



GCE A Level Examiners' Report

Computer Science
A Level
Summer 2024

Introduction

Our Principal examiners' report provides valuable feedback on the recent assessment series. It has been written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and details how candidates have performed in each component.

This report opens with a summary of candidates' performance, including the assessment objectives/skills/topics/themes being tested, and highlights the characteristics of successful performance and where performance could be improved. It then looks in detail at each unit, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.¹

The information found in this report provides valuable insight for practitioners to support their teaching and learning activity. We would also encourage practitioners to share this document – in its entirety or in part – with their learners to help with exam preparation, to understand how to avoid pitfalls and to add to their revision toolbox.

Further support

Document	Description	Link
Professional Learning / CPD	Eduqas offers an extensive programme of online and face-to-face Professional Learning events. Access interactive feedback, review example candidate responses, gain practical ideas for the classroom and put questions to our dedicated team by registering for one of our events here.	https://www.eduqas.co.uk/home/professional-learning/
Past papers	Access the bank of past papers for this qualification, including the most recent assessments. Please note that we do not make past papers available on the public website until 12 months after the examination.	Portal by WJEC or on the Eduqas subject page
Grade boundary information	Grade boundaries are the minimum number of marks needed to achieve each grade. For linear specifications, a single grade is awarded for the subject, rather than for each component that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results and Grade Boundaries and PRS (eduqas.co.uk)

¹ Please note that where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

Exam Results Analysis	Eduqas provides information to examination centres via the WJEC Portal. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.	Portal by WJEC
Classroom Resources	Access our extensive range of FREE classroom resources, including blended learning materials, exam walk-throughs and knowledge organisers to support teaching and learning.	https://resources.edugas.co.uk/
Bank of Professional Learning materials	Access our bank of Professional Learning materials from previous events from our secure website and additional pre-recorded materials available in the public domain.	Portal by WJEC or on the Eduqas subject page.
Become an examiner with WJEC.	We are always looking to recruit new examiners or moderators. These opportunities can provide you with valuable insight into the assessment process, enhance your skill set, increase your understanding of your subject and inform your teaching.	Become an Examiner Eduqas

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Executive Summary

The A Level Computer Science assessments for summer 2024 saw candidates demonstrate a good standard of knowledge and application overall, though performance varied across components and topic areas.

Component 1, focused on programming and system development, highlighted areas of strength such as understanding linked lists, simplifying Boolean expressions using truth tables, and familiarity with design methodologies. However, some candidates struggled with aspects such as collision handling in hash tables, considering the impact of data protection legislation, and fully grasping the compilation process stages. Writing algorithms to solve specific problems was also a challenge for many.

For the theory-focused Component 2, items such as computer architecture, data, communication and applications, the assessment produced consistent outcomes aligned with previous series. Candidates performed well on skills such as number representation, database design, encryption calculations, and assembly language programming. But they found more open-ended, descriptive questions demanding reasoning and examples, like those on distributed processing, random access files, and expert systems, quite difficult.

The non-exam assessment Component 3 saw many good project submissions overall. Strengths included thorough investigations into existing systems, clear prototyping and design documentation, exploitation of programming language features, and rigorous testing approaches. Areas for improvement involved developing comprehensive specifications tied to objectives, normalising data structures, self-evaluating performance, and utilising advanced validation techniques.

Some common areas where candidates could improve across components include:

- Providing reasoned explanations and examples instead of just stating facts
- Relating concepts to relevant, concrete scenarios to demonstrate application
- Careful reading to ensure all aspects of a multi-part question are fully addressed
- More practice with algorithmic problem-solving and open-ended analysis.

Areas for improvement	Classroom resources	Brief description of resource
General	Portal (WJEC)	Past papers, marking schemes and exemplar materials
General – administration	EDUQAS website	Specification
General – administration	EDUQAS website	Teacher guidance
Components 1 & 2	Digital Resources (eduqas.co.uk)	Knowledge organisers
Components 1 & 2 & 3	Ada Computer Science	Theory website

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COMPONENT 1 – PROGRAMMING AND SYSTEM DEVELOPMENT

Overview of the Component

Most candidates were well prepared and demonstrated an expected standard of knowledge and application required for A2 given the candidates' distributed learning over the past two years. There was a wide range of answers with many candidates achieving higher marks in questions applying Boolean algebra and truth tables. Candidates had a strong understanding of design methodologies and changeover methods to write extensively on these points.

