ENGINEERING DESIGN

INCLUDED ON THE KS4 PERFORMANCE TABLES

Moderators' report

OCR Level 1/Level 2

Cambridge National in

Engineering Design

J822

For first teaching in 2022 | Version 1

R039-R040 Summer 2025 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.

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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 Cambridge Nationals suite 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.

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We recommend all teachers complete the module on Online courses – NEA for their subject. These courses provide subject-specific information about course content; how to prepare for planning, marking and submitting; and support with understanding the marking criteria.

Accessing our online courses

You can access all our online courses from our teacher support website Teach Cambridge.

These free online courses currently cover the end-to-end NEA process for teachers. You'll find the link to the **Online courses** under the **Assessment** or **Training** tab – hover over **Assessment** or **Training** on the horizontal menu and select **Online courses** from the dropdown.

These self-paced online courses are intended for any teachers. During the course, you will engage with interactive content on subjects such as guidance on unit content, structure and administrative processes.

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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, which should include the centre number, unit number and candidate number.

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 given 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 task 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 internal assessor is marking a cohort of work, it is crucial to standardise marking across those involved. Internal standardisation ensures that the marks presented are accurate and consistent, and that the rank order of marks is maintained. Rank order errors are often referred 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 a card with 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 and do not form part of the moderation process.

Centres must use the Teacher Observation Records (TORs) included with the Set Assessments 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. This qualification does not use 'Witness Statements' which were included with the legacy qualification, and so these should not be used here.

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 within each Set Assessment 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

For this task 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. In some cases, candidates had used approaches like ACCESS FM and tabulated the response to each design idea of how it met the specification. This level of detail is useful, however, candidates should not spend too much time on this at the expense of producing creative freehand sketches of their design ideas.

From the marking criteria it should be noted that both 2D and 3D sketches are required – in quite a few cases just 3D sketches were produced. Candidates should be encouraged to produce a range (5 or so) of different creative design ideas for the product illustrated using 2D and 3D sketches from which they select a single design to develop in Task 2, 3 and 4.

Please try and encourage candidates to be a little more 'creative' with their range of design ideas. There was evidence of designs from some candidates of being rather similar and often quite 'boxy'.

Task 2 - Manual production of freehand sketches - design development

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. There was evidence here of candidates further developing all their initial design ideas, which is not required and detracts from developing further just one design idea. There were further instances of candidates replicating a design produced from Task 1, without further development which would impact any further marks.

Assessment for learning

2D and 3D sketches:

Refer to the marking criteria 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 engineering drawing conventions e.g. those in BS8888. While there was often evidence of candidates producing drawings by hand, the use of CAD to produce these engineering drawings is perfectly acceptable. Please remember that a 3rd Angle Orthographic drawing (2D) and Assembly Drawing (3D) is required for this task.

If 3D CAD (from Task 4) is used to generate orthographic and assembly engineering drawings then this should be clearly shown under Task 3. 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.

Please note that it is no longer required to corroborate independent working in this task, therefore a Teacher Observation Record (TOR) is no longer required.

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.

Task 4 - Use of Computer Aided Design (CAD)

Candidates 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 mated components (as an example four mated components). It was evident in some submissions that mating of component parts had not been used, and the design had been created by manipulating a single solid object (e.g. using extrudes and other non-mated features). Please try and use CAD software that allows components to be created separately and mated together. More successful candidates presented a series of annotated screenshots showing how separate components were created and how these were mated together. The final designs were then shown rendered using different materials and shown from various viewpoints.

Please note that it is no longer required to corroborate independent working in this task, therefore a Teacher Observation Record (TOR) is no longer required.

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 shown as 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. 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 often let down by a lack of step by step evidence of the 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 evaluation

This task was generally well attempted with most candidates being able to analyse a range of different speakers using the ACCESS FM approach. Note that they could review either passive or active speakers, or both types. They were also able to identify the relative strength and weaknesses of existing products, and present evidence using an appropriate engineering matrix. This was often a tabulated approach with speakers 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/centres attempted to use the QFD matrix with some good success. Please note that the specification now requires candidates to demonstrate primary or secondary research techniques, and that both are no longer required (although they can attempt both if they wish).

Task 2 - Product disassembly

Task 2 was often well attempted by candidates who were able to analyse a speaker. Please note that this task has now changed, and it is only required for the teacher to undertake the safe disassembly of a speaker, and for candidates to undertake the analysis of this. In some cases, candidates undertook the disassembly themselves, which is acceptable however not strictly required. Teachers could video the disassembly taking place, or perform it live. Please note the teacher guidance in the Set Assignment brief for this activity.

Candidates should make notes and gather evidence of how the speaker was safely disassembled. This can be done using a simple risk assessment and a series of annotated photos showing stages of disassembly.

The analysis of the dismantled speaker, 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.

It should be noted that as it is now not intended that candidates undertake the disassembly themselves that it is not required to corroborate safe and independent working for this task.

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.

Task 3 - Virtual CAD 3D

For Task 3 candidates generally demonstrated good use of CAD software to replicate the drawing of the passive speaker supplied, and to model this using individual mated components. The task asks for the speaker to be simulated, showing where the mobile phone is to be positioned. This task is also marked on the basis of if the candidate worked independently to produce their CAD model. A TOR is not supplied for this and a statement by the teacher in the comments section of the Unit Recording Sheet will suffice.

More successful candidates showed how they created their CAD model using a series of annotated screenshots. They then showed their final, rendered, design from various viewpoints with the phone in place.

There was some evidence, in very isolated cases, of candidates producing 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 of the passive speaker supplied. Please make sure that you follow the requirements set out in the Set Assignment brief.

Task 4 - Physical modelling - production planning

In Task 4 candidates made a good attempt at planning to produce the prototype passive speaker. There was evidence of different styles of planning, including the use of a table with suitable headings, and in some cases flow charts. While most plans were quite detailed, some would benefit from the inclusion of more stages of the prototype making process. Please also remember that it is a requirement of this task to demonstrate an understanding of safety considerations, which could be done in the plan or separately using a simple risk assessment.

Please note that it is no longer required to corroborate how independently candidates have produced their plan.

It was evident in some cases that the plan was produced retrospectively after the prototype had been made, which is not strictly the intention of this task.

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 this task there was often good evidence of prototype making taking place. 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 in the form of a 'making diary' 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.

Please encourage candidates to link their production back to their plan in their making diary.

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 Assessment 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 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 took each point in the design brief and evaluated these against their prototype.

Higher achieving candidates illustrated clearly using annotated photos, sketches, or sometimes even modified CAD images demonstrating the improvements that could be made to the product. Note that candidates are not required to physically make these improvements.

Please also 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. There was some evidence of candidates evaluating personal performance at prototype making, and evaluating their planning, and this gains no credit.

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.

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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.

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Online courses

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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 the link to the **Online courses** under the **Assessment** or **Training** tab – hover over **Assessment** or **Training** on the horizontal menu and select **Online courses** from the dropdown.

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 Cambridge Nationals suite 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.

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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.

Tell us what you think

Your feedback plays an important role in how we develop, market, support and resource qualifications now and into the future. We want you and your students to enjoy and get the best out of our qualifications and resources, but to do that we need your honest opinions to tell us whether we're on the right track or not.

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