



**DESIGN**

# GCSE AQA DESIGN & TECHNOLOGY



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- 50% NEA
- 50% Examination
- Areas of study will include: Core technical principles, Specialist technical principles, designing & making principles
- This will be taught through a mixture of theory and practical tasks

## (NON EXAMINED ASSESSMENT) 50%

- Investigate possibilities (10)
- Produce a brief & specification (10)
- Generate designs (20)
- Developing designs (20)
- Realising designs (20)
- Analyse & evaluate (20)

N:B Making equates to 10% of final mark



## EXAMINATION(50%)

- Mixture of questions:
- Multiple choice
- Short answer
- Long answer essay style questions
- Mathematical questions: (E.g. Working out area, percentages and quantities)
- Formal drawing skills. (Sketching, Isometric and Orthographic drawing)



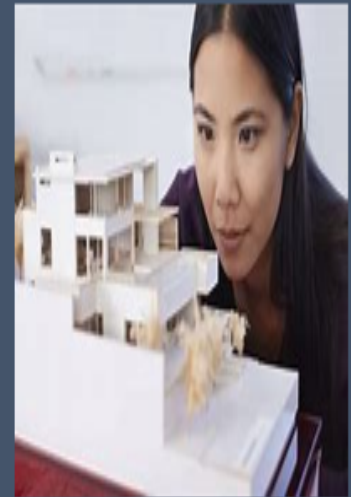


SUITABILITY FOR THE COURSE.  
WHAT SKILLS WOULD ALLOW  
ME ACHIEVE ON THIS COURSE?

- Good understanding of Science & Maths
- Creative (good at coming up with new and innovative solutions)
- Interested in using CAD/CAM to solve solutions
- Good analytical skills (reflective and thoughtful)
- Reflective and an independent learner (40 hour project)

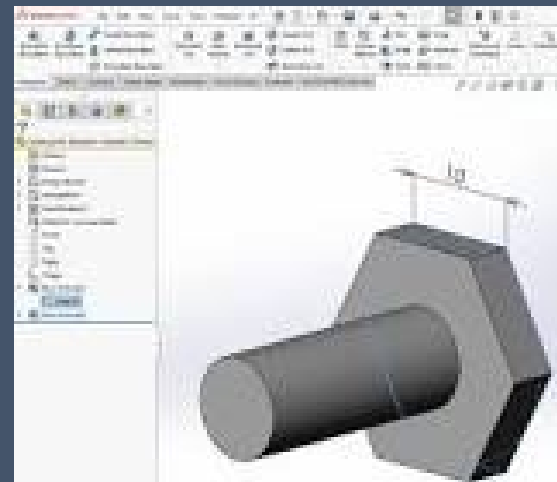
CAREER PROSPECTS

- University ( Product Design, Architecture, Engineering, Theatre Design, Textiles, Designing kite boards own business etc...)



# TOP TIPS DESIGN AND TECHNOLOGY

- Regularly use the knowledge organisers to revisit learning that has taken place in class throughout the year.
- Learn the command words ( Explain, Discuss, Evaluate). This will support you when answering exam questions
- Technology student.com is great resource for learning and revision. Has examples of NEA and strategies for presenting classwork
- Attend extra sessions to keep up with NEA. This is worth 50% of your mark. You can potentially get a level 4 before writing anything in the examination
- Ensure when generating work for your NEA it has innovative features and meets your target audience needs.
- If you have access to a computer that is suitable for gaming. You can have copy of Solid works that could be used to present 2d and 3d images on the computer.



**Dreams don't  
work unless  
you do.**

**BRAND VALLEY HARVEY,  
writer**

BRAND VALLEY HARVEY



**DESIGN**



# OCR DESIGN ENGINEERING A VOCATIONAL STYLE AWARD

ENGINEERING **DESIGN**

INCLUDED ON THE  
KS4 PERFORMANCE TABLES

*Specification*

OCR Level 1/Level 2

Cambridge National in  
**Engineering  
Design**

**J822**  
Version 1 (First teaching September 2022)

[ocr.org.uk/cambridgenationals](https://ocr.org.uk/cambridgenationals)

  
Cambridge  
Nationals

  
OCR  
Oxford Cambridge and RSA

# OCR NATIONALS

- **60% COURSEWORK** Areas of study will include:
  - Developing & presenting engineering designs
  - Design Realisation
- **40% EXAM**
  - Principles of Engineering



# AIMS

Engineering Design will encourage students to:

- Understand and apply the fundamental principles and concepts of Engineering Design, including the design process, types of drawings, influences on design, and the use of Computer Aided Design (CAD)
- Develop learning and practical skills that can be applied to real-life contexts and work situations • think creatively, innovatively, analytically, logically and critically
- Develop independence and confidence in using skills that would be relevant to the engineering design and development sector and more widely
- Analyse problems in design terms through practical experience of solving such problems, including designing, and modelling designs to meet a design brief
- Understand the different stages of the iterative design process, recognising the cyclical nature of this approach • evaluate designs through product disassembly and the process of using product analysis



# WHAT WILL YOU STUDY?

## What will you study as part of the qualification?

You will study the key aspects of engineering design, and have the opportunity to apply what you learn through a number of practical experiences. This will involve you studying three mandatory units:

- **R038: Principles of engineering design**

This is assessed by an exam.

In this unit you will learn about the design process, and all of the stages that are involved. Topics include:

- Designing processes
- Designing requirements
- Communicating design outcomes
- Evaluating design ideas

- **R039: Communicating designs**

This is assessed by a set assignment.

In this unit you will learn how to use sketching and engineering drawings to communicate your ideas.

Topics include:

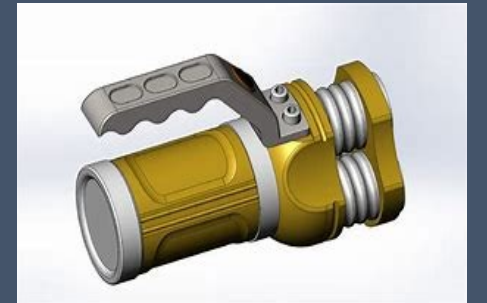
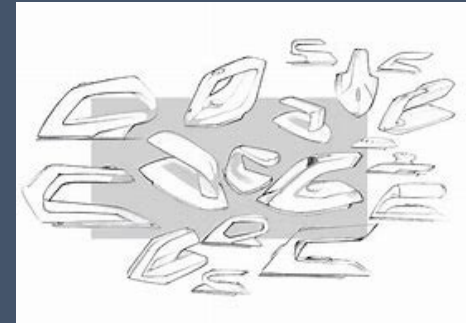
- Manual production of freehand sketches
- Manual production of engineering drawings
- Use of computer aided design (CAD)

- **R040: Design, evaluation and modelling**

This is assessed by a set assignment.

In this unit you will learn how to create and test models of your design. Topics include:

- Product evaluation
- Modelling design ideas



Task	Assessment guidance
<b>Task 1</b>	<ul style="list-style-type: none"> <li>Students must be able to produce freehand sketches of a design idea or design proposal using rendering techniques: thick/thin lines; texture; shading and annotation to demonstrate the design. It would be highly unusual to see the same output from students in a cohort.</li> <li>Ensure that students produce a range of design ideas and proposals that respond to the specification provided, using both 2D and 3D techniques and utilise graphical communication methods to enhance their ideas.</li> </ul>
<b>Task 2</b>	<ul style="list-style-type: none"> <li>Students are required to develop one design proposal further using rendering techniques to present both 2D and 3D sketches.</li> <li>Detailed annotation and labelling should be used to help describe the function, features, material choices, assembly methods etc.</li> <li>Students should explain how their design meets the design specification provided.</li> </ul>
<b>Task 3</b>	<ul style="list-style-type: none"> <li>Students must be able to produce a 3rd angle orthographic drawing and an assembly drawing for a design proposal. They must use the correct standards and conventions.</li> <li>Manual production of drawings refers to either the use of drawing boards or 2D CAD software, so access to either drawing boards and drawing instruments, or access to a 2D CAD software, is required.</li> <li>You should ensure that students produce a range of engineering drawings following standard conventions (BS 8888).</li> <li>To demonstrate their design proposal, students should utilise a range of assembly drawing techniques.</li> </ul>
<b>Task 4</b>	<ul style="list-style-type: none"> <li>You should ensure that students use CAD software to produce formal presentation design proposals.</li> <li>Students must demonstrate skill in using 2D and 3D CAD modelling.</li> </ul>