Comments on individual questions/sections

- Q.1** Most candidates demonstrated thorough understanding of linked lists and hash tables. In part (a) candidates responded with a sound understanding of the characteristics of linked lists, specifically its dynamic nature and the names of the various elements of a linked list. In part (b) the candidates gave very good responses that included detailed explanation on the issue of collision. Most candidates were able to correctly redraw the hash table in part (c). However, when stating how to access the value, most identified the correct key, but very few included the hash table name.
- Q.2** This question proved less demanding for many candidates, with a significantly acceptable accessibility rating and overall mean. Many candidates were able to fully determine and prove Boolean identities using truth tables.
- Q.3** Most candidates attempted this question with extended answers. Although there was shown understanding of Data Protection, there was often limited consideration of the impact the legislation had on data protection. In part (b) candidates considered various legislations, however very few candidates discussed the Freedom of Information Act or had limited understanding of this act.
- Q.4** The question was well answered by most candidates, with many getting 3 - 4 marks. candidates are very familiar with BNF as it has appeared frequently in previous papers. Many candidates correctly the operator and field but failed to create a correct final search.
- Q.5** Mostly, the Boolean algebra questions were well answered, with many candidates simplifying their expressions to their simplest forms using various methods. As in the previous series, some candidates correctly applied many Boolean algebraic identities, though they arrived at incorrect answers due to misapplication at earlier stages.

- Q.6** The question required candidates to demonstrate their knowledge of translation and execution errors. The question was well answered by candidates and gave a variety of examples including logical errors, syntax errors and semantic errors. Some candidates only stated examples and did not continue to write a fuller definition for runtime and translation errors.
- Q.7** This question required candidates to evaluate an algorithm which for a string in a stack of strings using Big O notation. Part (a) was fairly answered by candidates with most being able to successfully determine the growth rate for time performance is $O(n)$. Some candidates were able to identify that the while loop would execute n times. However, only a few candidates identified the instructions executed both inside and outside of the loop.
- Part (b) was generally well attempted, with the correct line identified. Centres should encourage candidates to correctly label the axis and clearly state the time complexity. In part (c) many candidates identified the correct memory constant of $O(1)$, but did not include further explanation for the second mark.
- Q.8** This question required candidates to write an algorithm to calculate and output the count, sum and mean (average) of any odd values in an unsorted one-dimensional integer array. This was generally well answered to a high level, with correct use of loops, MOD to determine an odd integer and calculating an average. For those that achieved lower marks, most candidates correctly declared variables and outputted the correct variables. Very few candidates included the check to ensure that odd values had been found. Without this inclusion division by zero could occur if none were found.
- Q.9** There were three parts to this question that required the description of the following principal stages of the compilation process: lexical analysis, syntax analysis and semantic analysis. Part (a) required the description of lexical analysis; this was particularly well answered with most candidates achieving full marks. The syntax analysis was also well answered, with most candidates achieving 1-2 marks. Part (c) was not as well answered, showing that only some candidates fully understand this stage of the compilation process.
- Q.10** Most candidates correctly identified data flow diagrams and/or flowcharts as diagrammatic methods to show the flow of data and information processing of systems. There was not always enough detail of the identified method to award the full marks. Very few candidates identified UML as a suitable diagrammatic method.
- Q.11** In this question candidates need to evaluate and identify the various parts of an algorithm. In part (a) they were required to explain the use of the variables and constants within the algorithm. This was well answered, with most of candidates correctly identifying π as the constant and identify at least one of the variables of radius, circumference and area, if not identifying all of them. Candidates showed thorough understanding of the criteria of both variables and constants.
- Q.12** This extended mark band question required the discussion of both the waterfall and agile approaches to software development and the various change over methods. Candidates showed good understanding of these areas of the specification. In most instances a detailed discussion took place to achieve marks within Mark band 2. Where candidates achieved the higher mark band, there was consideration of all changeover methods specifically in regard to their suitability in line with the software development methodology.

