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Thank you for joining today's event

Introducing Cambridge Advanced National in Engineering (AAQs)

- The session will begin at 4pm
- Please log in using your first and last name so that we can send you the materials after the session
- If you have any questions for us, please type them into the chat window

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Introducing Cambridge Advanced Nationals (AAQs) in Engineering

Liz Bull | *Subject Advisor*

What are Alternative Academic Qualifications (AAQs)?

Designed for students aged 16 to 19 years, AAQs are Level 3 qualifications that can be combined with A Levels, or with themselves, as part of a post-16 study programme.

Cambridge Advanced Nationals, our AAQs, encourage students to:

- develop subject specific key knowledge, understanding, and skills
- think creatively, innovatively, analytically, logically, and critically
- develop valuable communication skills that are important in all aspects of further study and life
- develop transferable skills, such as evaluation, planning, presentation, and research skills
- develop independence and confidence in applying their knowledge and skills

How are Cambridge Advanced Nationals assessed?

Cambridge Advanced Nationals in Engineering are assessed holistically and have a simple and intuitive assessment model, comprising:

externally assessed units, which focus on subject knowledge and understanding

applied or practical non-exam assessment units (NEA)

optional NEA units to provide flexibility.

Qualification	Size	External assessment (Exam)	Non-exam assessment (NEA)
Certificate	180 GLH	50%	50%
Extended Certificate	**360 GLH**	**40%**	**60%**

Certificate: F130 and F132
Extended: F130, F132, F132 and two optional NEAs

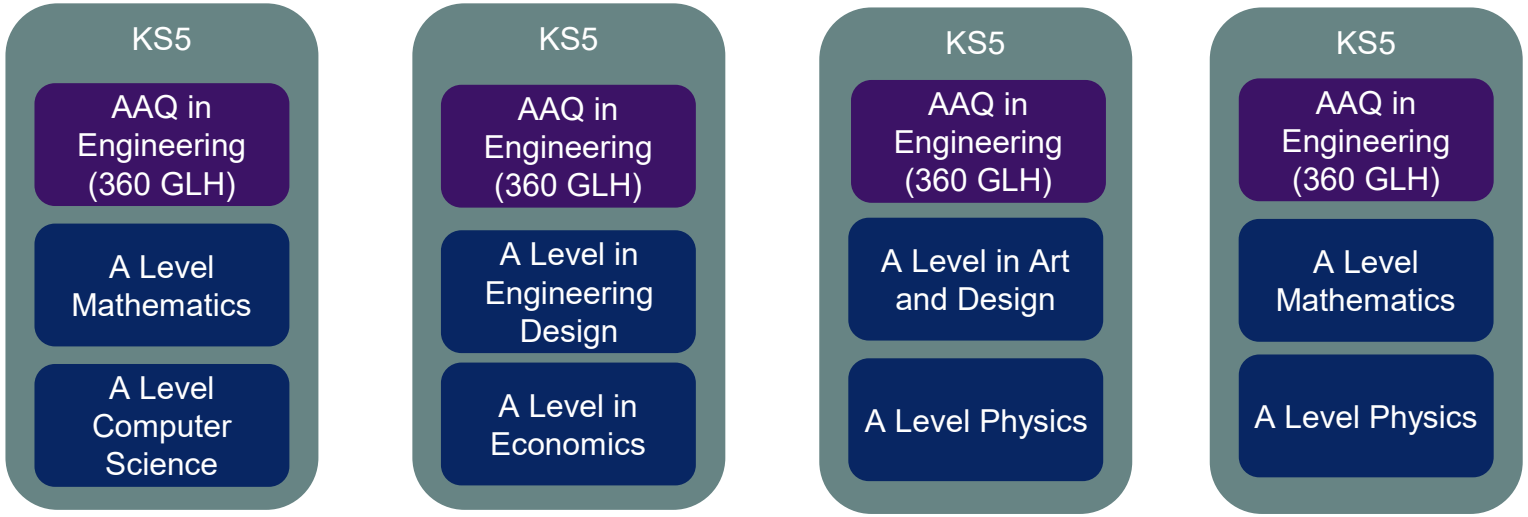
Certificate & Extended Certificate

- Our qualifications have Certificates embedded within them – if a student starts a course late or needs to leave early – they won't leave empty handed
- By completing the relevant units first, you can make sure all students achieve at least an AS Level-sized qualification

Where do they fit into a post-16 programme of study?

Students who want to progress onto further or higher education, but don't want to study only A Levels (or a T Level programme), can choose a mixed study programme.

These can be taken alongside complimentary A Levels to create programme of study. Here are some examples:



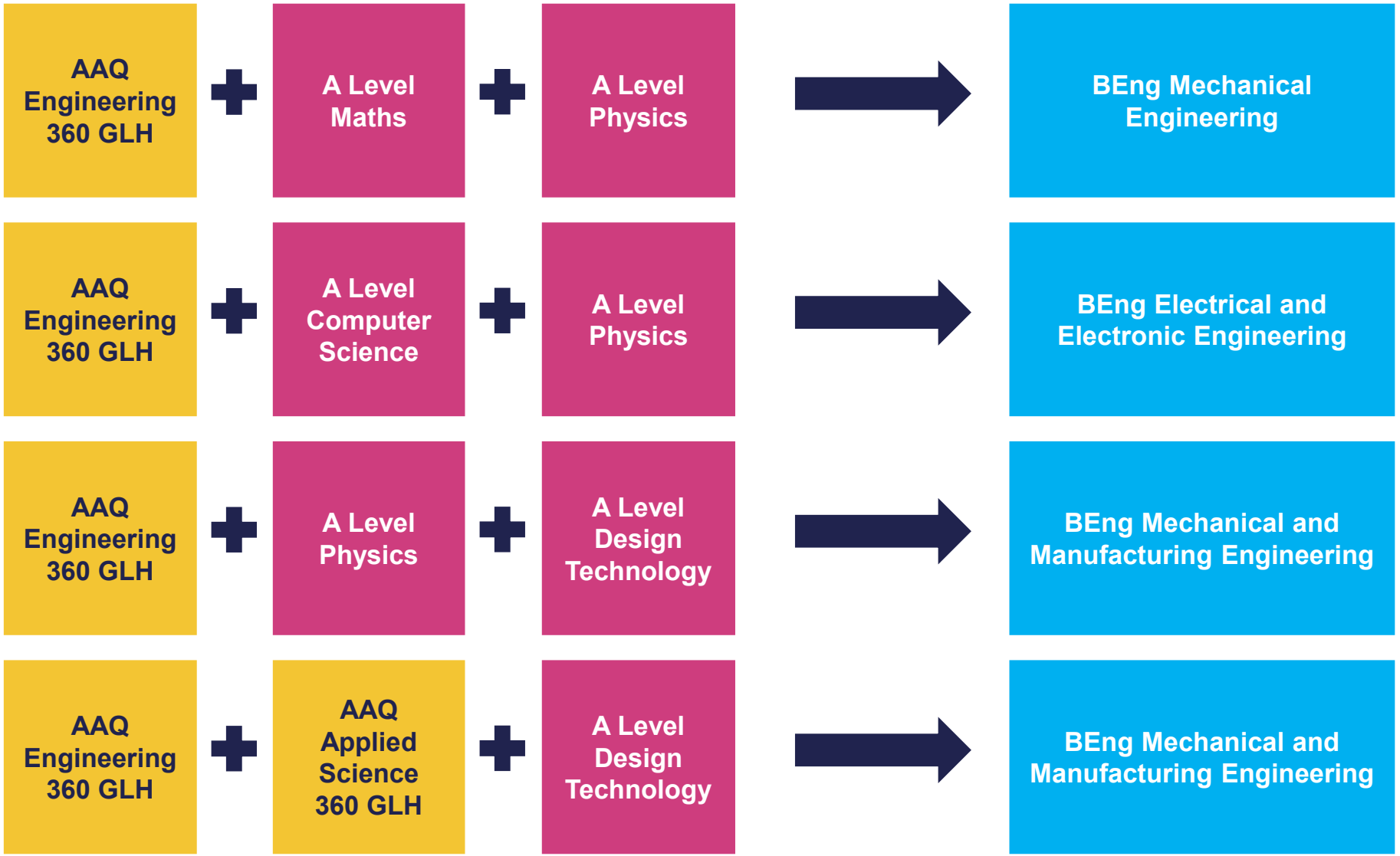
KEY
= A levels
= Cambridge Advanced Nationals

