

Examiners' report

A LEVEL

DESIGN AND TECHNOLOGY: PRODUCT DESIGN

**OCR Level 3 Advanced GCE in Design and
Technology: Product Design**

H406

For first teaching in 2017

H406/01 Summer 2025 series

Contents

Introduction	3
Paper 1 series overview	4
Question 1 (a)	5
Question 1 (b)	6
Question 1 (c)	7
Question 1 (d)	8
Question 1 (e)	9
Question 2 (a)	11
Question 2 (b) (i)	12
Question 2 (b) (iii)	13
Question 2 (b) (iv)	13
Question 2 (c) (iii)	14
Question 3 (a)	15
Question 3 (b)*	15
Question 4 (a) (i)	16
Question 4 (a) (ii)	17
Question 4 (b) (i)	17
Question 4 (b) (ii)	19
Question 4 (c)	21
Question 4 (d)	21
Copyright information	23

Introduction

Our examiners' 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. A selection of candidate responses is also provided. 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.

A full copy of the question paper and the mark scheme can be downloaded from [Teach Cambridge](#).

Would you prefer a Word version?

Did you know that you can save this PDF as a Word file using Acrobat Professional?

Simply click on **File > Export to** and select **Microsoft Word**

(If you have opened this PDF in your browser you will need to save it first. Simply right click anywhere on the page and select **Save as . . .** to save the PDF. Then open the PDF in Acrobat Professional.)

If you do not have access to Acrobat Professional there are a number of **free** applications available that will also convert PDF to Word (search for PDF to Word converter).

Paper 1 series overview

This component is the first of two examined components and makes up approximately a quarter of the total A Level qualification. This question paper has four sets of questions that predominantly cover technical principles within product design and require candidates to: analyse existing products, demonstrate mathematical skills in a D&T context, demonstrate their technical knowledge of materials, product functionality, manufacturing processes and techniques; and to demonstrate their understanding of wider social, moral, and environmental issues that impact on the design and manufacturing industries.

To be successful in this component candidates need to analyse modern consumer products that are designed to meet consumer needs, their design and manufacture, and show understanding of product development and commercial practices. Candidates are assessed on a range of materials and components used in the manufacture of products, as outlined in the specification.

Candidates need to show clear understanding of topics through written extended responses and support discussions with evaluation and use of examples. In mathematical skills questions candidates need to show workings, if a response is less successful but the method used is correct, candidates can gain access to some marks.

Many of the questions within the question paper are based on consumer products made from multiple materials or multiple parts, candidates are expected to analyse the product and refer to it in context to support their responses.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
- related their responses to the products or context of the product - showed clear workings in maths questions - used examples and evaluation to support extended responses - included quality control checks and detail of moulds in the manufacture/process question and covered the end to end process fully using a combination of sketches and notes.	- gave generic responses that did not relate to the product or its context - focused on one or two aspects in extended responses rather than appreciating the complexity of the topic - gave little support with examples in extended responses - gave little detail of moulds, machinery, or quality control in the process question - responded to the manufacture questions with a process that was inappropriate or inefficient for the product size and complexity or level of production required.

Question 1 (a)

- 1 Metal toy cars are popular with children and also as collectable items.

Fig. 1 shows a batch produced toy car in use and a collectable toy car.

Fig. 1



- (a) Identify a suitable manufacturing process for the body of metal toy cars of this type.

Justify your answer.

.....

.....

..... [2]

Most candidates responded to this question successfully by suggesting die casting, justifying how it suits moulding/casting of fine details/complex shapes like the car or is suitable and efficient for mass production once initial investment is made. Many candidates suggested sand casting which would not be an efficient process for a product of the size and complexity of the car.

Question 1 (b)

(b) Explain **two** ways that the metal toy cars, shown in **Fig. 1**, have been designed for upgrades and/or recycling.

1

.....

.....

.....

2

.....

.....

.....

[4]

Many candidates responded successfully to this question identifying the use of standard fixings, such as the wheels making it easy to disassemble and then repair or upgrade. Many identified that the body of the car was one piece that could be easily recycled. Some candidates did not explain that the car would need its parts separating before recycling could happen which limited marks.

