GCSE Engineering

NEA Coursework Guidelines

Name:

Section	**Marks**	**Date**
Problem solving	15	
Drawings and conventions	15	
Production planning	15	
Engineering skills used	15	
Applying systems technology	10	
Testing and evaluation	10	

This booklet is a guide to the coursework that is worth 40% of your engineering GCSE. Please see below the deadline for submission and the interim deadlines for each section of work.

Deadline for submission of GSCE Coursework – Friday 12th February 2027

Please bring this booklet to all coursework lessons.

AQA Brief and Problem – submission 2027

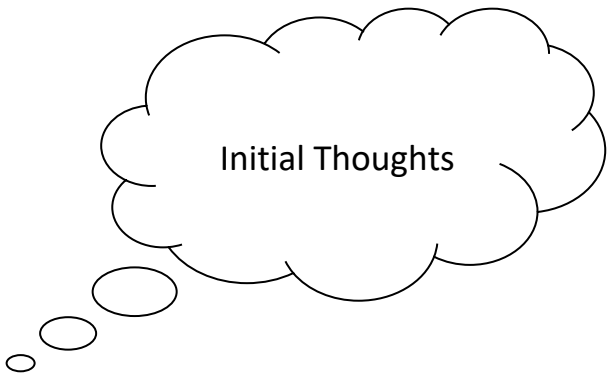
Context
Renewable energy technologies are becoming increasingly important as society looks towards a more sustainable future. Engineers play a vital role in developing devices and systems that harness renewable energy sources and convert them into useful power. This can reduce carbon emissions and improve energy efficiency. Your task is to identify a solution to the problem outlined below and to produce an engineered prototype device or system to help solve the problem. In addition to the problem, there are three examples of how the problem could be solved. You can choose a solution from this list, or you can create your own. Your solution must include both mechanical and electronic components to provide an integrated product.

Problem
Alternative lifestyles, camping adventures and 'off-grid' living are increasing in popularity. People are much more aware of environmental concerns related to the use of fossil fuels and they want to use renewable energy sources.

Your task is to engineer a device or system that will enable people to use a renewable energy source for a routine task.

Three examples of possible solutions
• Engineer a prototype device or system that uses solar energy to generate a light source during darker evenings.
• Engineer a prototype device or system that uses wind energy to generate electricity and can be used to recharge portable devices.
• Engineer a prototype device or system that uses energy from water movement to power an automatic scarer that will disperse birds from a garden.

Write down here your first thoughts on the brief and problem you have been set. What is your starting point?



Marks

The coursework is worth **80 marks**. These 80 marks are split in to **6 sections**. Each section is worth different marks. The coursework should take approximately **30 hours** to complete.

Sections

1) Problem solving - 15 marks

Demonstrate your ability to analyse a given problem, imagine solutions to that problem, use a range of modelling techniques, produce a prototype and communicate their ideas clearly.

2) Drawings and conventions - 15 marks

Demonstrate your ability to develop illustrated design ideas that conform to sector-specific conventions, use CAD effectively and clearly annotate your drawings.

3) Production planning - 15 marks

Demonstrate your ability to produce and follow a production plan and explain the stages of production, consider repeatability and use CNC, explain the quality control measures taken and consider health and safety.

4) Engineering skills used - 15 marks

Demonstrate your ability to use safely a range of materials and equipment and explain your choices, consider quality control and work to tolerances.

5) Applying Systems Technology - 10 marks

Demonstrate your ability to identify and explain the systems you have used and produce block diagrams to represent them.

6) Testing and Evaluating - 10 marks

Demonstrate your ability to undertake testing of your product and evaluate its effectiveness. You will also be expected to provide an honest evaluation of the product and make recommendations for improvements.

Look at how the marks are allocated and what you are being asked to complete.

Deadline tracker

Section	Deadline	Submitted ✓	Feedback(verbal/ portal)	Target	Contact home needed. Date/brief reason
1) Problem solving (15)					
2) Drawings (15)					
3) Planning (15)					
4) Practical (15)					
5) Systems (10)					
6) Testing (10)					

This tracker is to check if you are meeting the deadlines for each section. Any concerns about progress a discussion would be had with you in the first instance, then with home.

Submission of work

All work will be submitted electronically. An assignment will be set up for each of the sections on the school portal and a final submission assignment will be set up for when your project is complete.