Cambridge Advanced Nationals are worth UCAS Tariff points and our cycle 1 qualifications are on the UCAS Tariff points calculator. Calculate your UCAS Tariff points here

Certificate (150/180 GLH)		Extended Certificate (360 GLH)	
D*	28 points	D*	56 points
D	24 points	D	48 points
M	16 points	M	32 points
P	8 points	P	16 points

6

Study programme examples



Post-16 mixed study programme examples based on:

- 1 AAQ + 2 A Levels
- 2 AAQs + 1 A Level
- 3 AAQs
- 2 AAQs + 1 Cambridge Technical

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Compensation at unit level

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Hurdles based model

P1	M1	D1
P2	M2	D2
P3	M3	
P4		

In the hurdles-based model above, the student would fail to achieve a pass grade for the unit.

New Advanced National compensation based model

P1	M1	D1
P2	M2	D2
P3	M3	
P4		

Using our new compensation-based model, the same student would **still** achieve a grade/result for the unit.

Boundaries* for each unit can be found in the specification. The example above is simplified for illustration.

Watch the video: Cambridge Advanced Nationals – full compensation grading

Full compensation: Exemplar – Computer Aided Design Pass

Pass	Merit	Distinction
P1: Produce an appropriate 2D sketch using dimensions from the product. (PO4)	**M1: Use** appropriate variables or equations in a sketch or extrude. (PO2)	**D1: Produce** a surface model of a component of the design using appropriate tools and techniques. (PO4)
P2: Use the pattern tool within a sketch of a component. (PO2)	**M2: Use** advanced features that involve multiple planes and sketches. (PO2)	**D2: Produce** a to scale, complete, animated 3D assembly of the physical product. (PO4)
P3: Use a mirror tool in a sketch of a component. (PO2)		
P4: Use extrude and revolve tools in a sketch of a component. (PO2)	**M3: Produce** an exploded view of a 3D assembly. (PO4)	
P5: Use applied features to add details to a 3D model of a component. (PO2)		
P6: Produce a 3D assembly of at least **six** interfacing non-standard components. (PO4)		
P7: Use constraints within a 3D assembly that appropriately define the position or movement of the components within the model. (PO2)		
P8: Produce an orthographic technical drawing with more than one view of a non-standard component within a 3D assembly. (PO4)	**M4: Apply** accurate dimensioning and annotations to a technical drawing. (PO4)	**D3: Produce** a detailed technical assembly drawing that conforms to engineering drawing standards. (PO4)
P9: Set up an appropriate simulation for the assembly, using the operating conditions given. (PO4)	**M5: Conclude** the results of the simulation of an assembly. (PO3)	**D4: Recommend** alternative design ideas based on the results of the simulation. (PO3)
P10: Complete a simulation for the assembly to produce appropriate results. (PO4)		
P11: Create an alternative design for a component of the assembly. (PO4)	**M6: Use** table-driven features or configurations in designs to create variable designs of a component or assembly. (PO2)	**D5 Evaluate** whether the alternative design is an improvement using simulation software and design principles. (PO3)

Unit size (GLH)	60	90
Number of pass criteria	11	14
Number of merit criteria	6	8
Number of distinction criteria	5	6
Total number of criteria needed for a unit pass	9	12
Total number of criteria needed for a unit merit	13	17
Total number of criteria needed for a unit distinction	18	23
Total number of criteria	22	28

Total number of criteria: **22**

(11 Pass, 6 Merit, 5 Distinction)

Total required for a **Pass: 9**

Total required for a **Merit: 13**

Total required for a **Distinction: 18**

Q2. If a student achieved 8 pass, 3 merit and 2 distinction criteria what unit grade would they achieve?

SAMPLE

UCAS tariff points and Higher Education support

- Cambridge Advanced Nationals are worth UCAS Tariff points and our qualifications are on the UCAS Tariff points calculator.

Certificate		AS Level		Extended Certificate		A Level	
Distinction*	28 points	A	20	Distinction*	56 points	A*	56
Distinction	24 points	B	16	Distinction	48 points	A	46
		C	12			B	40
Merit	16 points	D	10	Merit	32 points	C	32
		E	6			D	24
				Pass	16 points	E	16
Pass	8 points						

- We have letters of support from a wide range of universities, including Russell Group universities.

- https://www.ocr.org.uk/qualifications/cambridge-advanced-nationals/engineering-level-3-h027-h127/why-choose-us/

Moderation with OCR

- No Lead Internal Verifier needed and no need to submit plans
- Two windows of submission per academic year that match the academic timetable
- In-person or virtual meetings to discuss internal moderation and review a sample of candidates for each unit

Constructive feedback from moderators about areas for improvement straight away and in a follow-up report

Cambridge Advanced Nationals in Engineering

Engineering is the safe, efficient and sustainable application of science/mathematics knowledge and practical skill to transform ideas and material into products and services that solve problems (as a team).

These are ‘general engineering’ qualifications

The **benefit** is better preparation to study a variety of engineering degrees

It is general engineering, because the mandatory units cover a mix of:

mechanical engineering, and

electrical/electronic engineering

Built in lots of **flexibility** to support you and your students depending on:

Student needs

Teacher’s skills/expertise

Centre resources

University progression

Qualification Structure

		GLH	180	360	Assessment
F130	Principles of Engineering	90	M	M	External
★ F131	Material Science and Technology	60	-	M	External
F132	Engineering in Practice	90	M	M	Internal
★ F133	Computer Aided Design	60	-	O	Internal
★ F134	Programmable Electronics	60	-	O	Internal
★ F135	Mechanical Product Design	60	-	O	Internal
★ F136	Computer Aided Manufacture	60	-	O	Internal
F137	Electrical Devices and Circuits	60	-	O	Internal

1st NEA released on June 1 2025 – and valid for 2 years.

