

Moderators' report

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KS4 PERFORMANCE TABLES

OCR Level 1/Level 2

Cambridge National in
Engineering Design

J822

For first teaching in 2022 | Version 1

R039-R040 Summer 2024 series

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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 R039 General overview

Candidates often demonstrated some excellent sketching and drawing skills in this unit and were clearly able to use Computer Aided Design (CAD) software effectively and competently.

Comments by task

Task 1 – Manual production of freehand sketches

Most candidates demonstrated very good sketching skills and were able to produce several initial design ideas. Rendering often included shade, tone and texture. Labels and annotations were often used effectively to explain the key features and to link the design back to the requirements of the design specification, as is required. Please make sure that labels and annotations clearly link back to the requirements of the design specification. From the marking criteria it should be noted that both 2D and 3D sketches are required – in some cases just 3D sketches were produced. Candidates should be encouraged to produce a range of (five or so) different design ideas for their product, illustrated using 2D and 3D sketches from which they select a single design to develop in Tasks 2, 3 and 4.

Task 2 – Manual production of freehand sketches – design development

As noted, it is only a requirement to take one design forward to be developed further. The development should clearly show which features of the initial design have been developed. This can be done using further 2D and 3D sketches to illustrate these features, along with appropriate labels and annotations. The design should also clearly show and justify how it satisfied the need and wants of the client/user.

Assessment for learning: 2D and 3D sketches



Refer to the marking criteria and the assessment guidance for this Topic Area, Task 1 and Task 2. Both 2D and 3D sketches are required to satisfy this fully.

Task 3 – Production of engineering drawings

There was clear evidence of a range of different 2D and 3D formal drawing techniques being used. Drawings should be produced using standard drawing conventions, e.g. those in BS8888. While there was often evidence of candidates producing drawings by hand, the use of 2D CAD produced formal drawings is acceptable for this task. Please remember that a 3rd angle orthographic drawing (2D) and assembly drawing (3D) is required for this task. If 3D CAD was used to generate 2D drawings (i.e. orthographic drawing), then it was also expected that candidates demonstrated their understanding of formal drawing techniques using a suitable hand-drawn drawing. Please refer to the unit specification for a range of suitable formal engineering drawing techniques. More successful candidates were able to fully dimension and annotate their drawings.

Task 3 requires the use of a TOR to support independent working (which is supplied with the Set Assignment brief).

Assessment for learning: 2D and 3D formal drawings

Refer to the marking criteria and assessment guidance for this task published in specification handbook.

To fully satisfy this task requires candidates to produce 2D and 3D formal engineering drawings, which should follow standard drawing conventions.

OCR support: Teacher Observation Records (TORs)

A blank TOR template along with full guidance on its use for Task 3 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 4 – Use of Computer Aided Design (CAD)

While this was well attempted, it was not always obvious to see the final design that candidates were proposing. Candidates, however, often demonstrated excellent skills and ability in using a range of different CAD software. Please remember that the CAD design should be suitably rendered and include dimensions and assembly views. Also please note that the CAD model should be 'complex' with the specification specifying that it should consist of at least four mated parts. It was evident in some submissions that mating of component parts had not been used in some designs, which had been created by manipulating a single solid object (e.g. using extrudes and other non-mated features).

The marking criteria for Task 4 also require corroboration of level of independence with which candidates work in producing their 3D virtual models. While no TOR was supplied with the Set Assignment brief for this, a statement by the teacher in the comments section of the Unit Recording Sheet will suffice.

Assessment for learning: Use of evidence

Where there is overlap of content, it is essential that evidence used to satisfy one task is not credited twice (i.e. double counted).

In this unit, CAD drawings produced for Task 3 and Task 4 should be clearly separate for each task so that they are marked just once.

Unit R040 General overview

Most candidates made a very good attempt at this unit, while others did not fully address all the requirements of each task as set out in the marking criteria. As this unit requires candidates to undertake practical activities, it is essential that candidates provide direct evidence of undertaking these activities, e.g. by keeping an annotated photo diary showing them working safely.

It was evident in this unit that most candidates were clearly capable of planning for and making a prototype. This was sometimes let down by lack of step-by-step evidence of making taking place, including the observance of safe working practices. Please remember that Teacher Observation Records (TORs) should only be used to support and corroborate direct candidate evidence. The final evaluation of the prototype in Task 6 against the design specification also requires some attention.