Progress review notes

Every 6 weeks you will discuss with your teacher your progress. This will be to check if you are on track and help plan going forward with your project. It is your responsibility to make notes of the conversations you have with your teacher. There are extra boxes for additional feedback from your teacher.

Date	Comments

Breakdown of each section – Each section has the mark scheme to go with it. We will go through what you are being asked to do and the mark scheme each time a new section is started. Use a highlighter

Problem solving - 15 marks

In this section will be required to demonstrate your ability to analyse a given problem, imagine solutions to that problem, use a range of modelling techniques, produce a prototype and communicate their ideas clearly. You should use sketches or modelling to show technical concepts and the initial steps in generating a functional solution. More detailed drawings/models using conventions should not be credited in this section, but rather in Drawings and Conventions.

You should provide (as appropriate):

- A written description of the task that clearly defines what the problem is
- Organised work that communicates ideas
- Evidence of a completed prototype of the design solution.

to highlight key words and make notes.

Level/mark	Problem analysis	Problem –solving	Modelling	Communicating	Production of a prototype
3 (11–15 marks)	The problem has been analysed thoroughly, resulting in a comprehensive and accurate description of the problem to be solved including consideration of relevant variables that may affect the engineered solution.	A range of alternative, well-explained methods of solving the problem is considered in detail. Choice is justified with reference to the demands of the problem resulting in an appropriate solution being selected and developed fully.	Excellent modelling is demonstrated using a range of techniques including 3D, graphical and mathematical. All aspects are well-explained and demonstrate that the final outcome should function as desired.	All information is consistently well-organised and presented in an appropriate format. All aspects of decision making are well conveyed.	A fully functioning and high quality prototype of the solution has been produced.
2 (6–10 marks)	The problem is accurately identified with most aspects of the problem having been analysed.	Consideration of other methods of solving the problem is limited to a single alternative suggestion with some detail, or a small number of methods that lack development. A mostly appropriate solution is chosen for further development.	Good modelling of several aspects of the development is demonstrated. Some drawings or records of other forms of modelling are annotated and it is clear from the drawings that the majority of ideas are workable.	Most information is organised and presented in an appropriate format. This conveys some aspects of decision making but not all choices are explained.	A functioning prototype with some non-critical flaws has been produced.

Drawings and conventions - 15 marks

In this section you will demonstrate your ability to develop illustrated design ideas that conform to sector-specific conventions, use CAD effectively and clearly annotate your drawings.

The drawings in this section could include:

- Orthographic (including sectional views)
- Isometric
- Assembly
- Schematics.

Students should provide (as appropriate):

- A development and explanation of a detailed, annotated design idea using appropriate engineering drawings
- Drawings that comply with sector-specific standards and conventions
- Detailed CAD drawings for presentation.

Level/mark	Development drawings	Computer aided design	Conventions	Annotation	Information
3 (11–15 marks)	Develops, justifies and evaluates a detailed and fully annotated solution that uses comprehensive and appropriate engineering drawings.	CAD has been used, with effect, to produce accurate drawings of complex parts and rendered 3D presentations.	Drawings consistently conform to sector-specific standards and conventions.	Drawings are annotated clearly, accurately and appropriately, and are easy to follow providing all required detail.	All information is consistently presented in a clear and logical manner that ensures understanding.
2 (6–10 marks)	Develops and partially evaluates an annotated solution using some engineering drawings.	CAD has been used to present adequate information of shape and size or the function of components to allow development to progress.	Drawings generally conform to sector-specific standards and conventions with occasional errors or omissions.	Drawings have annotation for most important features, but lack sufficient detail.	Most information is presented in a clear manner. Some detail may be missing or be confusing.
1 (1–5 marks)	Develops a solution using a limited range of engineering drawings.	CAD has been used to attempt to present a limited amount of simple information about shape or size.	Drawings use conventions to a very limited extent or inaccurately.	Drawings lack any annotation other than brief descriptions or labels.	Information is difficult to understand and lacks clarity.
0	Nothing worthy of credit				

Production planning - 15 marks

In this section students will demonstrate their ability to produce and follow a production plan and explain the stages of production, consider repeatability and use CNC, explain the quality control measures taken and consider health and safety.

Students should produce (as appropriate):

- A detailed production plan
- An explanation of each of the stages of production
- An explanation of the quality control techniques used to produce the product.

