

**A LEVEL**

Moderators' report

# COMPUTER SCIENCE

**H446**

For first teaching in 2015

**H446/03/04 Summer 2023 series**

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## Introduction

Our moderators' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

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.

## Online courses

We have created online courses to build your confidence in delivering, marking and administering internal assessment for our qualifications. Courses are available for Cambridge Nationals, GCSE, A Level and Cambridge Technicals (2016).

### Cambridge Nationals

All teachers delivering our redeveloped Cambridge Nationals suite from September 2022 are asked to complete the Essentials for the NEA course, which describes how to guide and support your students. You'll receive a certificate which you should retain.

Following this you can also complete a subject-specific Focus on Internal Assessment course for your individual Cambridge Nationals qualification, covering marking and delivery.

### GCSE, A Level and Cambridge Technicals (2016)

We recommend all teachers complete the introductory module Building your Confidence in Internal Assessment, which covers key internal assessment and standardisation principles.

Following this you will find a subject-specific course for your individual qualification, covering marking criteria with examples and commentary, along with interactive marking practice.

### Accessing our online courses

You can access all our online courses from our teacher support website [Teach Cambridge](#).

You will find links relevant to your subject under Assessment, NEA/Coursework and then Online Courses from the left hand menu on your Subject page.

If you have any queries, please contact our Customer Support Centre on 01223 553998 or email [support@ocr.org.uk](mailto:support@ocr.org.uk).

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## General overview

The A Level Computer Science Programming Project is designed to take candidates on a learning journey by giving them the opportunity to complete all sections of the software development life cycle by creating a significant software solution.

As always, the nature of the software solution is open ended. Candidates are encouraged to choose an area of interest to develop a project in.

This year's submissions followed the pattern of previous years. There were many games attempted, database driven apps in a wide range of environments, dynamic websites, mobile apps, machine learning, and many more.

The OCR specification suggests languages that can be used, but many more have been approved since. There are many projects which use languages such as LUA, R, Swift, TypeScript and more. The most common submissions have involved Python, JavaScript, C# (Unity framework) and PHP.

Most centres use digital submission. This is very much appreciated by the moderation team. Work can be submitted digitally using the online repository or posted on a USB memory stick.

Moderators aim to support the marks submitted whenever possible. Centres should concentrate on ensuring there is a correct order of merit within the cohort (i.e. the best work is given the highest mark and the least accomplished work has the lowest mark). Not all centres provided mark sheets with commentary explaining how marks were allocated for each marking section. A lack of commentary on marking makes it challenging for a moderator to understand the rationale for marking decisions. This increases the difficulty of the moderation process.

Care should be taken with administration. It is important that all candidate numbers match candidate names, work is submitted on time, and that marks submitted to OCR match those on the URS.

Some projects did not have sufficient scope for study at this level. Guidance on project setting can be [downloaded from Teach Cambridge](#). Candidates who choose their own project topic seem more engaged and perform more successfully. It is important that projects should include at some areas of study from the A Level course to be viewed as a suitable project. Where teachers are unsure, project proposals can be emailed to OCR for review. A zipped/collated collection of project proposals can be emailed to [ComputerScience@ocr.org.uk](mailto:ComputerScience@ocr.org.uk) for feedback.

Candidates who did well generally:	Candidates who did less well generally:
<ul style="list-style-type: none"> <li>• chose their own project topic and often completed development in a language/framework/environment that they learned specifically for the project</li> <li>• understood the marking criteria for design</li> <li>• included design elements both at the early stages of the project and throughout development</li> <li>• created a development journal that displayed the solution being built over time, evidence of code being written over time and discussed all</li> </ul>	<ul style="list-style-type: none"> <li>• chose a project from a narrow list of options and so were less engaged</li> <li>• used frameworks/environments that are no longer current so saw less value in learning them</li> <li>• began with good analysis sections but documented in less and less detail as the project went on</li> <li>• wrote code without documenting as they went along and then struggled to find evidence retroactively</li> </ul>

Candidates who did well generally:	Candidates who did less well generally:
<p>the thought processes involved and problems overcome</p> <ul style="list-style-type: none"><li>• made testing an intrinsic part of development</li><li>• clearly showed how failed tests formed the early part of the next iterative stage</li><li>• provided detailed evidence of testing with screenshots and/or video evidence</li><li>• understood the number of marks available for the evaluation section is equal to the number of marks available for development and planned their time effectively to make sure the solution was evaluated in sufficient depth.</li></ul>	<ul style="list-style-type: none"><li>• included evidence of testing as a bolt on once all development was completed and therefore struggled to produce realistic evidence of failed tests and remedial action</li><li>• did not correctly evidence testing with screenshots or video</li><li>• spent too long on development and found that the time allowed for evaluation was insufficient.</li></ul>

## Most common causes of centres not passing

There is a growing number of centres who submit cohorts which are generally strong, but include candidates who have performed less successfully. Often, the less successful candidates are being harshly treated. Marks are awarded as a best fit. Centres should try to avoid penalising candidates too harshly for minor omissions on otherwise credible attempts.

Similarly, if a candidate has provided a wealth of evidence where all the marking criteria have been achieved beyond doubt, centres should not be afraid to submit full marks.

Here follows a breakdown of common marking issues in each of the marking sections.

### Analysis

This section is often marked the best with good understanding shown by most centres. It is not always necessary to have real life end users involved in signing off each part of the process. Many candidates opt to include interviews or questionnaires as part of the research section which is good evidence. Success criteria should be specific and measurable to achieve the highest marks.