Question 1 (c)

- (c) Children's toys such as the metal toy cars need to be checked for safety and quality before distribution.

Identify and explain **two** methods that manufacturers use to protect and assure consumers.

1

.....

.....

.....

.....

.....

.....

2

.....

.....

.....

.....

.....

[6]

Most candidates focused on product testing but overlooked other methods to make sure reliability. Few addressed guarantees, quality control, or consumer rights. More successful candidates identified specific standards or tests such as British Standards to check specific materials/electrical safety/surface finishes or specific components, and the symbols used to reassure consumers.

Question 1 (d)

(d) The metal toy cars shown in **Fig. 1** are replicas of full-sized motor cars.

Identify and explain **three** intellectual property considerations that the manufacturer **must** take into account when creating designs for replica metal toy cars.

- 1
-
-
-
- 2
-
-
-
- 3
-
-
-

[6]

Several candidates demonstrated a misunderstanding of intellectual property (IP). Many responses focused primarily on manufacturing processes, with limited discussion of key IP concepts such as copyright, trademarks, patents, or design rights. Some candidates did note the importance of obtaining manufacturer permission to avoid legal issues associated with copyright infringement and some referred to brand reputation and design patents. Some more successful responses addressed the temporary nature of IP rights or the potential financial barriers that smaller companies may face in securing these permissions.

Question 1 (e)

- (e) Influential movements and related designers have inspired the creation of many products we use today.

Discuss the influence of key historical movements on the development of designs.

Use examples of historical movements in your answer.

.....

.....

.....

.....

.....

..... [8]

There was a clear understanding among candidates of the impact of historical design movements, with many referencing Bauhaus, Art Deco, and the Arts and Crafts Movement. Responses often successfully linked past design principles—such as *form follows function*—to the aesthetic and functional qualities of modern products. Many candidates also drew relevant connections between these movements and designers and contemporary brands such as Apple and Alessi, showing how historical styles continue to inspire present-day design. A many candidates made direct reference to famous designers related to the design movements to strengthen their responses.

Exemplar 1

The Arts and Crafts movement designer Charles Morris was known for incorporating nature and natural beauty into his design - as seen with his Bluebird and Anemone printed cotton. ~~This~~ This inspired Art Nouveau designer Charles Rennie Mackintosh to experiment ~~at~~ including nature in his designs also, which led to the development of one of his most famous designs, the flower stained glass. He combined the element of nature with geometric forms, to ~~a~~ develop ~~a~~ unique ~~more~~ designs. The Arts and Crafts movement also influenced Bauhaus trained modernist designer Marcel Breuer to rebel against the Arts and Crafts principals of beauty, softness and natural materials and instead his work was characterised by ~~stark~~ metal tubing and a Form follows function principal. This Form follows function philosophy is echoed in more recent designs also, like Hans Wegner's Scandinavian Modern chair. It also inspired the Red and Blue chair to experiment with new materials and prioritise the function of the chair over the shape, leading to the development of this iconic ~~de~~ famous design. [8] Bauhaus also influenced designs in other ways - Philip Stark famously rebelled against Form follows function to create unique designs using biomimicry - which led to the development of the Juicy Salif lemon squeezer, showing how a historical movement has significantly influenced later design.

This response shows a Level 3 response as the candidate describes several design movements and uses examples of both products and designers and how they have influenced the products we use today.

Question 2 (a)

2 Fig. 2.1 shows an inkjet printer used with desktop computers within home environments.

Fig. 2.1



(a) Identify and describe **two** ways in which the printer manufacturer could have used enterprise to drive the development of its product.

- 1
-
-
-
- 2
-
-
-

[4]

This question required candidates to demonstrate knowledge of ways a business can raise funds or seek support, such as sponsorship, partnerships, crowdfunding, or investment. However, some candidates misinterpreted the question, instead focusing on how advertising could be used to boost printer sales, which did not directly address the concept of financial or collaborative support from external companies. Many candidates successfully identified crowdfunding and venture capitalists as viable funding sources.