Level/mark	Producing and following a plan	Explaining the plan	Ensuring repeatability and using CNC	Sequencing and quality control	Health and safety
3 (11–15 marks)	Produced and followed a detailed production plan, covering most aspects of production using information contained within engineering drawings or circuit diagrams.	A comprehensive and detailed explanation of all of the stages in the production of an engineered product is provided.	Planning includes detail related to the use of jigs/fixtures to ensure repeatability. Detailed evidence that jigs or fixtures and/or CNC programming have been used.	Identifies all stages and explains the sequence of processes and the quality control techniques used to produce the product.	Comprehensively details the application of health and safety procedures in all processes.
2 (6–10 marks)	Produced and followed a simple production plan using information contained within engineering drawings or circuit diagrams.	A clear and detailed explanation of the main stages in the production of an engineered product is provided.	Evidence of the planned use of jigs, fixtures or CNC programming, to enable repeatable outcomes.	Identifies the main stages/ processes and an important quality control technique used to produce the product.	Details the application of health and safety procedures in the main processes.
1 (1–5 marks)	Followed a simple production plan using information contained within engineering drawings or circuit diagrams.	An outline plan that identifies limited aspects of production is provided.	Evidence of the use of a provided jig/ fixture or machining of a part on a CNC machine, using a provided program.	Identifies the main process(es) and mentions the need for quality control when producing the product.	Adheres to health and safety procedures.
0	Nothing worthy of credit				

Engineering skills used - 15 marks

Demonstrate your ability to use safely a range of materials and equipment and explain your choices, consider quality control and work to tolerances.

Students should produce (as appropriate):
• Evidence of the selection and safe uses of appropriate materials, parts, components, tools and equipment required to make their product
• An explanation of the processes used
• Evidence of the quality control measures taken.

Level/mark	Skill	Use of a range of processes and materials	Quality control and working to tolerances	Level of demand	Explanation of processes
3 (11–15 marks)	The outcome shows a high level of skill across a number of processes, with work completed accurately.	Used safely a wide range of appropriate: • materials • parts • components • processes • tools • equipment.	Applied the planned quality control to all stages of manufacture to make their product. The engineered product meets the tolerances stated.	Makes a complete, high-quality engineered product with a high level of demand.	Clear and detailed explanations of which alternative processes were considered, justifying why particular methods have been used.
2 (6–10 marks)	The outcome shows an acceptable level of skill across a number of processes, with most work completed accurately.	Used safely a small range of appropriate: • materials • parts • components • processes • tools • equipment.	Applied the planned quality control to a limited number of stages. The engineered product is made within some of the tolerances stated.	Makes an incomplete, high level of demand engineered product **or** a complete low level of demand product.	Simple explanations of why particular processes were used.
1 (1–5 marks)	The outcome shows a limited amount of skill with little work completed accurately.	Used safely a very limited range of: • materials • parts • components • processes • tools • equipment.	Applied quality control to a single stage. The engineered product is not made to any stated tolerances.	Makes an incomplete, low level of demand engineered product.	The processes that have been used are stated.
0	Nothing worthy of credit				

Applying Systems Technology - 10 marks

Demonstrate your ability to identify and explain the systems you have used and produce block diagrams to represent them.

Students should provide (as appropriate):

- Representations of technological systems used in their product in diagrammatic form
- Block diagrams with explanations of the systems operating within their product.

Level/mark	Application of systems technology	Explanations of systems technology
5 (9–10 marks)	Identifies and explains in detail two or more of the systems and technologies used in the engineered product to organise and control the function of the product.	Detailed block diagrams are produced for multiple systems with all sub-systems and feedback explained.
4 (7–8 marks)	Identifies and explains one or more systems technology used in the engineered product to organise and control the function of the product.	A complex block diagram for one or more systems with sub-systems or feedback explained.
3 (5–6 marks)	Explains in general terms a single systems technology used in the engineered product and how it operates.	A systems block diagram, including an explanation of each of the blocks as a system or shown diagrammatically with explanation.
2 (3–4 marks)	Displays a basic understanding of the systems technology used in the engineered product. Descriptions lack accuracy.	A linear systems block diagram where more than one operation is described.
1 (1–2 marks)	Shows a limited awareness of the systems technology used in the engineered product but descriptions lack any detail.	A simple systems block diagram is produced consisting of a single input/process/output operational structure.
0	Nothing worthy of credit	

Testing and Evaluating - 10 marks

In this section students will demonstrate their ability to undertake testing of their product and evaluate its effectiveness. They will also be expected to provide an honest evaluation of the product and make recommendations for improvements.