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COMPONENT 2: COMPUTER ARCHITECTURE, DATA, COMMUNICATION AND APPLICATIONS

Overview of the Component

The component 2 examination is well established and produces consistent outcomes which result in stable grade boundaries. The examination addresses each of the three Assessment Objectives (AOs) described in the specification, as follows:-

	Description	Weighting
AO1	Demonstrate knowledge and understanding of the principles and concepts of computer science, including abstraction, logic, algorithms and data representation.	48 /100
AO2	Apply knowledge and understanding of the principles and concepts of computer science, including to analyse problems in computational terms.	36 /100
AO3	Design, program and evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions.	16 /100

Therefore the balance between the AOs is set and adhered to, which, together with the scope of the specification content, produces a structure for a consistent assessment.

For this series the majority of candidates found the assessment to be accessible with 'attempted rates' ranging from 94.4% - 100% and exceeding 97% for most questions. The candidates were well prepared and were able to demonstrate a wide knowledge of the topics in the specification, with the questions requiring precise responses to programming or mathematical problems generally producing high marks.

As in previous series the questions requiring more descriptive answers often produced responses that were correct but lacked adequate reasoning or detail. For these type of questions, it is suggested that candidates should concentrate on the technical aspects of the topic and include examples to illustrate and help structure their responses.

Comments on individual questions/sections

Example AO1 Questions

Q.1 CPU registers. Mean mark of 5.2 out of 8 with a facility factor of 64.0.

This question comprised two parts and was intended to provide an accessible start to the paper.

Descriptions were required of the function of the Program Counter for part (a) and of the role of three other CPU registers for part (b). Most candidates provided an accurate response for part (a) and identified three registers, as required for part (b), although some candidates lost marks by missing, or providing inaccurate, descriptions of the role of the registers selected.

Q.7 Distributed processing. Mean mark of 1.3 out of 6 with a facility factor of 21.4.

This topic proved to be more challenging than expected, with many candidates stating an example of a suitable system but not referring to the chosen example when describing the operation of the system, as required. Several responses which provided a description of parallel processing were also seen.

Q 8 (b) Random access files. Mean mark 1.7 out of 6 with a facility factor of 28.5.

A topic which also proved to be more challenging than expected. Most candidates described the use of a hashing function to calculate an address, but few related this method of file organisation to access times, and some described a process applicable to a sequential system.

Q.12 Expert systems. Mean mark of 3.8 out of 8 with a facility factor of 45.0.

An open topic within the context of systems 'used by organisations for a variety of purposes.' The question was band marked with a range of points identified in the indicative content of the mark scheme. Most candidates were able to describe benefits associated with the use of a specialised and reliable knowledge base, but few covered the potential disadvantages arising from lack of creativity and adaptability. Several candidates would have benefited from the use of an example organisation to illustrate the points made in their response.

Example AO2 Questions

Q.2 Number representation. Mean mark of 6.0 out of 10 with a facility factor of 60.0

An accessible and well-practised topic. Most candidates were able to convert the given denary number into the specified 16-bit floating point form, accurately calculate rounding and truncation errors, and produce a correct representation of the given negative number in 16 bit, twos complement form. Many examples of full marks were seen for these items. The parts of the question that did cause some difficulties were usually the normalisation required for part (a) and the discussion of relative accuracies required for part (b)(ii).

Q.4 (b) Database design. Mean mark of 4.8 out of 10 with a facility factor of 48.0.

Most candidates were familiar with the design work required and were able to interpret the given scenario to produce reasonable entity relationships. Data tables also tended to be well done, particularly where ERDs had been developed to consider keys fields. The above performance indicators include the outcomes from part (b)(iii) 'measures to prevent double booking' which was found to be the most challenging item of the paper, with a facility factor of only 16.7.

