Moderators' report

OCR Level 1/Level 2

Cambridge National in
Engineering Programmable Systems

J824
For first teaching in 2022 | Version 1

R048-R049 Summer 2024 series

ocr.org.uk/cambridgenationals

Cambridge Nationals

OCR
Oxford Cambridge and RSA

Contents

Introduction

Our Moderators' reports are produced to offer constructive feedback on centres' assessment of moderated work, based on what has been observed by the moderation team. These reports include a general commentary of accuracy of internal assessment judgements, identify good practice in relation to evidence collation and presentation, and comment on the quality of centre assessment decisions against individual Learning Objectives. The report also highlights areas where requirements have been misinterpreted and provides guidance to centre assessors on requirements for accessing higher mark bands. Where appropriate, the report will also signpost other sources of information that centre assessors will find helpful.

OCR completes moderation of centre-assessed work in order to quality assure the internal assessment judgements made by assessors within a centre. Where OCR cannot confirm the centre's marks, we may adjust them in order to align them to the national standard. Any adjustments to centre marks are detailed on the Moderation Adjustments report, which can be downloaded from Interchange when results are issued. Centres should also refer to their individual centre report provided after moderation has been completed. In combination, these centre-specific documents and this overall report should help to support centres' internal assessment and moderation practice for future series.

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.

Please note, the content for this report is based on candidate work submitted in the June 2024 series. It is possible that not all units are covered within the report, however candidate style work and candidate exemplars from the 2023 series are available for all internally assessed units on Teach Cambridge .

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.

General overview

It is important for moderators to receive candidate work from centres by the deadline date. Delayed submission of samples slows down the moderation process, and the resolution of issues should they arise during moderation.

Centres should check carefully what sample work is being requested for moderation and make sure that the correct sample of candidates is sent to the moderator.

A completed Unit Recording Sheet (URS) is required for each candidate in the requested sample. Without a correctly completed URS for each candidate moderation cannot take place and will be delayed.

Please make sure that all candidates are correctly identified on their paperwork with the correct candidate number. This includes in the naming of electronic files.

Clerical errors

Please carefully check the addition of marks on the URS and their transcription to Interchange. If they are incorrectly totalled or transcribed, we will need to reconfirm them with centres at moderation. This introduces delay to the moderation process.

A copy of the IMS1 mark sheet generated by Interchange is no longer required to be sent to your moderator and can be retained in centre.

Marker comments on the URS

Marker commentary on the URS, along with clear indication of how the mark awarded is derived, helps greatly with the moderation process. Page numbers of where evidence can be found in the candidate work is also extremely useful. Candidate work can also be directly annotated showing where each Topic Area and mark band is being addressed.

Centres are reminded that work cannot be double counted, and if used as evidence for one task should not be used for others. This is also the case for work that overlaps more than one task or unit within the qualification. Work that is double counted might be discounted if found during moderation, thereby disadvantaging the candidate.

Internal standardisation

If more than one marker is marking a cohort of work, it is crucial to standardise marking across markers. Internal standardisation ensures that the marks presented are accurate and consistent, and that the rank order of marks is maintained. Rank order errors are referred back to the centre by the moderator and often require the centre to remark work, thereby delaying the moderation process.

Photographic evidence should be annotated by the candidate to explain what is being presented. It should also clearly identify the candidate, for example, using their candidate number.

Authentication

It is essential that candidate work is authentic. This means that it is individual, and that sources of information are referenced. This is not only good practice but avoids the risk of penalties being applied. Moderators check for authenticity during moderation, referring any suspected cases to OCR for further investigation. This will delay moderation and may have serious consequences for the centre and candidate. Copies of Candidate and Unit authentication statements are required to be completed and should be kept in centre in case they are requested. They do not need to be sent to the moderator.

Centres must use the Teacher Observation Records (TORs) included with the Set Assignments to support and corroborate candidate-generated evidence where independence is part of the marking criteria. Where a TOR is not included, and the task requires the corroboration of independence then this should be noted on the URS.

Teacher Observation Records (TORs)

TORs are used to support and corroborate evidence produced by candidates and are useful where this evidence is difficult to show directly. Examples include working independently, working safely, and producing high quality finished items. They cannot be used as a direct source of evidence when the candidate is able to produce evidence themselves. Moderation will impose penalties where a TOR is used incorrectly. TORs should be individualised for each candidate, and not all be identical.

Full guidance on how to use the TOR correctly can be found alongside the supplied TOR with each Set Assignment brief, with further guidance on the OCR website.

Unit R048 General overview

In this unit there was good evidence in this unit of candidates being able to use software to create and simulate an electronic circuit, and to produce a PCB layout. Step by step evidence of safely making and populating the PCB was sometimes a little disappointing, as was evidence of testing and evaluation. This is explained in more detail below.

