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# **GCSE EXAMINERS' REPORTS**

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**ELECTRONICS  
GCSE**

**SUMMER 2023**

## Introduction

Our Principal Examiners' reports offer valuable feedback on the recent assessment series. They are written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and detail how candidates have performed.

This report offers an overall summary of candidates' performance, including the assessment objectives/skills/topics/themes being tested, and highlights the characteristics of successful performance and where performance could be improved. It goes on to look in detail at each question/section of each component, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.<sup>i</sup>

The information found in this report can provide invaluable insight for practitioners to support their teaching and learning activity. We would also encourage practitioners to share this document – in its entirety or in part – with their learners to help with exam preparation, to understand how to avoid pitfalls and to add to their revision toolbox.

## Further support

Document	Description	Link
Professional Learning / CPD	Eduqas offers an extensive annual programme of online and face-to-face Professional Learning events. Access interactive feedback, review example candidate responses, gain practical ideas for the classroom and put questions to our dedicated team by registering for one of our events here.	<a href="https://www.eduqas.co.uk/home/professional-learning/">https://www.eduqas.co.uk/home/professional-learning/</a>
Past papers	Access the bank of past papers for this qualification, including the most recent assessments. Please note that we do not make past papers available on the public website until 6 months after the examination.	<a href="http://www.wjecservices.co.uk">www.wjecservices.co.uk</a> or on the Eduqas subject page
Grade boundary information	<p>Grade boundaries are the minimum number of marks needed to achieve each grade.</p> <p>For unitised specifications grade boundaries are expressed on a Uniform Mark Scale (UMS). UMS grade boundaries remain the same every year as the range of UMS mark percentages allocated to a particular grade does not change. UMS grade boundaries are published at overall subject and unit level.</p> <p>For linear specifications, a single grade is awarded for the overall subject, rather than for each component that contributes towards the overall grade. Grade boundaries are published on results day.</p>	<p>For unitised specifications click here:</p> <p><a href="https://www.eduqas.co.uk/Results-and-Grade-Boundaries">Results and Grade Boundaries (eduqas.co.uk)</a></p>

Exam Results Analysis	WJEC provides information to examination centres via the WJEC secure website. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.	<a href="http://www.wjecservices.co.uk">www.wjecservices.co.uk</a>
Classroom Resources	Access our extensive range of FREE classroom resources, including blended learning materials, exam walk-throughs and knowledge organisers to support teaching and learning.	<a href="https://resources.eduqas.co.uk/">https://resources.eduqas.co.uk/</a>
Bank of Professional Learning materials	Access our bank of Professional Learning materials from previous events from our secure website and additional pre-recorded materials available in the public domain.	<a href="http://www.wjecservices.co.uk">www.wjecservices.co.uk</a> or on the Eduqas subject page.
Become an examiner with WJEC / Eduqas.	We are always looking to recruit new examiners or moderators. These opportunities can provide you with invaluable insight into the assessment process, enhance your skill set, increase your understanding of your subject and inform your teaching.	<a href="#">Exam Marking jobs   Examiner &amp; Moderator Vacancies From Eduqas</a>

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## Subject Officer's Executive Summary

The component 1 examination paper, component 2 examination paper and component 3 NEA assessment overall performance was in line with previous years, with similar mean marks to the 2019 series. The standard deviation of marks for all three components was very similar to the 2019 series.

Component 1 and component 2 examination papers' overall facility factors showed similar difficulty to previous series.

The NEA reports were again presented to a high standard by most candidates with many complex systems being realised with final physical circuits produced on breadboard or PCB.

Areas for improvement	Classroom resources	Brief description of resource
Plotting of data and drawing of graphs using a pencil.	Electronics eBook resources	Chapters cover the content of the specification with worked examples, exercises and practical investigations for each topic.
Recognition of electronic sub-system.	Electronics eBook resources  Knowledge organisers	Component 1, Chapter 1 covers recognition and design of systems from sub-system blocks with worked examples, exercises and practical investigations for each topic.  A good revision starting point.
Quality of response (QER) question approach.	Electronics eBook resources  Past papers and mark schemes	Chapters cover the content of the specification with worked examples, exercises and practical investigations for each topic.  Past papers and mark schemes contain many examples of QER questions and model answers.
NEA – The specification should give details of the individually chosen problem which is drawn from the analysis of research into the problem.	Electronics as specification  2019 and 2020 CPD material	Overview of the NEA and marking criteria.  2019 and 2020 CPD material on the secure website contains commentary from previous series and examples of work.

<p>NEA – The report process should be taught throughout the course of study.</p>	<p>Electronics as specification</p> <p>2019 and 2020 CPD material</p>	<p>Overview of the NEA and marking criteria.</p> <p>2019 and 2020 CPD material on the secure website contains commentary from previous series and examples of work.</p>
<p>NEA – Sub-system test results obtained from circuit simulations are only valid if real components such as LM741 or BC548 are chosen rather than the generic IC1 and Q1.</p>	<p>2019 and 2020 CPD material</p>	<p>2019 and 2020 CPD material on the secure website contains commentary from previous series and examples of work.</p>

# ELECTRONICS

## GCSE

Summer 2023

### COMPONENT 1: PRINCIPLES OF ELECTRONICS

#### Overview of the Component

This component is aimed at testing the fundamental concepts of electronics and is broken down into small parts to test multiple factors of a candidate's understanding of the essential knowledge needed to make progress in the subject.