★ = significant subject crossover with the current L3 technical units.

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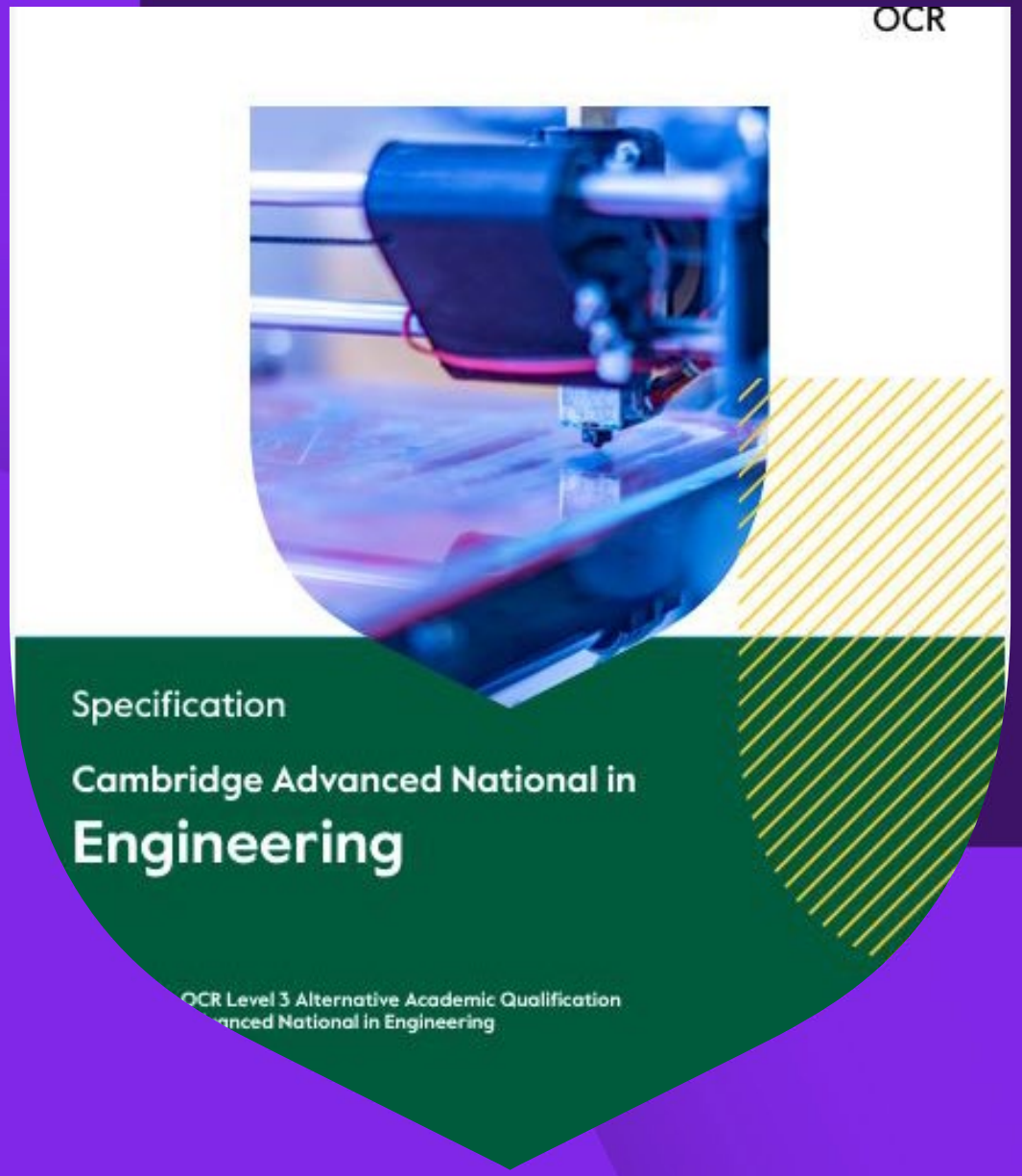
Mandatory Units Content and Assessment Summary



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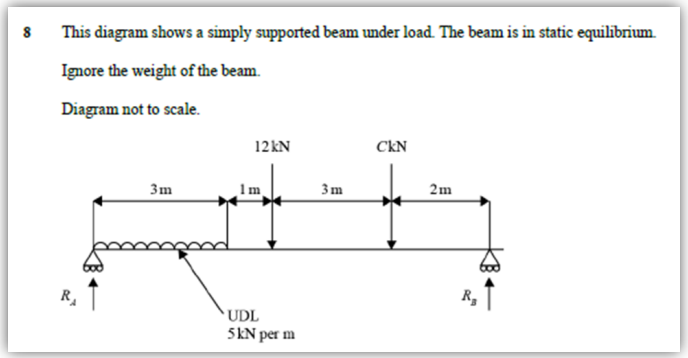
Unit F130 : Principles of Engineering

Topic Area 1: Mathematics	Topic Area 2: Mechanical principles	Topic Area 3: Electrical / electronic principles
• 1.1 Application of SI Units • 1.2 Mensuration • 1.3 Algebra • 1.4 Trigonometry	**2.1 Systems of forces** • 2.1.1 Forces • 2.1.2 Moments • 2.1.3 Systems of coplanar concurrent forces • 2.1.4 Systems of coplanar non-concurrent force in equilibrium • 2.1.5 Direct loading of engineering components • 2.1.6 Sheer loading of engineering components • 2.1.7 Stress vs strain graphs **2.2 Simply supported beams** • 2.2.1 Beams and beam supports • 2.2.2 Forces acting on beams • 2.2.3 Beam calculations • 2.2.4 Bending moment diagrams **2.3 Linear dynamic systems** • 2.3.1 Parameters and applications • 2.3.2 Interpretation of graphs • 2.3.3 Newton's Laws of Motion • 2.3.4 SUVAT equations • 2.3.5 Energy and power • 2.3.6 Friction • 2.3.7 Conservation of energy • 2.3.8 Momentum	**3.1 Electrical principles** • 3.1.1 Concepts of electricity • 3.1.2 Capacitors and capacitance • 3.1.3 Direct current networks • 3.1.4 Inductors and inductance • 3.1.5 Alternating current • 3.1.6 Electrical efficiency **3.2 Analogue and digital circuits** • 3.2.1 Analogue circuit • 3.2.2 Digital logic circuits

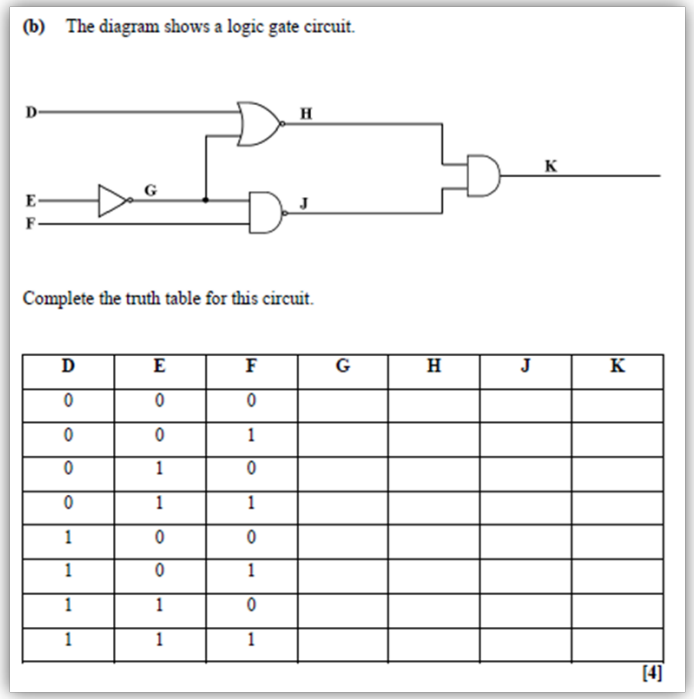
Student will have access to a Formulae Booklet which can be found on Teach Cambridge .