Assessment for learning



This is an area on the specification, that some students are less successful with. It is worth finding examples such as Levi Roots sauce and Magic Whiteboard as well as companies' products such as Tangle Teezer and Trunki that pitched to the dragons without success; and famous brand collaborations to drive success such as Nike and Apple to discuss businesses can raise funds through partnerships, crowdfunding, or investments.

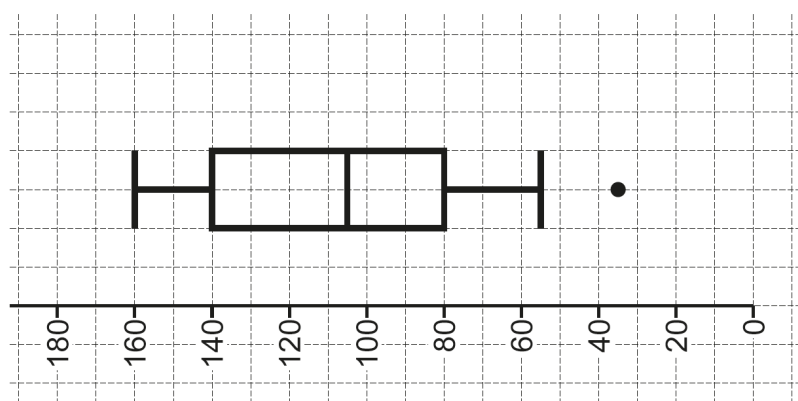
Question 2 (b) (i)

(b) Variations have been found in how much ink a cartridge holds.

4100 cartridges were tested to see how many pages could be printed before they needed replacing.

The results are shown in the box plot (**Fig. 2.2**) below:

Fig. 2.2



(i) Use **Fig. 2.2** to state the **median** number of pages that could be printed from the cartridges.

..... [1]

Most candidates gave a successful response to this question. A misconception was giving the range rather than the median.

Question 2 (b) (iii)

(iii) Calculate how many cartridges printed **at least** 80 pages. Show your working.

[2]

Number of cartridges

Usually, candidates gave a successful response to this question, but some lost the second mark by only giving the value of one quartile rather than number of printer cartridges.

Question 2 (b) (iv)

(iv) Use **Fig. 2.2** to state the upper quartile of the number of pages that could be printed from the cartridges.

..... [1]

A common less successful response was a range of 140 - 160 however most candidates gave the successful response of 140.

Question 2 (c) (iii)

- (iii) Calculate the ratio of the people that selected **quality** to the total number of people asked. Show your working and the ratio in its simplest form. **[2]**

Ratio

Most candidates were able to gain some marks on this question, demonstrating a basic understanding of how to calculate ratios. However, full marks were often missed due to not simplifying the ratio, which was a required step for full marks.

Question 3 (a)

3 Awareness of climate change and pollution has led to the development of alternative sustainable materials.

(a) Identify a biodegradable material. Explain **one** advantage and **one** disadvantage of using this material in a product.

Biodegradable material:

Advantage

.....

Disadvantage

.....

[3]

This question was often successfully responded to by candidates, with PLA and bamboo being popular and appropriate responses. However, some candidates missed full marks by failing to provide a disadvantage of the material they selected. A few responses less successfully identified manufactured boards, which are not fully biodegradable, and therefore not suitable as successful responses in this context.

Question 3 (b)*

(b)* Discuss the implications and opportunities of using sustainable materials in products.

Use specific examples of sustainable materials and products in your answer.

.....

.....

.....

.....

.....

..... **[8]**

This question required candidates to discuss the implications and opportunities of using sustainable materials in product design. Most candidates provided clear examples of companies using sustainable materials. More successful responses connected material choices to environmental impact often referencing carbon footprint and circular economy principles.

Question 4 (a) (i)

4 Fig. 4.1 shows a rainwater container. The container has a downpipe which collects water off a roof.

Fig. 4.2 shows a view of the rainwater container. The lid and stand are not shown.