Comments by task

Task 1 – Drawing and simulating electronic circuits

For Task 1 there was often good evidence of candidates being able to use software to create a circuit schematic diagram, and the circuit being simulated. Occasionally there was limited evidence of simulation, or of any circuit corrections based on the outcomes of testing as is required for this task.

The task also requires candidates to demonstrate how they can use software to produce a PCB layout – which should include both track and component views. Annotated screenshots are an effective way to illustrate simulation and show PCB layout production. Please remember that both track and component side views are required.

Task 2 – Constructing electronic circuits

Task 2 asks candidates to safely manufacture a blank PCB and to populate the PCB using suitable components. While it was often clear that candidates had done this, their submission often lacked evidence of safely manufacturing the PCB (e.g. by (photo) etching or engraving methods).

Candidates need to clearly show step by step evidence of making the blank PCB and then populating the PCB with components. Health and safety is an essential requirement of this task and could be addressed using risk assessments, and with the use of suitable PPE being showing in any photos.

It is the intention of this task that candidates use the PCB they have produced themselves to populate and test, and not be supplied with a pre-manufactured board for populating components to. There was evidence in isolated cases of candidates being supplied with a blank PCB supplied by the centre. This is acceptable should the candidate fail to produce a PCB so that they can proceed with the assignment, although it should be clearly noted in the work presented.

Annotated photographs are an excellent way for candidates to show step by step evidence of circuit construction. This task relies both on direct evidence from the candidate, and additional supporting evidence of independent working using a TOR. Evidence of independent working can be corroborated using the TOR supplied with the Set Assignment brief.

OCR support: Teacher Observation Records (TORs)

(i) A blank TOR template along with full guidance on its use for Task 2 can be found in the Set Assignment brief.

It is important to remember that they cannot be used as a substitute for direct evidence that the candidate can produce. They should only be used to support and corroborate things like independent and safe working, or the quality of a finished product.

Task 3 – Testing electronic circuits

Task 3 requires clearly presented evidence of testing, which should include both visual inspection and functional testing. Functional testing includes confirming correct operation of the circuit, and taking of measurements using suitable instrumentation (e.g. multimeter, oscilloscope, logic probe).

In a few cases, there was limited evidence of functional testing and little or no measurements recorded.

An effective way to produce evidence for this task is for candidates to include annotated photographs showing testing taking place i.e. visual inspection of the circuit and for them to produce a table of readings – comparing actual with expected values.

Candidates are also required to identify any faults in their own circuit. If their circuit contains no faults, then teachers should have circuits with known faults for candidates to use to identify faults to complete this part of the task. This is noted in the assessment guidance in the specification which states:

'You should ensure that students have access to suitable test equipment to test the functionality of their completed circuit. Should their circuit function as expected i.e. "work first time" then you should provide students with further circuits with known faults. This will enable students to identify these faults using common fault-finding techniques.'

Finally, an evaluation of the construction and operation of the circuit is required to secure marks in the higher mark bands.

Assessment for learning: Test plan template
Candidates could be provided with a template on which to record expected test values, and on which to record and compare actual test readings for the circuit.

Assessment for learning: Evaluation
Task 3 provides an excellent opportunity to develop skills of evaluation by evaluating how well the circuit was constructed, and how well it operates.

Unit R049 General overview

In this unit candidates often presented sound evidence of producing a block diagram for the system in the scenario, selecting an appropriate programmable system with required input and output devices and programming the system. Simulation was presented using various methods, and the also evidence of testing the system for correct operation.

Comments by task

Task 1 – Planning the development of programmable systems

In this task it was clear from the evidence presented that most candidates were able to produce a relevant and accurate block diagram of the proposed system. There was also evidence of being able to select appropriate hardware and software to develop the system with. Sometimes the block diagrams included input and output devices that were not required. Also, candidates sometimes went into unnecessary level of detail about the chosen programmable system hardware and software, or the input and output device selected.

Task 2 – Develop programmable systems

For this task most candidates were able to provide most evidence of different connection methods and showed how they proposed to connect input and output devices to their own system. Sometimes these were a little generic, and it was not always clear which method had been selected by the candidate and how this had been implemented. How the system is connected up needs a little more attention, and could be more clearly articulated (e.g. the method for connecting the input and output devices selected). This could be done with simple annotated photos showing the connection methods used.

There was also evidence of screenshots showing program creation and simulation. One method used by candidates to show simulation was by highlighting program operation on a flow chart. An alternative method to show the simulation taking place is to use a short video showing the program sequencing through the flow chart. There was also evidence of how to download the program to the programmable device.