Students should provide (as appropriate):

- Evidence of a range of appropriate testing of the product
- An analysis and evaluation of the completed product, with further explanation as to how and why it could be improved.

Students should consider and asses how well the solution meets the requirements of the problem and how the solution could be improved if the problem were to be revisited.

Level/mark	Testing	Evaluating
5 (9–10 marks)	Undertaken detailed and objective testing of all aspects of the product using a variety of testing techniques to compare with a comprehensive specification. An explanation of how quality is maintained through testing, detailing methods that ensure the work is within tolerance.	A comprehensive analysis and evaluation of all aspects of the completed product, both systems operation and manufacture. Well-reasoned suggestions made for how and why possible improvements could be made.
4 (7–8 marks)	Undertaken appropriate testing of most aspects of the product and provided an informative comparison to the product specification. Quality control methods applied consistently to ensure all aspects of work are within tolerance.	A detailed analysis and evaluation of the completed product, explaining how and why either systems operation or manufacture could/needs to be improved.
3 (5–6 marks)	Undertaken a range of basic testing on the product using a variety of techniques comparing the results to the product specification. An explanation of the method used to ensure quality is maintained.	An analysis and evaluation of the completed product, explaining why it needs to be improved.
2 (3–4 marks)	Undertaken testing of limited aspects of the product with comparison to the product specification, using a single technique. Some quality issues addressed.	A limited analysis and evaluation of an aspect of the completed product, stating why it needs to be improved.
1 (1–2 marks)	Undertaken testing of a single aspect of the product with comparison to the product specification. Has a minimal awareness of quality issues.	Limited analysis and evaluation of an incomplete product.

Tips

- Use the lesson time wisely.
- Meet the interim deadlines, these are set so that you don't fall behind with your work and plan your time effectively.
- Complete a section and submit it for feedback then you have time to edit and improve. Don't leave it until the final deadline.
- Meet the criteria – look specifically at what you are being asked to do and refer to the mark scheme.
- Attend after school to catch up and have more support.
- Don't over complicate what you need to do.
- Use time at home to research areas that you are unsure about such as electronics.

Links to websites.

www.aqa.org.uk/subjects/engineering/gcse/engineering-8852 - GCSE specification and guidance.

Websites/resources/books/information
Write down here any websites you use. Keep this a record as you have to declare these when you submit your work.

Checklists – use these to check off your work as you complete it.

Problem solving (15 marks)
In this section you will be required to demonstrate your ability to analyse a given problem, imagine solutions to that problem, use a range of modelling techniques, produce a prototype and communicate your ideas clearly.

Checklist

Description	Evidence in your coursework (This is only a guide of what you could include and does not have to be in this order)	✓
A written description of the task that clearly defines what the problem is.	Analysis of the context – investigating what you are being asked to do.	
	Research – General (securing devices, valuables, public spaces)	
	Developing your own brief – what are you going to do. What did you find out from your analysis/research?	
	Relevant research (electronics, existing products, user, data)	
	User of your product - Client research/questionnaire/internet research/conversation	
	Specification (list of criteria your product needs to be based on your findings)	
	Summary of your findings (at the end of the research or on each page?)	
Communication of ideas	Sketches of design solutions to the problem (range exploring solutions)	
	Annotated and explained. Showing technical concepts.	
	CAD/Sketches/modelling/different views)	
Completed prototype of the design solution	Prototype of chosen design solution - high quality - fully working - different materials)	

Drawings (15 marks)
In this section you will demonstrate your ability to develop illustrated design ideas that conform to sector-specific conventions, use CAD effectively and clearly annotate your drawings.