Q.6 Encryption. Mean mark of 1.9 out of 6 with a facility factor of 29.0.

Most candidates addressed the AO1 part of this question by describing the use of a single encryption key. The associated AO2 explanation of reasons for using symmetric encryption was, in general, poorly addressed, with a low facility factor of 16.9. Several candidates gained full marks in the cypher encryption exercise in part(b) although the item did cause some difficulties, producing an overall facility factor of 40.6.

Q.11 Parallel processing. Mean mark of 2.0 out of 4 with a facility factor of 50.0.

The majority of candidates were able to complete the required calculations correctly and most produced explanations based on the number of processors, but without noting that the calculations demonstrated that the linear fraction is the more significant limitation.

AO3 Questions

Q.5 SQL commands. Mean mark of 5.6 out of 10 with a facility factor of 56.0.

This is a well taught and practised topic, and most candidates were able to produce the required commands correctly, although, as in previous series, some candidates failed to distinguish between text and numeric fields ('...') as required.

Q.9 Assembly language. Mean mark of 4.2 out of 6 with a facility factor of 69.8.

This is also a well taught and practised topic, and most candidates were able to interpret the scenario and successfully translate the logic of the given algorithm into assembly code, using the instruction set provided.

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COMPONENT 3 (NEA) – PROGRAMMED SOLUTION TO A PROBLEM

Overview of the Component

Many projects of a good standard were submitted for moderation this summer. Moderators saw some work of an excellent standard. Many centres had assessed the work accurately and had clearly explained their assessment decisions which aided the moderation process.

Tasks

Comments on tasks/questions relating to candidate performance/meeting assessment criteria

Discussion:

It is important that centres recognise the importance of the discussion section. This section provides opportunities for the candidates to present their problem situations to their teacher, peers and/or other competent third parties. Candidates should receive detailed informed feedback regarding the scope of their chosen problem and should reflect, in depth, on the discussions and feedback to allow them to firm up their ideas and ensure that unsuitable topics are revised or discarded.

Candidates should receive detailed informed feedback regarding the scope of their chosen problem and should reflect, in depth, on the discussions and feedback to allow them to firm up their ideas and ensure that unsuitable topics are revised or discarded. This is a good opportunity for teachers to steer candidates away from unsuitable ideas that will lack the scope required to produce work to a standard and level appropriate for this qualification. Some candidates are simply describing their feedback rather than using it to reflect and refine their ideas. If needed, candidates have the option to reconsider their problem or potentially identify a different, more suitable problem situation.

Investigation:

When candidates selected appropriate real-life problems, they were presented with a chance to conduct an investigation into the existing system. Candidates were expected to identify the data collected, processed, and produced by the current system. Where this did not take place, the investigation tended to be more narrative and therefore the ability to identify suitable objectives could not take place. For students to access the higher mark bands the investigation of the existing system should be thorough.

Where candidates are not able to identify a real-life problem or have a new idea that does not have any current end users, they should carry out extended research into similar commercial systems, identifying common characteristics and should base the conclusions of their investigations on the information that they have been able to gather.

It is important that candidates produce a comprehensive working specification and that measurable objectives are set that will inform the design, prototyping, software development and testing processes. The objectives should be determined by each section of their investigation, often students will propose ideas in their research but not follow this through in the objectives.

Design:

The design stage is an opportunity to effectively plan and develop the technical elements of the functional solution before its implementation. This should be forward-thinking and include a range of elements, including:

- designs of screen layouts
- consideration of all forms of inputs and outputs required
- evidence of all data structures with methods of access
- consideration of data validation
- design of programming routines for the functional solution using a recognised convention such as pseudocode or flowcharts etc.

Candidates should be encouraged to relate all elements of their design to their project. In some centres candidates are describing abstract concepts such as validation checks and sorting constructs. These only have merit when applied to the current project and can demonstrate some value to its implementation.

Some centres are still using screen shots of already developed code as a way of considering the processing stages. This section should be completed before the prototyping and software development stage and not retrospective.