8 This diagram shows a simply supported beam under load. The beam is in static equilibrium.

Ignore the weight of the beam.

Diagram not to scale.



(b) The diagram shows a logic gate circuit.

Complete the truth table for this circuit.

D	E	F	G	H	J	K
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				

[4]

Q3. How long is the longest EA?

1 hour 15 minutes // 1 hour 30 minutes // 2 hours // 2 hours 30 minutes

Unit F131 : Materials science and technology

OCR Level 3 Alternative Academic Qualification Cambridge Advanced Nationals in Engineering

Topic Area 2: Types of material	
Teaching content	**Breadth and depth**
2.1 Metals	
2.1.1 Ferrous metals (containing iron) ▫ Cast iron ▫ Low carbon steel ▫ Medium carbon steel ▫ High carbon steel ▫ Stainless steel	To include: ▫ Difference between pure metals and alloys ▫ Relative properties of the ferrous metals to each other and alternative materials ▫ The relationship between the crystalline structure, lattice structure and the material properties ▫ Bonding mechanism (metallic) ▫ Typical applications and why the general properties of the material make it suitable for these applications and why the material is appropriate for the application ▫ Standard forms of supply: • Ingot/billet • Sheet • Bar • Flat stock • Castings
2.1.2 Non-ferrous metals (containing no iron) ▫ Aluminium and its alloys ▫ Titanium ▫ Copper ▫ Nickel ▫ Zinc ▫ Brass Lithium	To include: ▫ Difference between ferrous and non-ferrous metals ▫ Relative properties of the non-ferrous metals to each other and alternative materials ▫ The relationship between the crystalline structure, lattice structure and the material properties ▫ Bonding mechanism (metallic) ▫ Typical applications and why the general properties of the material make it suitable for these applications ▫ Standard forms of supply:

Section A

2 Which of these is a thermoplastic polymer?

Tick (✓) **one** box.

- Epoxy resin ☐
- Polyester resin ☐
- Polypropylene ☐
- Urea formaldehyde ☐

[1]

3 Which of these describes how an increase in the pressing force during sintering affects the properties of a ceramic component?

Tick (✓) **one** box.

- It decreases the density of the component ☐
- It decreases the strength of the component ☐
- It increases the density of the component
- It increases the mass of the component

Section B

13 Car headlights have a transparent lens on the front. These lenses could be made from glass or polymer.

Discuss which of these materials is the most sustainable choice for this application.

In your answer you **must** write about:

- the **advantages** of using each material for a car headlight lens.
- the **disadvantages** of using each material for a car headlight lens.
- **which** material you would recommend **and** the reasons why.

.....

.....

.....

- F131: Materials science and technology

  This unit is assessed by an exam.

  In this unit you will learn about different material properties, the types of material and their relative properties, and how these properties can be affected by different processing techniques. Topics include:

  - Topic Area 1 Material properties
  - Topic Area 2 Types of material
  - Topic Area 3 Effect of processing techniques on material properties
  - Topic Area 4 Material failure mechanisms and prevention
  - Topic Area 5 Sustainable materials and practices in engineering

SAMPLE

16

Unit F132: Engineering in Practice

Topic Area 1: Product analysis **1.1 Product analysis of the components**	**Topic Area 2: Produce CAD mechanical and electronic drawings** **2.1 Produce a 2D CAD engineering drawing of a mechanical prototype** • 2.1.1 Engineering Drawing Standards • 2.1.2 Mechanical features and component types **2.2 Produce a CAD engineering drawing of an electronic circuit** • 2.2.1 Engineering drawing standards • 2.2.2 Electronic circuit diagrams • 2.2.3 Circuit simulation	**Topic Area 3: Plan the safe manufacture of a mechanical prototype and an electronic circuit prototype** **3.1 Plan the safe manufacture of a mechanical prototype** **3.2 Plan the safe manufacture of an electronic circuit prototype**
Topic Area 4: Manufacturing processes **4.1 Manufacture a mechanical prototype** **4.2 Manufacture an electronic circuit prototype**	**Topic Area 5: Evaluate a prototype** **5.1 Evaluate a mechanical prototype** **5.2 Evaluate an electronic circuit prototype**	

Unit F132: NEA Scenario & Part A Mechanical Prototype

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Scenario

You work for a lighting company that manufactures different types of lighting solution. The product you have been asked to investigate is an **angled desk lamp**.

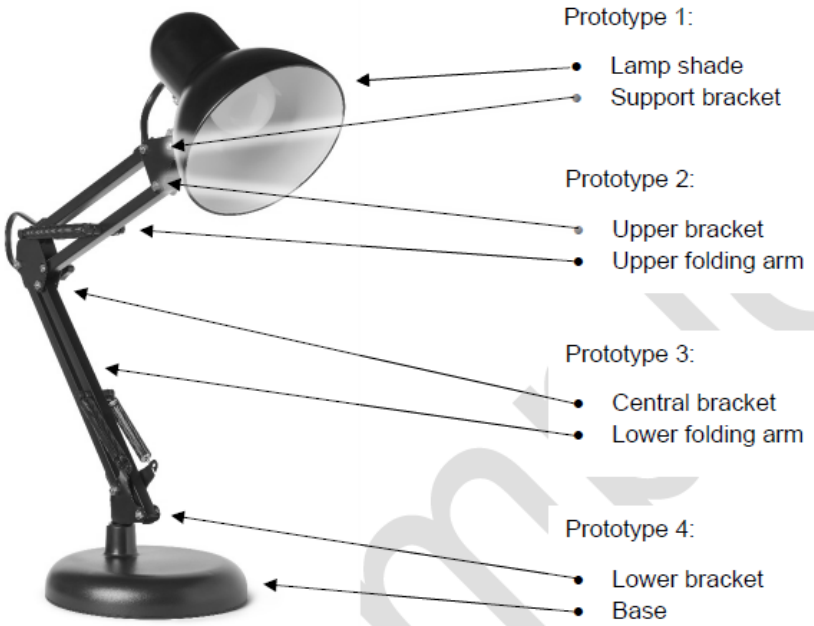
To ensure that a work area is well lit for different purposes, angled desk lamps need their height, angle and tilt to be adjustable.

