **limited**. • The candidate will use a **basic** range of accurate and appropriate technical language.

Assessment Objective	AO2: Candidates must apply their knowledge and understanding to develop and implement solutions to the problems identified		
	A	**C**	**E**
Grade Descriptions	For AO2, candidates characteristically: • apply advanced knowledge and understanding of the concepts of the systems development process and analytical approaches to problem solving; • document user requirements using accurate, appropriate technical language; and • apply appropriate project management techniques in implementing and testing a desktop solution using an RDMS through an event driven programming environment.	For AO2, candidates characteristically: • apply good knowledge and understanding of the concepts of the systems development process and relevant approaches to problem solving • document user requirements using relevant technical language; and • apply project management techniques in implementing and testing a desktop solution using an RDMS through an event driven programming environment.	For AO2, candidates characteristically: • apply basic knowledge and understanding of the concepts of the systems development process and basic approaches to the solution of a problem; • document user requirements using basic technical language; and • apply limited project management techniques in implementing and testing a basic desktop solution using an RDMS through an event driven programming environment.
AO2 Evidence	**Grade A Key Features**	**Grade C Key Features**	**Grade E Key Features**
Coursework	The candidate will produce an excellent solution of the problem using a RDMS, which will include the following: • A high-quality, user-friendly interface. • The candidate will implement the database connection through a single connection string. • The solution will contain multiple tables, and demonstrate the ability to add, update, delete and display meaningful data from multiple tables. • The candidate will have fully considered data validation and error trapping, on all data entry. • The candidate will have implemented complex elements from their selected	The candidate will produce a satisfactory solution of the problem using a RDMS, which will include the following: • The solution to the specified problem has a satisfactory user-interface. • The solution will contain multiple tables, and demonstrate the ability to add, update and delete. • The candidate will have attempted data validation and error trapping in some instances. • The candidate will have attempted to implement complex elements of the solution.	The candidate will produce a basic solution of the problem using a RDMS, which will include: • A basic user-interface. • An attempt to implement multiple tables • Ability to add, update, delete data will have errors evident and system failure may occur when reading/writing to the database. • The candidate will not implement the complex elements of the selected problem area. • A basic report will have been included. The candidate will demonstrate a basic understanding of the need for a robust and

	area, including consideration of double bookings. • Reports produced will select data from a number of tables and may include calculations. The candidate will demonstrate an excellent understanding of the need for a robust and dependable system, this will be evidenced by the production of a highly detailed test plan. Test plans should include • reference to user requirements. • a range of test data (Valid, Extreme and Invalid) • reasons for the test and the expected outcome. • the test plan should cover all navigation and data capture. Testing outcomes will be thoroughly evidenced. This will include: • screenshots of testing linked to the test plan • evidence of solving problems encountered (changes made to code etc) • retesting failed tests and recording the new results. The candidate will include a highly detailed user guide. This will be a professionally produced document to assist users in the operation of the finished system.	• Reports produced will be basic, drawing data from a single table or displaying data with no meaning. The candidate will demonstrate a satisfactory knowledge of the need for a robust and dependable system, this will be evidenced by production of a test plan. The test plan may include: • limited or no reference to user requirements. • an attempt to include test data (Valid, Extreme and Invalid) and there is some consideration for expected outcomes. • some satisfactory evidence of testing will be provided. This may include evidence of failed tests and solutions. Candidates will include a satisfactory user guide that contains useful instructions.	dependable system, this will be evidenced by: • production of a basic test plan that does not test all aspects of navigation and data entry. • the test plan will be missing relevant test data and contain basic information regarding outcomes. • basic evidence of testing will be included. The user guide included will provide basic instructions.

CCEA Assessment Resource **Mock examinations** **CCEA past paper questions** **Class tests** **Classwork** **Bookwork**	• The candidate can apply **advanced** knowledge and understanding of the concepts of the systems development process and **analytical** approaches to problem solving. • The candidate will use an **extensive** range of accurate, appropriate technical language and concepts to solve complex problems.	• The candidate can apply **good** knowledge and understanding of the concepts of the systems development process and **relevant** approaches to problem solving. • The candidate will use a **reasonable** range of accurate, appropriate technical language and concepts to solve complex problems.	• The candidate can apply **basic** knowledge and understanding of the concepts of the systems development process and **basic** approaches to problem solving. • The candidate will use a **basic** range of accurate, appropriate technical language and concepts to solve complex problems.