Comments by task

Task 1- Product analysis

This task was generally well attempted with most candidates being able to analyse a range of different lamps using the ACCESS FM approach. They were also able to identify the relative strengths and weaknesses of existing products, and present evidence using an appropriate engineering matrix. This was often a tabulated approach with lamps being ranked and compared against each other using the ACCESS FM criteria. Some candidates also presented their data using graphs (e.g. bar charts). More ambitious candidates attempted to use the QFD matrix with some success. It should be remembered that candidates should demonstrate both the use of primary and secondary research techniques. While candidates were clearly able to undertake secondary research, primary research was often overlooked.

Task 2 – Product disassembly

Task 2 was often well attempted by candidates who were able to safely disassemble and analyse a lamp provided to them by the centre. This task relies both on direct evidence from the candidate and additional supporting evidence of independent working using a TOR. Direct evidence can be provided by the candidate using a simple risk assessment before commencing the activity along with step-by-step annotated photographs showing them safely disassembling the lamp. Evidence of independent working can be corroborated using the TOR supplied with the Set Assignment brief. The analysis of the dismantled lamp, as per the specification and marking criteria, needs to consider: function of components, materials, production methods, assembly methods and manufacturing methods. A good way of presenting this, for each component, is in tabular format. Often not all these points were sufficiently covered, or some were omitted altogether. Also, some centres included maintenance which is a requirement of the legacy specification and so not required.

Assessment for learning: Referencing

This task provides excellent opportunity for candidates to reference the information they have found while researching, e.g. from the internet.

Referencing is important to avoid potential malpractice, and further guidance on referencing is available in the specification handbook and on the OCR website.

OCR support: Teacher Observation Records (TORs)

A blank TOR template along with full guidance on its use can be found for Task 2 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 – Virtual CAD 3D

For Task 3 candidates generally demonstrated good use of CAD software to replicate the drawing of the lamp supplied, and to model this using individual mated components. The task asks for the lamp to be simulating, showing it on and off, and this was often well demonstrated using a series of screen shots. This task is also marked on the basis with which candidate worked independently to produce their CAD model. While no TOR is supplied with the Set Assignment brief for this, a statement by the teacher in the comments section of the Unit Recording Sheet will suffice.

In some isolated cases candidates produced their own (range of) different designs using CAD, which is not the intention of the supplied Set Assignment brief. The intention was to replicate the design supplied. These instances were dealt with through appropriate processes to ensure fair credit for the work completed. Centres are reminded to make sure that candidates follow the requirements of the Set Assignment brief exactly.

Task 4 – Physical modelling – production planning

In Task 4 candidates made a good attempt at planning to produce the prototype lamp. There was evidence of different styles of planning, including the use of a table with suitable headings and, in several cases, flow charts. While most plans were quite detailed, some would benefit from the inclusion of more stages of the manufacturing process. Please also remember that it is a requirement of this task to demonstrate an understanding of safety considerations. This task is also marked on the basis with which candidates worked independently to produce their production plan. Again, while no TOR is supplied with the Set Assignment brief for this, a statement by the teacher in the comments section of the Unit Recording Sheet will suffice.

As in Task 3, had candidates deviated from the provided design for the lamp in the planning stage, these were dealt with through appropriate processes. Again, it is essential that centres check that candidates are following the exact requirements of the Set Assignment brief.

Assessment for learning: Planning

Candidates could be provided with a blank planning template or table with appropriate headings for them to complete.

Task 5 – Physical modelling – prototype production

For Task 5 there was often good evidence of prototype making in action. Please encourage candidates to provide detailed step-by-step annotated photographs of this activity taking place, recording all key stages of the making process. 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.

Annotated photos should show stages in the making of the prototype being produced by the candidate and should not just be a series of stock images with commentary of what the candidate did. It is good practice to identify candidates in the photos, which can be done using their candidate number on a card in the image.

As in previous tasks, had candidates deviated from the supplied design, these were dealt with through appropriate processes.

OCR support: Teacher Observation Records (TORs)



A blank TOR template along with full guidance on its use can be found for Task 5 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 6 – Physical modelling – evaluation of a prototype

For the final task, Task 6, while many candidates were able to provide a comprehensive evaluation of their prototype against each of the aspects of the product specification and make suggestions for potential improvements, some of these evaluations were lacking in depth and detail. More successful candidates illustrated clearly using annotated photos, sketches or modified CAD images the improvements being made. Please note that it is not a requirement of this task for candidates to assess their own personal performance or evaluate the production plan as was the case in the legacy specification.

Assessment for learning: Review



Task 6 provides an excellent opportunity to develop skills at the process of review by reviewing a prototype against a product specification and making suggestions for improvements.

Supporting you

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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](#).

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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.

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01223 553998

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