Prototype:

The prototype work is intended to allow self-reflection on the chosen method of solution and the design work. Candidates should clearly identify the sections they have chosen to include explaining their justification for these.

Candidates can demonstrate their work through a series of screen shots of the project running and demonstrating the sections identified by the candidate. Many centres have also used video evidence for this section which is to be commended as it allows candidates to thoroughly demonstrate the workings of their solutions.

This element of the prototype is intended to allow self-reflection on the chosen method of solution and the design work. Strengths and weaknesses of the current solution should be identified with some proposals for improvement, it is not appropriate to include feedback from third parties in this section of the work.

Post prototype Refinement of Design:

This part of the project is to allow candidates to alter their design after third party feedback. Candidates should evaluate their feedback and give justifications for the acceptance or rejection of the proposals.

It is important to note this should be refinements to the original designs, some centres are showing the before and after of the designs which is giving some excellent evidence for the section. There are still some centres showing the finished programmed changes to the design, this will be assessed in Software Development and hence is not appropriate for this section.

Software Development:

To access the higher mark bands all programs should fully exploit the language, using advanced programming features and well-structured data normalised to 3NF, this was not always evident.

There should be examples of effective searching and sorting at the programming end and output content as requested by the user. The system should aim to cover all the objectives identified and fully exploit the programming facilities of the language.

Many solutions had limited validation methods but did cover basic validations for some key components. Often the program contained some self-documenting identifiers, however this was not there for all variables and structures. Many centres included some detailed annotation that helped identify where the candidates had included their complexity.

Many centres provided solutions that could not be run due to additional packages/libraries requirements, in this instance these should be provided or information on these additions provided in a 'README' file and the cover sheet. It may be of benefit to provide additional video evidence of the system being used to support this section. Where centres did this, the moderation process was made easier.

Testing:

Where centres had included a testing table clearly outlining the types of testing taking place, typical, extreme and invalid, candidates produced some excellent testing evidence. Many centres have moved to using video evidence for this, linking the videos with the individual tests. Where candidates have evidence of several tests in a single video, a time reference would be useful allowing the moderator to go directly to this.

It is important that the testing work should focus on the functionality of the solution in terms of:

- Input facilities including measures to ensure reasonable data entry
- Processing facilities to ensure correct and accurate output
- Appropriate output including screen and paper-based outputs

The testing should cover each objective with data designed to measure the outcomes of the system against the desired outcome. The quality of the commentaries accompanying the testing evidence has a major role in identifying the marks to be awarded for this section of the work. Candidates should give specific suggestions to refine the system with any tests that do not successfully pass testing.

Evaluation:

It is pleasing to see many centres correctly assessing candidates' evaluations. Higher level candidates are giving detailed analysis of their performance in each section of the project and thoughtful observations about any changes to their future practices.

For candidates to access the higher mark bands they need to cover each section of the evaluation. Some candidates can find this difficult if their initial investigation is not detailed enough as these sections link together.

A few candidates were using this section to demonstrate their solution met all the original objectives, while this is useful it is not evaluative and could be included in testing. The expectation is the candidates should be self-reflective in this section and fully analyse their own performance.

Task marking

Comments on approaches to internal marking

It would aid the moderation process if centres would ensure that candidates' work and documentation are saved with filenames that clearly identify the centre number, candidate number and candidate name. As detailed in the specification for this qualification, "For example Diane Smith (centre number 68999, candidate number 12345) would store her work in a folder named 68999_12345_SM_D. In addition, candidates should ensure that they have linked their work to the GCE Computer Science Component 3 Task sheet. The centre should make notes on the Centre Mark Sheet the nature of any assistance given and the extent to which the solution actually works as stated in the report there should also be specific reference to the assessment objectives in the comments written on the work and coversheets.

Supporting you

Useful contacts and links

Our friendly subject team is on hand to support you between 8.30am and 5.00pm, Monday to Friday.

Tel: 02920 265 401

Email: CS@eduqas.co.uk

Qualification webpage: [AS and A Level Computer Science | Eduqas](#)

See other useful contacts here: [Useful Contacts | Eduqas](#)

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