# R039 COMMUNICATING DESIGNS (12 GLH)

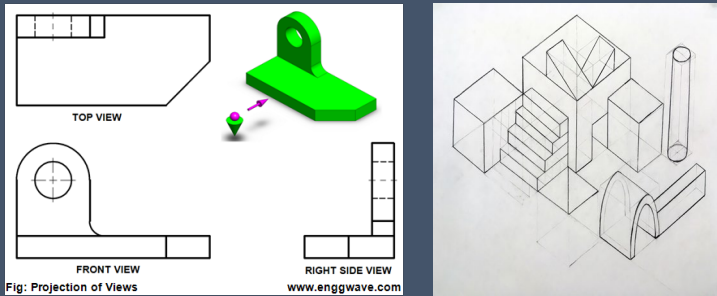
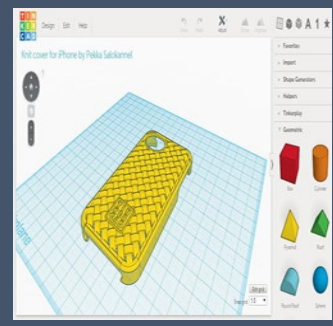
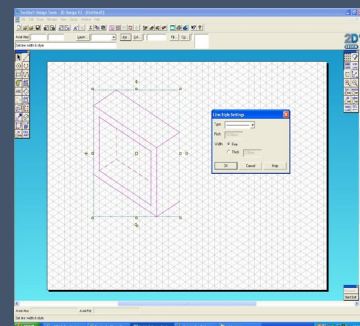
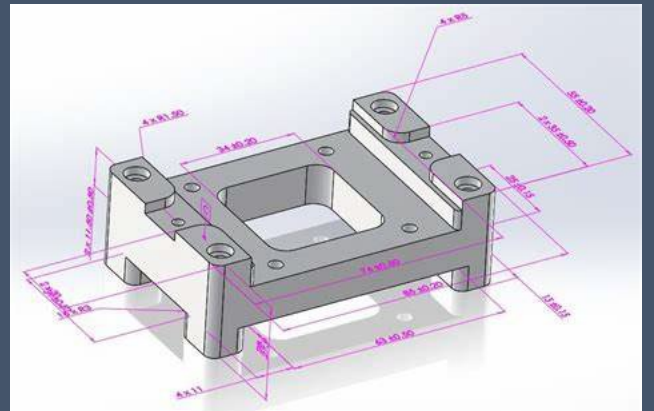


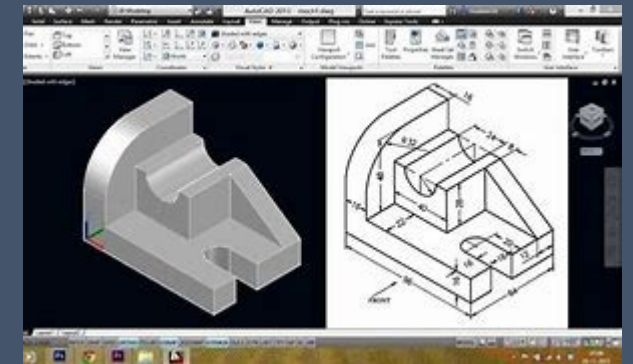
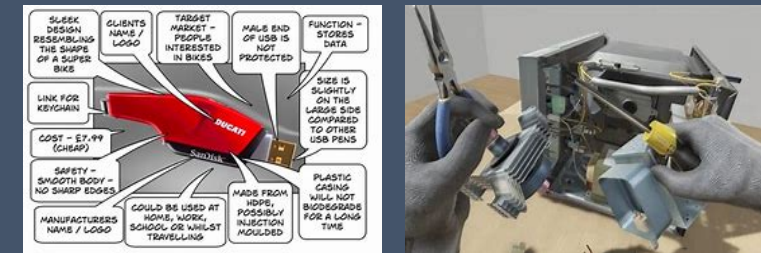
Fig: Projection of Views  
www.enggwave.com



## Assessment guidance

Task	Assessment guidance
<b>Task 1</b>	<ul style="list-style-type: none"> <li>Students should use ACCESS FM to analyse the specified product and compare products using an appropriate customer driven engineering matrix.</li> <li>Both primary and secondary research should be undertaken to identify the strengths and weaknesses of existing products. This should be completed individually, so it would be highly unusual to see the same output from all students in a cohort.</li> </ul>
<b>Task 2</b>	<ul style="list-style-type: none"> <li>You should ensure that students undertake a product disassembly carefully, under close supervision, and following safety guidelines, in order to analyse how it is made and assembled.</li> <li>Students should include step-by-step photographic evidence of the disassembly, and explain how they used tools and instruments safely.</li> </ul>
<b>Task 3</b>	<ul style="list-style-type: none"> <li>Students will require access to 3D CAD software in order to produce a virtual 3D model from the product specification provided.</li> <li>Different views of the virtual 3D model should be evidenced, and you should ensure that students simulate the operation of the product.</li> </ul>
<b>Task 4</b>	<ul style="list-style-type: none"> <li>Students are required to plan the production of a prototype, and will need to identify and plan the different stages required to manufacture the it.</li> <li>We provide a template for a risk assessment that students can use as part of their production plan.</li> </ul>
<b>Task 5</b>	<ul style="list-style-type: none"> <li>Students should follow their production plan in order to produce a prototype, working safely at all times.</li> <li>Students should take photographs at each stage, and you should encourage your students to keep a diary of the activities that they carry out.</li> <li>You should complete a Teacher Observation Record for this task.</li> </ul>
<b>Task 6</b>	<ul style="list-style-type: none"> <li>Students should evaluate their manufactured prototype against the product specification, and suggest a range of potential design improvements.</li> </ul>