Assessment Objective	AO3: Candidates must analyse and evaluate the concepts of software systems development and candidates' own performance in problem solving		
	A	**C**	**E**
Grade Descriptions	For AO3, candidates characteristically: • comprehensively justify strategies for solving a given problem; • comprehensively analyse and evaluate test strategies and test results/outcomes drawing valid conclusions; and • critically evaluate the solution with regard to user requirements and the project plan and critically evaluate personal performance.	For AO3, candidates characteristically: • provide good justification of strategies for solving a given problem; • competently analyse and evaluate test strategies and test results/outcomes drawing valid conclusions; and • provide good evaluation of the solution with regard to user requirements and the project plan and reliably evaluate personal performance.	For AO3, candidates characteristically: • provide a basic justification of strategies for solving a given problem; • provide a basic analysis and evaluation of test strategies used and test results obtained; • provide test outcomes drawing simple and sometimes incomplete conclusions; and • provide a basic evaluation of the solution, making limited reference to user requirements and the project plan and basic evaluation of personal performance.
AO3 Evidence	**Grade A Key Features**	**Grade C Key Features**	**Grade E Key Features**
Coursework	The candidate will demonstrate excellent analysis and evaluation skills. This is evidenced by • highly detailed reference to the tasks, resources and timescales contained in the project plan. • fully considering the implications of changes to the project plan and detailing the impact upon their project. • fully evaluating how initial user requirements have been met, this should be supported with reference to specific tests and other evidence. • fully evaluating the approaches to develop the system and justify the	The candidate will demonstrate satisfactory analysis and evaluation skills. This is evidenced by • relevant reference to the tasks, resources and timescales contained in the project plan. • evaluation of how some of the initial user requirements have been met. • providing a satisfactory evaluation of their selected development approach. • providing satisfactory evaluation of test procedures. • evaluating their own performance and their solution in a satisfactory manner.	The candidate will demonstrate basic analysis and evaluation skills. This is evidenced by • a limited reference to the project plan, the tasks completed, the resources and the timescales. • a basic reference to user requirements will be made, these may not provide an evaluative comment. • a basic evaluation of test procedures and the candidate's solution will be provided. • a basic evaluation of their own performance

	selected approach with reference to their project. • completing a detailed evaluation of the test procedures. • providing a detailed assessment of their solution. This will focus on areas of strength and areas for future improvement. • the candidate will provide a detailed evaluation of their own performance. • the portfolio of evidence will be presented in a structured manner with a high degree of clarity, the candidate will use specialist vocabulary throughout.	• relevant material is sufficiently organised and presented with some clarity and coherence. • use of specialist vocabulary and spelling, punctuation and grammar are satisfactory.	• the portfolio of work will be poorly organised and lack clarity. • the candidate will make limited use of specialist vocabulary.
CCEA Assessment Resource **Mock examinations** **CCEA past paper questions** **Class tests** **Classwork** **Bookwork**	• The candidate can **comprehensively** justify strategies for solving a given problem and can **comprehensively** analyse and evaluate test strategies and outcomes drawing valid conclusions. • The candidate will use an **extensive** range of accurate, appropriate technical language and concepts when **critically** analysing and evaluating solutions to problems • The candidate will be able to provide excellent justification for their responses	• The candidate can provide a **good** justification of strategies for solving a given problem and can **competently** analyse and evaluate test strategies and outcomes drawing valid conclusions. • The candidate will use a **reasonable** range of accurate, appropriate technical language and concepts when providing **good** analysis and evaluation for solutions. • The candidate will be able to provide reasonably good justification for their responses	• The candidate can provide a **limited** justification of strategies for solving a given problem and can **limited** analyse and evaluate test strategies and outcomes drawing valid conclusions. • The candidate will use a **basic** range of accurate, appropriate technical language and concepts when providing **limited** analysis and evaluation for solutions. • The candidate will provide minimal justification for their responses

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	The use of resources is tightly prescribed. The centre must ensure that: • 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	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: • 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. If work has been completed in groups, teachers must ensure that they can determine and assess the individual student's contribution to the work. 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.
Limited	Work is completed without any direct supervision and would not normally contribute to assessable outcomes.

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