Checklist

Description	Evidence in your course work (This is only a guide of what you could include)	✓
Idea - A development and explanation of a detailed, annotated design.	**Develop and explain your chosen idea** Make sure that you **fully annotate your ideas.** Your annotations could include the following information: technical information, developments made, materials used, how it works, how it solves the problem, sizes, components, key features, processes to manufacture.	
Presentation of ideas Drawings that comply with sector-specific standards and conventions	**Select the most appropriate way to present your work.** • orthographic (including sectional views) – could be produced on fusion. • isometric • assembly • schematics	
CAD Detailed CAD drawings for presentation.	CAD model of final idea for presentation (you can create the flowing on Fusion) • Rendered drawing • Parts •Wire frame	

Production Plan (15 marks)
In this section you will demonstrate your ability to produce and follow a production plan, be able to explain the stages of production, consider repeatability and use of CNC, explain the quality control measures taken and show consideration of health and safety. **If someone picked up your production plan they should be able to make your product without any further guidance.**

Checklist

Description	Evidence in your course work (This is only a guide of what you could include)	✓
Production Plan A detailed production plan	**Produce a plan of production** (how you will make your final product) Consider – Timescales, materials , specifics at each stage, machines and tools you are using, processes, quality checks, heath and safety (cross them off if you have included these in your plan)	
	Stages An explanation of each of the stages of production including timings. List the stages of manufacturing your product. What is involved during each stage of making your product. Think about the order of these stages.	
	Processes including CNC/Repeatability Have you included what aspect could be produced using CNC? Have you created templates or Jigs?	
	Quality Control Consider how will you ensure quality control at each stage of the making process. Checks that could be made or testing parts to ensure a high quality piece is being made.	
	Health and Safety - What health and safety equipment do you need - How do you use the machine the equipment needed and for what machine/process/stage	

Engineering Skills Used (15 marks)
In this section you will demonstrate your ability to use safely a range of materials and equipment and explain your choices, consider quality control and work to tolerances.

Checklist

Description	Evidence in your course work (This is only a guide of what you could include)	✓
Practical Evidence The selection and safe uses of appropriate materials, parts, components, tools and equipment required to make your product.	Take images of your practical work and of you making your product. Demonstrate a **wide range** of skills. • Parts • Components • Tools • Equipment • Materials *** Your final product will also be evidence of all the above and the level of skill you have shown.**	
Explanation The processes used and alternatives.	Explanation of what you have done and why (annotate your photographs) Justify why you have selected a tool/material/process. Explanation of alternative ways to make your product and why.	
Evidence of Quality control measures taken.	Photographic evidence with an explanation of what you are doing to ensure high quality work. • Accuracy/tolerances • Safety factors • Jigs, templates, quality checks.	

Applying Systems Technology (10 marks)
In this section you will demonstrate your ability to identify and explain the systems you have used and produce block diagrams to represent them. You should provide (as appropriate): representations of technological systems used in your product in diagrammatic form and/or block diagrams with explanations of the systems operating within your product.

Checklist

Description	Evidence in your course work (This is only a guide of what you could include)	
Identify and explain two or more of the systems and technology used in your product that control/organise the function of your product.	Explain how the system/s work in your product, this could include: - How the technology you have used controls your product. - How the system you have used organsises the function of your product. - What the input, process and output of your product is. - How many systems you have and the individual functions of each one.	
Block diagrams/Diagrammatic form Explanations of the systems operating within your product using block diagrams.	Create block diagrams representing your system/s. - Input - Process - Output - linear block diagram - Sub systems - feedback -Multiple systems - Description of each block or operation in your diagram - Explanation of feedback.	

Testing and Evaluating (10 marks)
In this section you should demonstrate your ability to undertake testing of your product and evaluate its effectiveness. You will also be expected to provide an honest evaluation of the product and make recommendations for improvements. **Remember an evaluation is 'how well does the solution work and how could it be better?'.**

Checklist

Description	Evidence in your course work (This is only a guide of what you could include)	
Testing Evidence of a range of appropriate testing methods for your product	- How quality checks have been carried out throughout the making of your product. - How your work is within the tolerances you had identified in your plan. - Show you have tested all aspects of your product using appropriate and different testing methods for different aspects of your design. - Evidence of different testing methods, what they are for and why. - Explaining what you have found out from your testing. Use your diary.	
Analysis and evaluation of the completed product, with further explanation as to how and why it could be improved	- Asses how well the solution meets the requirements of the problem &user. -Evaluate the whole process including research, design and manufacturing - Well reasoned suggestions to what could be improved if the problem were to be revisited. What could you have done better? - Explain why you would improve aspects of your design. - What alternative systems/materials/processes could you have used. Revisit to production plan and design. - Were there any gaps in your research or design that you would need to look at? - Did you meet all your specification points and user requirements?	