## R040 DESIGN EVALUATION & MODELLING 912GLH)



## Assessment guidance

This unit is assessed by an exam. The exam is 1 hour 15 minutes. It has two Sections — Section A and Section B.

- Section A has 10 marks
- Section B has 60 marks
- The exam has 70 marks in total

This will be conducted under examination conditions. For more details refer to the [Administration](#) area.

The Engineering Design '[Exploring our exams: a guide to our Sample Assessment Material](#)' gives more information about the layout and expectations of the exam.

A range of question types will be used in the exam, but it will always require students to use the skills of analysis and evaluation.

Teaching content	Assessment Guidance
1.1	<ul style="list-style-type: none"><li>• Students may be required to recommend a design strategy for a particular product and justify their choice.</li></ul>
1.2.1	<ul style="list-style-type: none"><li>• Students will need to be able to identify the key stages of the iterative design process and describe the stages involved in carrying out each process.</li></ul>
1.2.2 - 1.2.3	<ul style="list-style-type: none"><li>• Students will need to know how to analyse existing products using ACCESS FM.</li><li>• Students will need to understand how the stages of the iterative design process allow the development of the design based on a cyclic process of designing, making, evaluating, and refining of the prototype.</li></ul>
2.1.1 – 2.1.3	<ul style="list-style-type: none"><li>• Students will need to know how to use ACCESS FM to produce an engineering design specification and knowledge of the scale of manufacture.</li><li>• Students should know at least one example of a product produced by each scale of manufacture.</li><li>• Students will need to know how designs are made sustainable through the consideration of the 6Rs, and should know at least one example of how a product is made sustainable by one of the 6Rs.</li><li>• Students will need to be able to describe the influences on engineering product design.</li></ul>
3.1.1	<ul style="list-style-type: none"><li>• Students will need to know each of the engineering drawing techniques and may be expected to identify each of the conventions or representations stated.</li><li>• Students may also be expected to add dimensions using the conventions to provided drawings.</li></ul>
3.1.2	<ul style="list-style-type: none"><li>• Students will need to describe at least one modelling method in the creation of a product prototype and give one example of a product produced using one of the modelling methods.</li></ul>

# R038 PRINCIPLES OF ENGINEERING 1 HOUR 15 MINS

## Assessment guidance

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## EXAMINATION(40%)

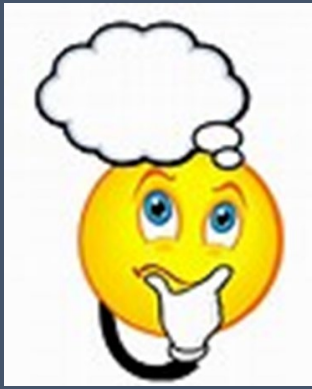
1 hour 15 mins

Part A – includes 10 multiple choice questions (MCQs) •

Part B – includes short answer questions and extended response questions. One extended response question will be assessed using a levels of response mark scheme