An example of an angled desk lamp is shown below. The angled desk lamp you are using may look slightly different to this one

Part A: Mechanical Analysis, Drawing and Prototype Manufacture

The non-standard components in the angled desk lamp have been grouped together as shown in **Fig. 1**.

Fig. 1



Each prototype (1, 2, 3 and 4) may also contain relevant standard components, such as nuts and bolts.

You will be told which **one** of these prototypes to use in your assignment.

Sample

90 GLH

18

Unit F132: NEA Part A - Task 2

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Task 2:

Produce two-dimensional (2D) Computer Aided Design (CAD) mechanical drawings

Topic Area 2 is assessed in this task.
Having carried out your product analysis, you now need to produce 2D CAD engineering drawings of the prototype you are going to manufacture.

The task is:
Use a CAD software package to produce 2D CAD engineering drawings of the prototype which follow standard drawing conventions.
Your evidence **must** include:

- Annotated screenshots of CAD software being used to produce the engineering drawings.
- Final 2D CAD engineering drawings in a pdf file format.

Use the assessment criteria below to tell you what you need to do in more detail.

Pass	Merit	Distinction
P3: Produce an appropriate third angle orthographic projection of the non-standard component(s) in the prototype using engineering drawing standards.	**M2: Produce** an appropriate sectioned/detailed view of **one** non-standard component from the prototype using engineering drawing standards.	**D1: Produce** an appropriate isometric assembly projection for the prototype using engineering drawing standards.

Sample

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Unit F132: Resource Guidance

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Cambridge Advanced National in Engineering

Resource Guidance for F132: Engineering in Practice – The Mechanical Prototype

Unit F132: NEA Part B Scenario for the Electronic Prototype

Scenario:

Part B: Electronic Circuit Analysis, Drawing and Prototype Manufacture
The lighting company want to improve the angled desk lamp by making it automatically turn the light on or off depending on the ambient light level.
They want you to make a prototype of the electronic circuit using a Light Emitting Diode (LED).

Important

Part A and Part B are independent activities and should not be integrated together.

Unit F132: NEA Part B

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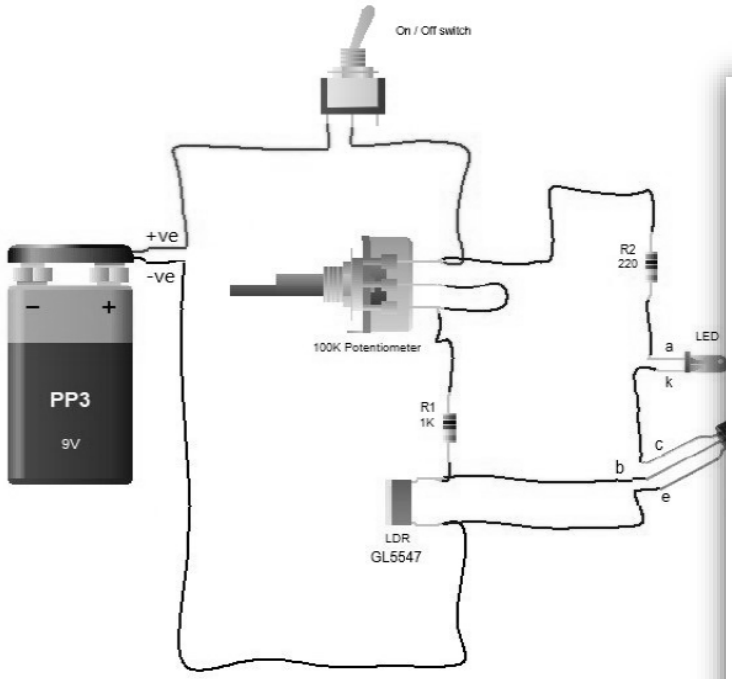
Task 6

Produce a CAD drawing and simulate an electronic circuit.
Topic Area 2 is assessed in this task.

This is a picture of the electronic circuit needed to achieve the improvement. The LED should turn on when the ambient light falls below a threshold set by the potentiometer. The LED should turn off when the ambient light goes above this threshold.



The task is:
Produce a CAD engineering drawing of the electro
conventions.
Simulate the circuit in operation so you can compl
Appendix A to record your simulated values.

Parameter	Explanation
V_{R2}off	Voltage across R2 when the LED
V_{LDR}off	Voltage across LDR when the LE
$I_T$off	Total current through the circuit w
V_{R2}on	Voltage across R2 when the LED is off
V_{LDR}on	Voltage across LDR when the LED is off
$I_T$on	Total current through the circuit when the LED is on

Your evidence **must** include:

- Final CAD drawing of the electronic circuit diagram.
- Annotated screenshots of the simulation of the electronic circuit in operation.
- A completed test table (Appendix A) showing simulated values.
- Annotated screenshots of any simulated testing completed, including connections of virtual test equipment and readings.

Use the assessment criteria below to tell you what you need to do in more detail.

Pass	Merit	Distinction
P8: Produce a CAD drawing of the electronic circuit diagram using engineering drawing standards.		
P9: Simulate the electronic circuit to demonstrate its correct operation.		**D4: Use** correct methods to measure appropriate values and voltages from the simulated circuit.

Assessment Guidance

This assessment guidance gives you information to meet the assessment criteria. There might not be additional assessment guidance for each criterion. It is only given where it is needed. You must read this guidance before you complete your evidence.

Assessment Criteria	Assessment guidance
P8	• The circuit diagram must be an accurate representation of the required circuit and be drawn to meet current engineering drawing standards (e.g. BS 60617).
P9	• Students must use simulation to show the function of the circuit to meet the stated requirement(s).
D4	• Students need to use correct testing methods and virtual test equipment to generate the results required.