This task relies both on direct evidence from the candidate, and additional supporting evidence of independent working using a TOR. Evidence of independent working can be corroborated using the TOR supplied with the Set Assignment brief.

OCR support: Teacher Observation Records (TORs)

ⓘ   A blank TOR template along with full guidance on its use for Task 2 can be found in the Set Assignment brief.

It is important to remember that they cannot be used as a substitute for direct evidence that the candidate can produce. They should only be used to support and corroborate things like independent and safe working, or the quality of a finished product.

Task 3 – Test programmable systems

In Task 3 there was, for most candidate, clear evidence of both visual and functional testing being performed against a test plan, and evaluation of system operation. Again, short videos showing system operation are another effective way in which functional testing can be demonstrated. Remember that this task requires both visual and functional testing of the system, against a test plan produced by the candidate. The outcomes of testing should be clearly recorded against the test plan.

Finally, candidates are required to evaluate the performance of their system based on the outcomes of testing and suggest improvements. These could be to the hardware, or the operation of the program itself. Most candidates were able to provide some evaluation of performance, albeit perhaps the weakest part of the assignment. Note that it is not required for them to undertake these improvements.

Assessment for learning: Test plan template

Candidates should use the test plan template provided with the Set Assignment, or one provided by the centre to record the visual and functional tests to be undertaken and to record the outcomes of testing.

Assessment for learning: Evaluation

Task 3 provides an excellent opportunity to develop skills of evaluation by evaluating how well the programmable system operated, making suggestions for improvements.

Supporting you

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

We've made it easier for Exams Officers to download copies of your candidates' completed papers or 'scripts'. 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

We send a monthly bulletin to tell you about important updates. You can also sign up for your subject specific updates. If you haven't already, sign up here.

OCR Professional Development

Attend one of our popular professional development courses to hear directly from a senior assessor or drop in to a Q&A session. Most of our courses are delivered live via an online platform, so you can attend from any location.

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 a free test-building platform, providing unlimited users exclusively for staff at OCR centres with an Interchange account.

Choose from a large bank of questions to build personalised tests and custom mark schemes, with the option to add custom cover pages to simulate real examinations. You can also edit and download complete past papers.

Find out more.

Active Results

Review students' exam performance with our free online results analysis tool. It is available for all GCSEs, AS and A Levels and Cambridge Nationals (examined units only).

Find out more.

You will need an Interchange account to access our digital products. 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.

Online courses

Enhance your skills and confidence in internal assessment

What are our online courses?

Our online courses are self-paced eLearning courses designed to help you deliver, mark and administer internal assessment for our qualifications. They are suitable for both new and experienced teachers who want to refresh their knowledge and practice.

Why should you use our online courses?

With these online courses you will:

- learn about the key principles and processes of internal assessment and standardisation

- gain a deeper understanding of the marking criteria and how to apply them consistently and accurately

- see examples of student work with commentary and feedback from OCR moderators

- have the opportunity to practise marking and compare your judgements with those of OCR moderators

- receive instant feedback and guidance on your marking and standardisation skills

- be able to track your progress and achievements through the courses.

How can you access our online courses?

Access courses from Teach Cambridge. Teach Cambridge is our secure teacher website, where you'll find all teacher support for your subject.

If you already have a Teach Cambridge account, you'll find available courses for your subject under Assessment - NEA/Coursework - Online courses. Click on the blue arrow to start the course.

If you don't have a Teach Cambridge account yet, ask your exams officer to set you up – just send them this link and ask them to add you as a Teacher.

Access the courses **anytime, anywhere and at your own pace**. You can also revisit the courses as many times as you need.

Which courses are available?

There are **three types** of online course for Cambridge Nationals.

All teachers delivering our redeveloped Cambridge Nationals suite from September 2022 are asked to complete the course **Essentials for the NEA**, 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 of the NEA units.

We have also created subject-specific **Understanding the examined unit** courses that provide a wealth of information to support you with the delivery, assessment, and administration of the examined unit. The courses outline the assessment structure, including details on synoptic assessment, performance objectives and command words for your Cambridge Nationals qualification. Working through the course, you have an opportunity to interact with resources developed to support the exam, in particular candidate exemplars and mark scheme guidance. The final section covers details on administrative requirements, including assessment opportunities, entry rules and resits.

How can you get support and feedback?

If you have any queries, please contact our Customer Support Centre on 01223 553998 or email support@ocr.org.uk.

We welcome your feedback and suggestions on how to improve the online courses and make them more useful and relevant for you. You can share your views by completing the evaluation form at the end of each course.

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on
01223 553998

Alternatively, you can email us on
support@ocr.org.uk

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