

What makes a good GCSE Electronics project?

The obvious answer is 'one that gives you a sense of achievement and high marks!' The AQA GCSE Electronics syllabus (3541) is focused towards you gaining a thorough basic knowledge of electronics. This enables you to apply your knowledge to practical electronic systems and also provides a sound base for further study.

Best projects

The best projects are nearly always those that have been chosen by the pupils themselves. However most will have limited experience of what is feasible and so the guidance of the teacher at the onset of the project is vital. Pupils should not be over ambitious. A basic project that functions will gain higher marks than one that is too complex and fails to work. As a rough guide a project should have at least three active devices (transistors or integrated circuits) and less than twenty passive components.

Design work should be well structured, easy to follow, clearly laid out in a logical sequence under headings that reflect a design process. Design folder work needs to be focused and succinct, containing no 'padding'.

Electronic products is about designing and making through Electronics, so a greater emphasis should be placed on the electronics content of a design folder than on that of resistant materials. It should be immediately apparent when viewing the design work of candidates, which ones have followed an Electronic Products course and which ones have studied Resistant Materials.

The content of a typical Electronic Products design folder may be as follows:

Description of the problem

Designing begins with the identification of a viable problem, which has been recognised as a potential project. A design brief is written based on the identified problem, which is a statement of intent and will often begin 'I am going to design and make an electronic product which will'

Research

With the title and aim for the project approved by the teacher you need to carry out some research. This is a collection of relevant information taken from a range of sources which may include reference books, manufacturers' data sheets, component catalogues, use of systems kits and prototyping boards, computer modelling etc. It is essential that research is relevant to the problem in hand and that it is not general information on electronics. The Internet and powerful databases such as Encarta should be used as research tools, in a focused and selective way and not as a source of general information. Consider an egg-timer which sounds an alarm when the egg has cooked. Research is needed to find out how long an egg takes to cook and then how loud should the alarm be. Useless padding will gain no credit.

Analysis

This seeks to break down the problem into a series of smaller problems or sub-systems. The use of the 'systems approach' to identify appropriate building blocks, as most projects will consist of one or more input devices, some sort of processing device, an output device and a power supply.

Specification

A detailed electronic specification is essential to any project and should be the basis for evaluations of the product, both formative and summative. The specification should reflect the research and analysis and should contain quantitative information.

Generation of ideas

Once the electronic parameters have been specified, you can generate a couple of possible solutions. You are expected to use books, magazines, data sheets, catalogues etc, to find circuits that can be adapted to their specific purpose. There is no expectation that you will produce original electronic design ideas, but you should be able to use building blocks creatively, or to modify existing circuits to meet their needs. There is an expectation however that pupils will produce a range of alternative ideas to solve the problem in hand and will have an understanding of how each alternative functions. **A single** 'found circuit' will elicit low marks here.

Development of final solution

You should show evidence of why you chose a particular circuit for development and say why they rejected others. You should produce an accurate final circuit diagram which meets your specification and which uses correct circuit symbols as laid out in British Standards documentation. You should design a circuit layout from the circuit diagram which is suitable for the specified construction style and whichever method is used, there should be some development to show how the layout of tracks and components has been arrived at.

Evaluation and testing

With the whole system now working it can be evaluated against the initial specification. This should contain evidence of matching the performance of your design against the points of specification, and making recommendations for further development. Third party evaluation offers an objective look at the product. The evaluation must include some form of clear photographic evidence of the work carried out. A digital photo of the circuit board.

Industrial practices and the use of IT

When presenting information on industrial practices, it should be focused on your project and should not be general. Describing how your project could be manufactured in batch production would be appropriate.

The use of IT in Electronic Products should be encouraged and could, if possible, extend beyond word processing and imported clip art to the use of specialist software whose use would be appropriate at the research, initial design and development stages of the design process.

Product realisation

Subsequent consideration of the specification will enable the candidate to decide which solution to implement. Full circuit diagrams can then be drawn and components selected from catalogues. There will almost certainly be at least one component for which you can calculate the value (e.g. the series resistor for an LED).

Together with the design folder, you must endeavour to present a complete, well-made and well-finished electronic product, which works.

Producing successful coursework for electronic products is a demanding and challenging task which needs to be approached logically and thoughtfully. Electronic product outcomes can be very rewarding and when presented as described above, are likely to be successful too.