Sample

22

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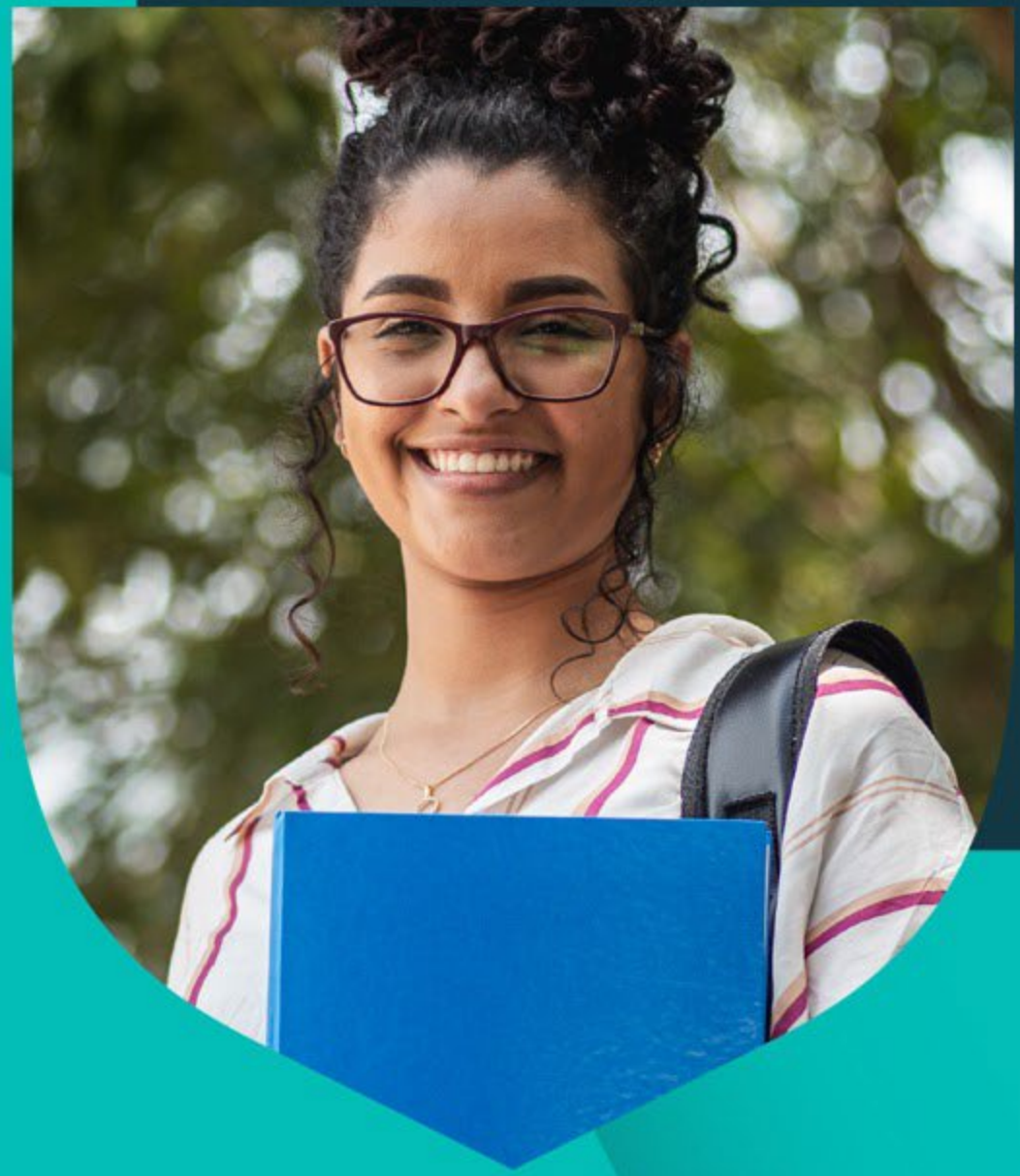
Optional NEA Units



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Assessment at a glance – Extended Certificate optional units

Unit	Topic Areas	Assessment details
F133 Computer Aided Design (CAD)	• Produce 3D models using Computer Aided Design (CAD) • Create a 3D assembly of multiple components within a CAD software • Creating technical drawings from 3D models • Simulations in 3D modelling	**Assignment** 60 GLH OCR-set assignment Centre-assessed and OCR-moderated
F134 Programmable electronics	• Microcontrollers and microcontroller systems • Using input and output devices and other electronic components in microcontroller systems • Designing, developing, and assembling microcontroller-based programmable systems • Programming microcontrollers	**Assignment** 60 GLH OCR-set assignment Centre-assessed and OCR-moderated
F135 Mechanical product design	• Product analysis • Product design	**Assignment** 60 GLH OCR-set assignment Centre-assessed and OCR-moderated
F136 Computer Aided Manufacture (CAM)	• Subtractive and additive Computer Aided Manufacturing (CAM) processes • Three-dimensional (3D) Computer Aided Design (CAD) modelling of prototype components • Manufacturing prototype components using subtractive processes • Manufacturing prototype components using additive processes • Evaluating prototype components manufactured using subtractive and additive manufacturing processes	**Assignment** 60 GLH OCR-set assignment Centre-assessed and OCR-moderated
F137 Electrical devices and circuits	• Power sources • Semiconductor devices • Analogue circuits • Digital circuits	**Assignment** 60 GLH OCR-set assignment Centre-assessed and OCR-moderated

Unit F133

OCR Level 3 Alternative Academic Qualification Cambridge Advanced National in Engineering

Tasks for students and assessment criteria

Unit F133: Computer Aided Design (CAD)

Scenario Title: Hand drill

Valid for assessment from September 20XX to 20XX.

For use by students beginning the qualification in September 20XX.

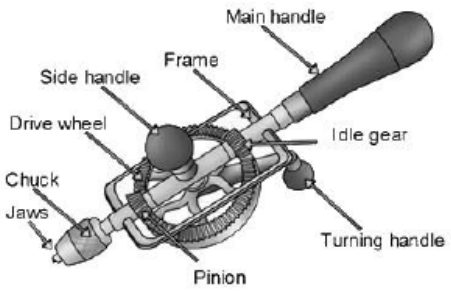
Scenario

The product is a **hand drill**.

You are a junior design engineer for OCR Tools. They want you to produce and optimise a three-dimensional (3D) Computer Aided Design (CAD) assembly of a hand drill.

An example of a hand drill and associated components is shown below.

P2: Use the pattern tool within a sketch of a component. (PO2)	**M2: Use** advanced features that involve multiple planes and sketches. (PO2)	**D2: Produce** a to scale, complete, animated 3D assembly of the physical product. (PO4)
P3: Use a mirror tool in a sketch of a component. (PO2)		
P4: Use extrude and revolve tools in a sketch of a component. (PO2)	**M3: Produce** an exploded view of a 3D assembly. (PO4)	
P5: Use applied features to add details to a 3D model of a component. (PO2)		
P6: Produce a 3D assembly of at least **six** interfacing non-standard components. (PO4)		
P7: Use constraints within a 3D assembly that appropriately define the position or movement of the components within the model. (PO2)		
P8: Produce an orthographic technical drawing with more than one view of a non-standard component within a 3D assembly. (PO4)	**M4: Apply** accurate dimensioning and annotations to a technical drawing. (PO4)	**D3: Produce** a detailed technical assembly drawing that conforms to engineering drawing standards. (PO4)



Unit F135

OCR Level 3 Alternative Academic Qualification Cambridge Advanced National in Engineering

Tasks for students and assessment criteria

Unit F135: Mechanical Product Design

Scenario Title: Toaster redesign

Valid for assessment from September 20XX to 20XX.

For use by students beginning the qualification in September 20XX.

Scenario

You work for a product design company as a mechanical product designer. A client has asked you to redesign an existing product.

The product is a budget two-slice toaster. An example of a two-slice toaster is shown b
The two-slice toaster that you are using may look slightly different to this one.