### Design

A common mistake is to award high marks when candidates have not fully explained and justified algorithms, validation decisions, test data and problem decomposition. It is the spirit of the course that code is designed during the design phase. Any algorithms that are clearly reverse engineered from written code should not be given marks.

### Development

The mark scheme credits evidence of development, rather than the quality or complexity of the final solution. It is therefore possible for a candidate to attempt an ambitious project, not fully complete all aspects of it yet, and yet still score highly in this section if sufficient evidence of the development process has been provided.

There are increased examples of alternative programming paradigms such as machine learning being submitted. This can formulate good evidence of development.

Candidates often spend too much time concerning themselves with the aesthetics of the system. Candidates receive marks for the programming code that is written however and should therefore focus on this.

The best evidence of development is a detailed development journal that shows screenshots of the solution in stages as it is being built along with the programming code at each stage.

### Testing during development

Testing tables alone are not sufficient evidence to score in this section. Candidates can be given marks for discussion of testing, screenshot and/or video evidence of testing being completed, evidence of failed tests and remedial action.

## Testing for Evaluation

It is not possible to use the same evidence in the 'Testing during development' section to gain credit in 'Testing for Evaluation'. To score highly, candidates should provide evidence of testing for function, robustness, and usability. Often, high marks are submitted yet there are too few tests to realistically say the system has undergone rigorous robustness testing.

## Evaluation

To score highly in the evaluation candidates must show evidence of the clear correlation between the success criteria, the testing evidence, and an associated critical evaluation of the results. This section should be afforded the time that reflects the number of marks available.

## Common misconceptions

### Misconception



The spirit of the unit is that candidates embark on a significant software development project. This should be conducted using a professional grade programming language and, therefore, markup code used for making user interfaces is not sufficient on its own.

Some examples that do not meet this requirement are:

- Website projects that use front-end skills in HTML and Cascading Style Sheets (CSS) alone. HTML and CSS form markup code only and do not have the features of high-level programming languages. To make the project suitable for study at this level, the candidate should combine the front-end skills with JavaScript, calls to the server and suitable data processing with a server-side language such as PHP, Python or Perl.
- Mobile apps or Windows Desktop apps where the candidate has heavily focused on User Interface (UI). Like the point above, no more than limited marks should be given for creating a user interface with Extensible Application Markup Language (XAML) markup or Swift UI. To make it suitable for this level, candidates could include a local database or, again, connect to a server and make suitable asynchronous calls for data processing.
- Any block-programming environment such as Scratch, App Inventor or Game Maker.

## Avoiding potential malpractice

The understanding around using online tutorials to produce code remains a concern. General guidelines to follow are:

- A candidate can use a tutorial to fulfil a section of their code. The tutorial must be fully referenced. As this is not the candidate's own work, no marks will be available for this section of code if the candidate solely uses the tutorial.
- A tutorial could be used as a good starting point for a piece of work. After this it would be expected that the candidate provides evidence of their own development that **significantly** builds on the initial learning and goes in a new direction.
- Candidates should only be given marks for work they have created themselves.
- If a candidate uses a tutorial and does not reference it, this is plagiarism and is a malpractice concern.

Centres are reminded that the project is individually marked and so group work is not appropriate and could constitute collusion.

### Use of Artificial Intelligence

This year has seen large media coverage into developments in Artificial Intelligence (AI). While the use of AI has not been a concern in projects this year, centres should be advised that the guidance of using AI in projects is identical to that surrounding the tutorials above. Any AI generated code must be referenced and no marks can be given for it, failing to do so could constitute plagiarism. It is recommended that centres read the Joint Council for Qualifications (JCQ) guidelines surrounding use of AI in coursework.

## Helpful resources

### Exemplar work

Centres are reminded that there are several exemplars provided by OCR that can be referred to when assessing candidates' coursework. These are available on [Teach Cambridge](#) .

### Project setting guidance

OCR provide guidance for teachers and candidates on creating suitable A level projects. This can be found on the [Teach Cambridge](#).

### Project Proposal Checking

OCR offer a project checking service. Final project ideas can be emailed to: [ComputerScience@ocr.org.uk](mailto:ComputerScience@ocr.org.uk) for review and feedback.



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# Supporting you

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## Teach Cambridge

Make sure you visit our secure website [Teach Cambridge](#) to find the full range of resources and support for the subjects you teach. This includes secure materials such as set assignments and exemplars, online and on-demand training.

**Don't have access?** If your school or college teaches any OCR qualifications, please contact your exams officer. You can [forward them this link](#) to help get you started.

## Reviews of marking

If any of your students' results are not as expected, you may wish to consider one of our post-results services. For full information about the options available visit the [OCR website](#).

## Access to Scripts

For the June 2023 series, Exams Officers will be able to download copies of your candidates' completed papers or 'scripts' for all of our General Qualifications including Entry Level, GCSE and AS/A Level. Your centre can use these scripts to decide whether to request a review of marking and to support teaching and learning.

Our free, on-demand service, Access to Scripts is available via our single sign-on service, My Cambridge. Step-by-step instructions are on our [website](#).

## Keep up-to-date

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## OCR Professional Development

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Please find details for all our courses for your subject on **Teach Cambridge**. You'll also find links to our online courses on NEA marking and support.

## Signed up for ExamBuilder?

**ExamBuilder** is the question builder platform for a range of our GCSE, A Level, Cambridge Nationals and Cambridge Technicals qualifications. [Find out more](#).

ExamBuilder is **free for all OCR centres** with an Interchange account and gives you unlimited users per centre. We need an [Interchange](#) username to validate the identity of your centre's first user account for ExamBuilder.

If you do not have an Interchange account please contact your centre administrator (usually the Exams Officer) to request a username, or nominate an existing Interchange user in your department.

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