Fig. 4.1

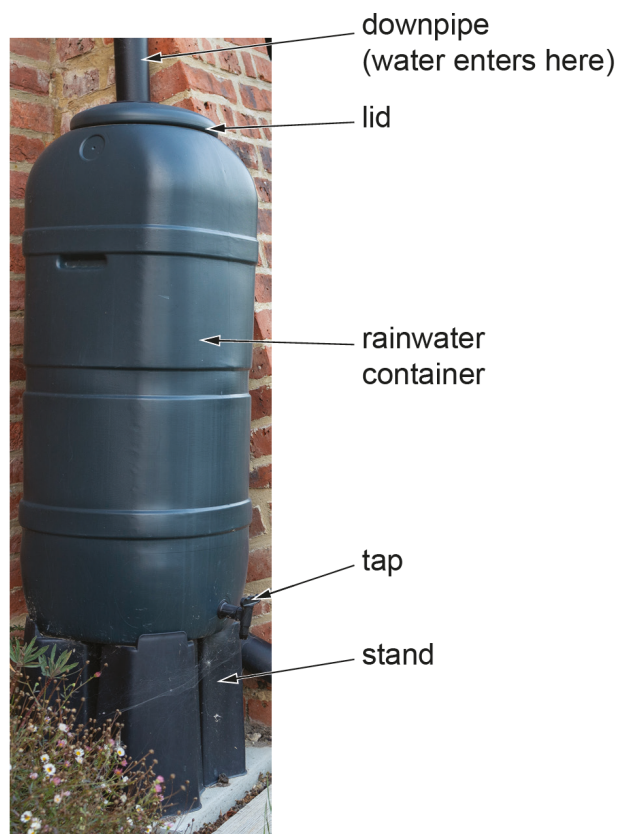
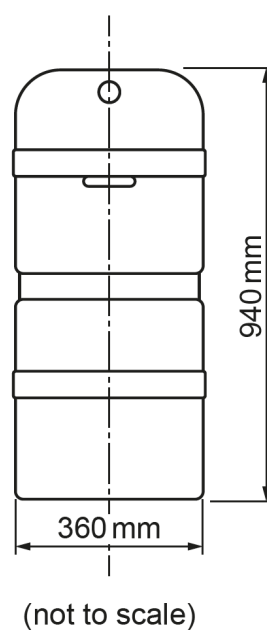


Fig. 4.2



(a)

(i) Identify a suitable thermopolymer for the rainwater container.

..... [1]

Most common and successful responses included PP, HDPE, PVC, and ABS. Most common less successful responses mentioned PLA or named a thermosetting polymer, but these were rarely seen.

Question 4 (a) (ii)

- (ii) The material of the rainwater container could deteriorate from exposure to the weather.

Describe how this could be prevented.

.....

.....

.....

..... [2]

This question received the fewest full mark responses. Many candidates successfully identified the use of additives introduced during manufacturing as a method to prevent material degradation. Many candidates focused on adding a surface treatment such as painting or covering the container, which did not fully address the requirement of preventing deterioration of the material.

Question 4 (b) (i)

- (b) The rainwater container is hollow and is manufactured as a batch of 10 000.

- (i) Use annotated sketches and/or notes to show how the **rainwater container** could be manufactured.

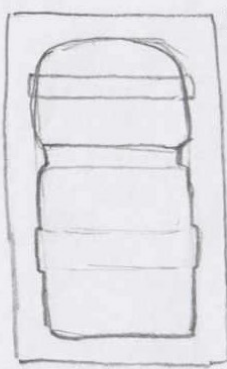
Identify any relevant specialist tooling and quality control checks.

[8]

Most candidates were able to identify the correct manufacturing processes, typically blow moulding or rotational moulding. However, a lack of detail in describing these processes often prevented full marks from being given, with many responses missing key steps or terminology. Many responses made little or any reference to quality control (QC), which impacted their marks.