Use the assessment criteria below to tell you what you need to do in more detail

Pass	Merit	Distinction
P1: Describe the function(s) of the product. (PO2)	**M1: Explain** how the operating principles enable the product to function. (PO2)	
P2: Safely **disassemble** an engineered product into its main components. (PO4)	**M2: Produce** information about how to methodically disassemble the product. (PO4)	**D1: Produce** clear guidance to allow reassembly of the product by a third party. (PO4)
P3: Identify the materials used to make **two** different non-standard components (PO4) (Identification through **doing** tests)		**D2: Analyse** the materials and processes used for **two** non-standard components, including how you were able to identify them. (PO3)
P4: Identify **two DFMA related** design features from the components in **P3**. (PO2)		

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SAMPLE

Unit F134

Tasks for students and assessment criteria

Unit F134: Programmable Electronics

Scenario Title: Roadwork traffic light system

Valid for assessment from September 20XX to 20XX.

For use by students beginning the qualification in September 20XX.

Scenario

You are a junior programmable electronics engineer working for the local council.

The council are to complete roadworks which will require a temporary traffic light system to be put in place to ensure the safe movement of vehicles through the roadworks.

The system will have 2 sets of traffic lights, one at each end of the roadworks. The road is reduced to a single lane while the roadworks take place, so the sets of traffic lights need to let traffic through at one end and stop it at the other.

An example of a traffic light system is shown below.

Use the assessment criteria below to tell you what you need to do in more detail.

Pass	Merit	Distinction
P1: Analyse appropriate microcontroller types and casings for the application. (PO3)	**M1: Justify** the selection of a suitable microcontroller type, casing, system and programming language. (PO3)	**D1: Explain** how the selected microcontroller type, casing, system and programming language could be future proofed against new requirements. (PO2)
P2: Analyse appropriate microcontroller systems and programming languages for the application. (PO3)		

Unit F136

Use the assessment criteria below to tell you what you need to do in more detail.

Pass	Merit	Distinction
P1: Describe how the component can be manufactured using subtractive CAM processes. (PO2)	**M1: Explain** what sustainability considerations should be applied in the manufacture of the component using subtractive and additive CAM processes. (PO2)	**D1: Evaluate** the suitability of subtractive and additive CAM processes to manufacture the component. (PO3)
P2: Describe how the component can be manufactured using additive CAM processes. (PO2)		

Tasks for students and assessment criteria

Unit F136: Computer Aided Manufacture (CAM)

Scenario Title: Stepper motor mount bracket OR Hose barb fitting

Valid for assessment from September 20XX to 20XX.

For use by students beginning the qualification in September 20XX.

Scenario

You are an engineer with Cambridge Engineering, a small manufacturing company.

A client wants to investigate the use of both additive and subtractive CAM processes to manufacture prototypes of some new components.

Your supervisor has asked you to choose either Component A or Component B to work with.

The client has placed an order to manufacture two versions of one prototype component using two different Computer Aided Manufacturing (CAM) processes.

The component to be manufactured is **either**:

- Component **A**: a stepper motor mount bracket, **OR**
- Component **B**: a hose barb fitting.

An orthographic engineering drawing of Component A and Component B is given in Appendix A. For both components:

- the client has specified four functional dimensions (shown in **bold** text) that **must** be kept
- other remaining dimensions can be adapted as part of the design for manufacturing process and/or you will need to decide upon yourself.

Before you choose one component to manufacture please read all the tasks.

Unit F137

Unit F137: Electrical devices and circuits

Scenario Title: OCR Radio Repair

Valid for assessment from September 20XX to 20XX.

For use by students beginning the qualification in September 20XX.

Scenario

You are a trainee starting at OCR Radio Repair. As part of your induction you are going to investigate different types of circuits often found within radios to understand their function.

Task 1

DC Circuits

Topic Area 1 is assessed in this task.

Your first tasks are about DC circuits. You have been asked to investigate the two DC resistor circuits shown in **Fig.1** and **Fig. 2**.

Fig. 1 is a circuit of resistors in series and **Fig 2** is a circuit of resistors in parallel:

Fig. 1

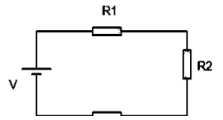
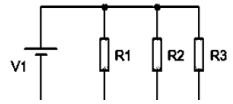


Fig. 2



Use the assessment criteria below to tell you what you need to do in more detail.

Pass	Merit	Distinction
P3: Calculate reactance, impedance, phase angle, current, voltage, power in a circuit with two or three passive RLC components in series or parallel configuration. (PO2)	**M2: Produce** the resultant waveform graphically by the addition or subtraction of two sinusoidal waves with the same frequency. (PO4)	**D1: Evaluate** the advantages of using power factor correction in a circuit. (PO3)
P4: Calculate the resonance and Q-factor or bandwidth in a RLC circuit with series and/or parallel configuration. (PO2)		

SAMPLE

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Support package

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Support Package for Engineering

Teaching & Learning	Assessment	Training
• Textbook • Switching Guide • Mapping Guide • Getting Started Guide • Curriculum Planner • Scheme of Work • E-Learning course	• Annotated Sample Assessment Materials • Assessment Story • Practice Papers • Candidate Style Answers (EA) • Candidate Style Work (NEA) • NEA Guide • Student Guide	• Choosing AAQs and understanding the compensation model • Starting to Teach • Ask the SA • Ask the Moderator • Preparing for the Exam • Preparing for the NEA • Exploring the exam (*after live examination series*) • Exploring the NEA (*after live examination series)* • Enhance your teaching

Website - OCR Level 3 AAQ Cambridge Advanced Nationals in Engineering

Teach Cambridge - https://www.ocr.org.uk/qualifications/teach-cambridge/

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Key support – Teaching and Learning

Support Resource	What is it?
Switching guide	Offers a guide for moving to OCR from another awarding body. The Switching guide contains information on the differences between the specifications, including at the specification point level, differences between the assessment models, and some next steps that can be taken as you prepare to teach with OCR
Mapping guide	Offers a guide to help you move forward from your current OCR qualification to a new one
Curriculum planner	Suggested ways of delivering the specification content across a particular time frame
Scheme of work	A scheme of work that outlines the teaching of the specification over a 2-year course. Breaks down the specification into specification point, guided learning hours, earning intentions, teaching ideas, subject knowledge and further support.
Textbook	Print and digital publication covering the mandatory and optional units.
E-Learning course	A course to support the delivery of the Cambridge Advanced Nationals

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Key support – Assessment

Support resource	What is it?
Sample Assessment Material	A sample exam paper to ensure familiarity with the layout of the exam
Annotated Sample Assessment Materials	*'Exploring our exams: a guide to our sample assessment material'* Understanding the format and structure of the exam, an insight into the assessment objectives and an explanation of the sample assessment
Assessment Story	'*Understanding the assessment – examined and moderated*' Understanding the rationale for the assessment strategy
Candidate style answers	Answers produced to offer teachers an insight into how the assessment objectives are applied in the examined unit.
Practice papers	Practice papers to help students prepare for the examined units
NEA Guide	Guidance to support the delivery, internal assessment and submission of work
Candidate style work	For use by teachers only, with the purpose of helping you mark your candidates' work. We will provide a range of example pieces of work with a Principal Moderator commentary measuring the work against the NEA requirements.
Student guide	Guides for parents and students on key points about their assessments.