## QUALITIES & SKILLS THAT WOULD ALLOW ME TO ACHIEVE ON THIS COURSE?

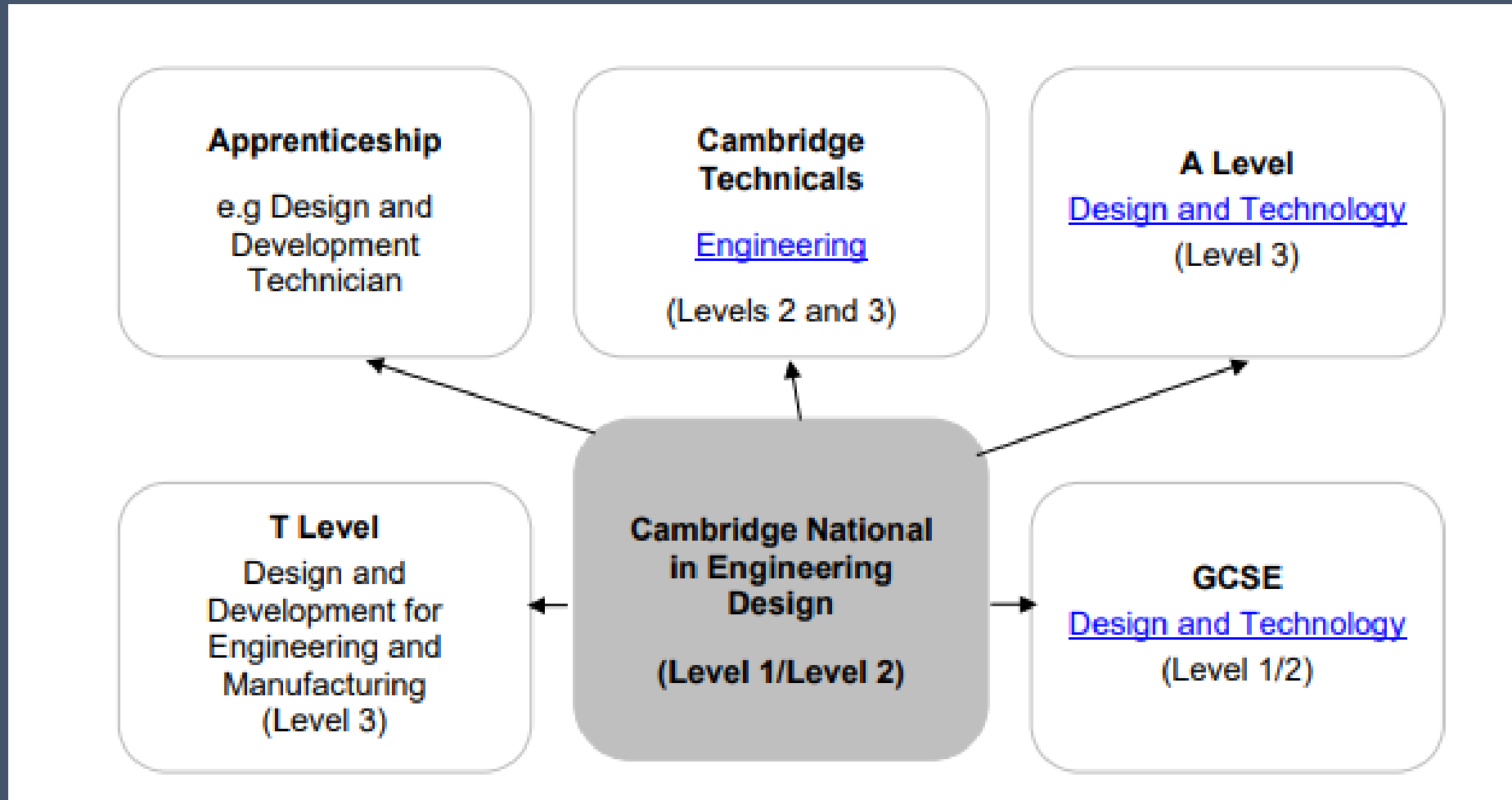
- Good at Maths
- Likes working in an accurate and concise way
- Capable of working in a variety of ways to achieve outcomes
- Using CAD/CAM to solve solutions
- Able to communicate using a variety of design strategies
- Able to be analytical and identify strengths and weaknesses of products
- Likes taking things apart and discovering how things work
- Works hard throughout course.
- Enjoys manufacturing

## CAREER PROSPECTS

- College courses post 16 (carpentry, engineering & apprenticeships)
- Is recognised by University courses as a possible pathway



# Progression opportunities from studying the course



# TOP TIPS ENGINEERING DESIGN

- Regularly revisit learning that has taken place in class throughout the year.
- Learn the command words ( E.g State, evaluate).This will support you when answering exam questions in Year 11.
- Attend extra sessions to keep up with NEA. (R039 and R040) This is worth 60% of your mark.You can potentially get a pass before writing anything in the examination
- If you have access to a computer that is suitable for gaming.You can have copy of Solid works that could be used to present 2d and 3d images on the computer.
- You have an assessed unit in Year 10 starting in Feb 23. If absent you will need to catch up on missed time. This unit must be assessed in Year 10.You will not get a second chance if the grade is lower than you want.