Exemplar 2

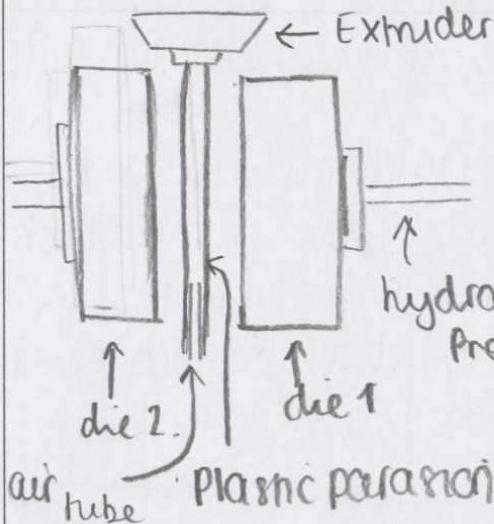
Blow moulding could be used to make this product. First 2 half dies are made from ~~aluminium~~ ^{stainless steel} using a CNC milling machine



X2 x1000
← die

The inside of the die should leave a cavity of the shape that is ~~they trying to~~ being made.

once made the dies are attached to a hydraulic press.

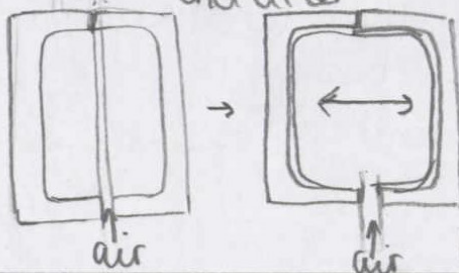


a ^{hollow} tube of plastic parison is then extruded and goes down and over a tube where air will be blown through.

The ~~most~~ die is then closed using the hydraulic press. This clamps the parison off at ~~the~~ the top and ensures it is air

tight to the bottom.

air is then forced through the tube at high pressures, forcing the plastic to ~~take~~ take the shape of the mould, leaving a hollow interior.



once left to cool and harder the container is removed and flash is removed using a sharp blade.

Visual checks are ~~carried~~ carried out to ensure there are no inconsistencies and all ~~the~~ details have been picked up. X-ray technology can also be used.

This is a Level 3 response outlining blow moulding as a suitable process, detail is given of the mould and end to end process. The response could be improved with more detail about QC checks and how they would be carried out such as checking the weight of the finished container to make sure it is the correct thickness and dimensions, checking the wall thickness of the moulding. Visual checks for imperfections in material or moulding, checking the temperature during moulding and checking the mould for damage after every 50 uses.

Question 4 (b) (ii)

- (ii) Use annotated sketches and/or notes to show how the **stand** shown in **Fig. 4.1** could have been designed to optimise the use of material.

An image of the stand is repeated in **Fig. 4.3** below.

Fig. 4.3

OCR is aware that third party material appeared in this exam but it has not been possible to identify and acknowledge the source. Item removed due to third party copyright restrictions.

[5]

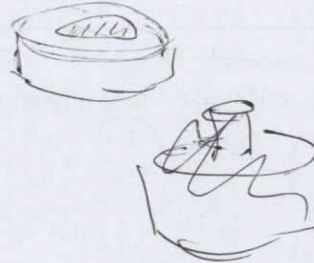
This question received a mixed range of responses; some very successful responses used annotated sketches were seen that correctly identified common optimisation strategies, such as reducing wall thickness, minimising the number of parts, and the use of webbing to maintain strength while reducing material. Some candidates misinterpreted the concept of optimisation, often confusing it with general product manufacture.

Exemplar 3

- (ii) Use annotated sketches and/or notes to show how the stand shown in Fig. 4.1 could have been designed to optimise the use of material.

An image of the stand is repeated in Fig. 4.3 below.

OCR is aware that third party material appeared in this exam but it has not been possible to identify and acknowledge the source. Item removed due to third party copyright restrictions.



[5]

Making the design symmetrical like a simple hollow disc can remove the need to create multiple grooves and unusual shapes, however might be less strong. However this reduces the use of the plastic.



and energy to produce a simpler shape

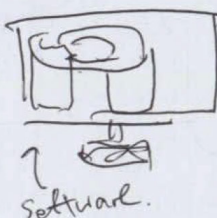
Changing form

You can also reduce the use of the plastic by creating a meshed metal product.



which is strong due to structural triangulation and uses much less materials

Changing material



software.