Schemes of work

Our new **large and comprehensive schemes of work** cover all aspects of the specification providing everything you need to deliver the qualification:

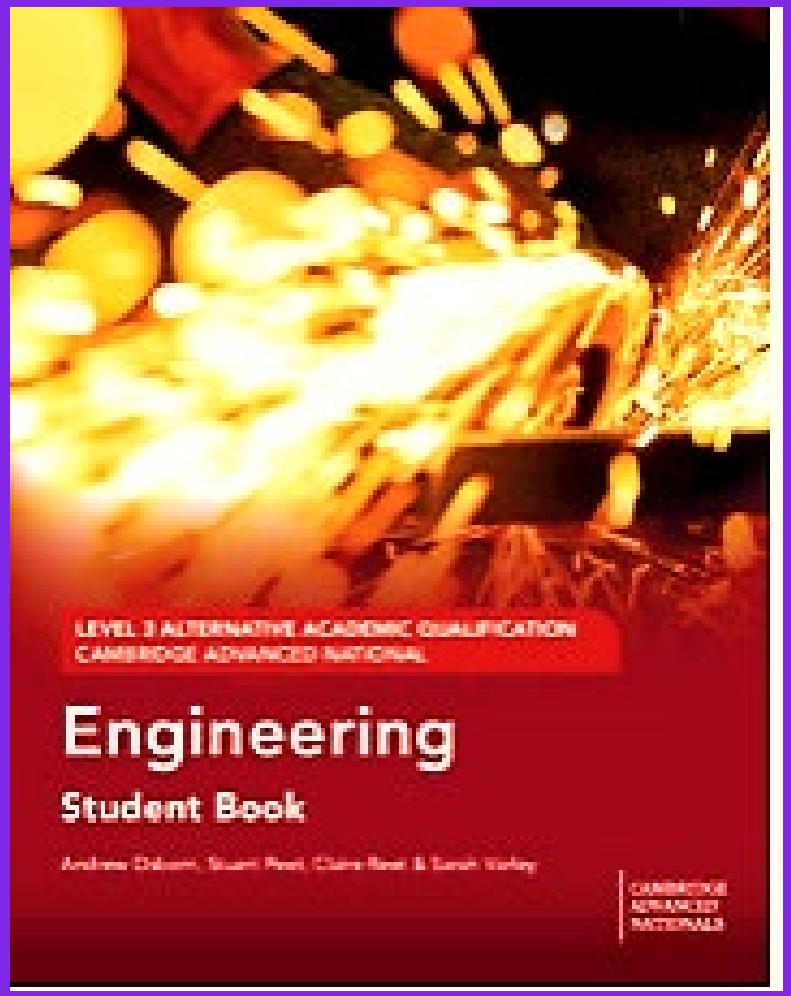
- **Lesson by lesson** – the whole specification is broken down into single 1 GLH lessons
- **Editable**
- **Key words** are highlighted
- **Learning outcomes** – what the students should know by the end of the lesson
- **Teaching ideas** for lesson starter and main activities and student independent learning are included
- **Links** to useful resources to support lessons
- **Subject Knowledge support**

Watch our Schemes of Work video

Scheme of Work - a lesson example

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
2	Physical measurement of dimensions of the components using tools Recording of results of inspection and dimensions	1	By the end of the lesson, students should: • Measure components using a variety of tools • Record measurements of inspections.	1) Using either a virtual resource/visualiser demonstrate to students how to measure with tools like a **vernier calliper, steel rule** and **micrometer.** 2) Have students measure with these tools, to find density of objects. Or you can give the students density and get them to measure the volume to then calculate the mass (synoptic with F130 1.2). Ensure there is a variety of shapes and design for students to work with to ensure using all parts of the tools. 3) Have students record their measurements. This can be done using **sketches** or digitally with photographs where students create **labelled diagrams** of what they have measured.	Online measuring devices Vernier Calliper Micrometer These simulators are good to train the students on how to use these tools on a larger scale. The Engineering ToolBox is a useful website. See the List of materials showing densities to use with measuring.	Have students use a component from home to do their own measurements and create a recording of their results
3	NEA work	4	By the end of the lesson, students should: • Complete P1/P2/M1 of the F132 criteria on the NEA.	1) Introduce the NEA and explain the task, sharing the marking criteria and explaining the assessment guidance. 2) You will need to demonstrate and record the disassembly of the product in F132 which need to be shared with the class. 3) You need to distribute the 'prototypes' each student will be focussing on to complete this task prior to them starting. 4) Follow instructions for F132 set assignment and have students complete their sections for P1/P2/M1 for the NEA. This time includes feedback from assessors to improve work if necessary.		Give students a copy of the NEA and ask them to highlight the key information and words from the scenario, and the requirements for Task 1. This should include the marking criteria. To begin to complete NEA work for Task 1.

Textbook Publication



Mandatory units are in print, optional units are in a digital format.

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Benefits to students

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- Chances to resit papers in January and June: 3 attempts in total
- Resubmit coursework in the next appropriate window
- No more hurdles – every single mark counts towards their final grade
- Content is relevant, up-to-date, and career-orientated

Support for all OCR teachers

Free ***My Cambridge*** login for all teachers (and technicians) via your exams officer that gives you access to:

- Teach Cambridge: teaching resources, schemes of work, assessment materials and set assignments
- OCR Train: our on-demand training and standardisation platform
- Interchange: request your moderation visits during the two windows
- Active Results: compare your school's results against national averages and drill down into item-level and candidate-level analysis
- Access to Scripts: see candidate papers after results day
- Submit for Assessment: digital upload of candidate work for moderation
- ExamBuilder: create assessments from our large bank of question from the Cambridge Technical course, as well as access to all A level and GCSE questions

Teach Cambridge

Why choose Cambridge Advanced Nationals?

Full compensation grading: Students are always rewarded for their demonstrated abilities - every single mark your students earn will directly contribute to their final grade. No mark will go to waste.

Every mark matters: Gone are the days of hurdle elements in units. If a student meets all but one Pass criterion and some Merit criteria, they won't face failure. Our approach compensates for performance at both the unit and qualification levels, ensuring fairness and encouragement for every student.

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Complementary practical application: Designed to be taken alongside A Levels, Cambridge Advanced Nationals seamlessly complement a mixed study programme while maintaining a strong focus on the practical application of skills and knowledge - a valuable supplement to A Levels, enabling clear progression to university.

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Next Steps

- Visit the new Cambridge Advanced Nationals landing page and download our specifications, sample assessment materials, switching guides and more
- Book onto one of our free to attend deep dive subject specific webinars and professional development courses
- Watch our full compensation marking video and download the Cambridge Advanced Nationals summary brochure
- Sign up for email updates (be sure to select “Cambridge Advanced Nationals” and/or your subject areas)
- Join the OCR Facebook group for teacher support
- Let us know you’ll be teaching Cambridge Advanced Nationals here

Please let the Partnerships team know if you’re planning on teaching Cambridge Advanced Nationals or have any questions: partnerships@cambridge.org

Have a subject query? We can also put you in touch with our expert Subject Advisors.

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Question?

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