CAD and FEA and MFA analysis can be used to minimise material but optimise strength by analysing stress points and areas we can sacrifice.

CAD design



another design like this can be used which reduces production time & use of materials.

This shows a Level 3 response as the candidate identifies several ways in which the design of the stand could be optimised, they successfully use a series of annotated sketches to support their response.

Question 4 (c)

- (c) The manufacturer needs to create a hole in the rainwater container for the tap.

The tap requires a 35 mm diameter hole.

The rainwater container is 3 mm thick.

Calculate the volume of material in mm^3 that is removed. Show your working and give your answer to the nearest cubic millimetre.

[3]

Volume of material removed mm^3

Candidates who applied the correct formula generally gained full marks. However, some did not gain marks as the radius was not used correctly or by not completing the final step, such as rounding up the response to the nearest cubic millimetre.

Question 4 (d)

- (d) Discuss the implications of the Health and Safety at Work Act for the manufacturer of the rainwater container.

.....

.....

.....

.....

.....

..... [6]

Many candidates focused solely on manufacturing safety, including Personal Protective Equipment (PPE) and risk assessments, on occasion in the context of a school workshop rather than an industrial setting. References to Health and Safety at Work Act (HASAWA) were made by stronger candidates. Some more successful candidates discussed brand trust, ethical manufacturing, costs to the manufacturer and the positive impact on worker welfare in their responses as successfully as the use of PPE and risk assessments.

Copyright information

Question 1: Toy blue van, © Andrii Zorii, iStock / Getty Images Plus

Toy mini car, © jeff5150, iStock / Getty Images Plus

Question 2: Inkjet printer, © macbrianmun, iStock / Getty Images Plus

Question 3: Rainwater container, © Ray Orton, iStock / Getty Images Plus

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 the exam paper builder platform for a range of our qualifications. [Find out more](#).

Free for all OCR centres with an Interchange account, it allows unlimited users per centre. We require an [Interchange](#) username to verify your centre's users for ExamBuilder.

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

Once you have an Interchange username, use the form on [this page](#) to sign up for ExamBuilder, or ask an existing user at your centre to create an ExamBuilder account for you.

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](#).

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 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?

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.

The subject-specific courses are tailored for each qualification that has non-exam assessment (NEA) units, except for AS Level and Entry Level. They cover the following topics:

- the structure and content of the NEA units
- the assessment objectives and marking criteria for the NEA units
- examples of student work with commentary and feedback for the NEA units
- interactive marking practice and feedback for the NEA units.

We are also developing courses for some of the examined units, which will be available soon.

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.

You can email your thoughts to resources.feedback@ocr.org.uk or visit our [feedback page](#) to learn more about how you can help us improve our resources.



Designing and testing in [collaboration with you](#) and your students



Helping young people develop an [ethical view of the world](#)



Equality, diversity, inclusion and belonging (EDIB) are [part of everything we do](#)

Contact the team at:

☎ 01223 553998

🖥 ocr.org.uk

To stay up to date with all the relevant news about our qualifications, register for email updates at ocr.org.uk/updates

Visit our Online Support Centre at support.ocr.org.uk



OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

OCR is a Company Limited by Guarantee and an exempt charity. Registered in England. Registered office: The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA. Registered company number: 3484466.

We operate academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers.

We are committed to providing a fully accessible experience across all our products, platforms, and websites. Find out more about our [accessibility standards](#).

© OCR 2025. All rights reserved. We retain the copyright on all our publications. However, our registered centres are permitted to copy and distribute our material for their own internal use, in line with any specific restrictions detailed in the publication. Find out more about our [copyright policies](#).

We update our publications regularly so please check you have the most up-to-date version.

We cannot be held responsible for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and do not guarantee that any content on such websites is, or will remain, accurate or appropriate.

When we update our specifications, you'll see a new version number and a summary of the changes. While we do our best to reflect these changes in all associated resources on [Teach Cambridge](#), if you notice any discrepancies, please refer to the latest specification on our website and [let us know](#).

Our resources do not represent any teaching method we expect you to use. We cannot be held responsible for any errors or omissions in our resources.