The overall performance of the paper was good with an overall mean mark of 49.1%, which is comparable to the mean from previous years. A full range of marks from 0 to 80 was observed across all candidates.

In general candidates attempted the majority of questions with the largest omission being the QER question which tested the ability of candidates to analyse and evaluate a circuit design and communicate their understanding in an extended response.

The quality of presentation in candidates' answers appeared weaker compared to previous years, for example, diagrams drawn in ink instead of pencil, use of a ruler was sparse and when it was used candidates were unable to follow graph paper grids accurately.

#### Comments on individual questions/sections

- Q.1 No specific areas to highlight.
- Q.2 Most candidates were able to construct a working block diagram to meet most of the specification, although some did not know the function of the given sub-system blocks.
- Q.3 Circuit rules for voltage and current were not well understood by many candidates.
- Q.4 Most candidates understood the basic operation of the Zener diode to produce a regulated voltage, but some were unable to apply basic rules for the circuit.
- Q.5 Several candidates found it hard to plot data accurately onto a graph and use the resulting graph to find additional values to determine the status of a sensing system.
- Q.6 Most candidates understood Boolean Algebra, but some were unable to complete a truth table from a basic logic circuit. A number of candidates did not know the NAND equivalent circuits for standard logic gates making identification of double inversions impossible.
- Q.7 With this QER question, some candidates showed good understanding of the transistor switch sub-system and the ability to perform the appropriate calculations related to the design to verify its functionality. Too many candidates focused on the diode rather than the transistor in this question.

Q.8 No specific areas to highlight.

Q.9 The operation of the MOSFET and its associated calculations were well understood by many candidates. However, some candidates found this question very difficult.

# ELECTRONICS

## GCSE

Summer 2023

### COMPONENT 2: APPLICATION OF ELECTRONICS

#### Overview of the Component

This component is aimed at testing the application of electronics in systems and requires candidates to apply the knowledge gained about basic building blocks and apply this to the function of larger systems.

The overall performance of the paper was good with an overall mean mark of 38.4%, which is comparable to the mean from previous years. A full range of marks from 0 to 80 was observed across all candidates.

In general candidates attempted the majority of questions and as with Component 1, the largest omission was the QER question which tested the ability of candidates to analyse and evaluate a circuit design and communicate their understanding in an extended response.

The quality of presentation in candidates' answers appeared weaker compared to previous years. For example, in question 7 a large number of graphs were needed that required accuracy in order to obtain the correct answer. However, these were often drawn freehand in ink without a ruler resulting in many inaccurate and crossed out solutions.

#### Comments on individual questions/sections

- Q.1 For flow charts all links should enter the main program rather than another command or go to an End/Stop command as appropriate.
- Q.2 Many candidates knew the function of a monostable timer and were able to draw its output graph. Candidates found determination of time from an oscilloscope trace more challenging. There were two issues, accurately reading the decimal part of their answers and a failure to take note of the units ms/cm when determining the actual time period. This made it difficult for candidates to obtain the correct frequency.
- Q.3 The inverting amplifier circuit was recognised by many candidates, and they were also able to read the scale correctly on the graph to determine the amplitude of the input signal. Candidates' drawing skills varied significantly when drawing the output signal, the lack of a pencil resulted in many ink drawings with significant crossing out.
- Q.4 Candidates need to be aware that bandwidth is defined as  $\frac{1}{\sqrt{2}}$  or 70% of maximum gain not 75%.
- Q.5 Many candidates were not familiar with the frequency division feature of a 2-bit counter. A number of candidates could not complete the design of a latch using a D-type flip-flop.

- Q.6 A few candidates were unable to transfer the lighting sequence to the truth table, and therefore could not determine the correct Boolean expressions. Many candidates were able to correctly identify the layout of a 555 astable correctly and determine the current limiting resistor correctly. However, errors often occurred when the incorrect voltage/current were selected, and a significant number failed to select a preferred resistor value having determined the ideal value.
- Q.7 As mentioned previously, the candidates' ability to carefully construct timing graphs severely restricted success in this question. Some candidates did not seem to understand the operation of a decade counter.
- Q.8 Some candidates encountered problems when dealing with the summing amplifier formula, through basic numeracy errors.
- Q.9 With this QER question, many candidates showed a good understanding of the multipliers 'k' and ' $\mu$ ' when performing calculations. However, very few candidates realised that the motion sensor output needed to be inverted to enable the system to work as described.

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### **COMPONENT 3: EXTENDED SYSTEM DESIGN AND REALISATION TASK – NEA**

#### **Overview of the component**

The NEA is an integral part of the WJEC Eduqas GCSE in Electronics. This component requires each learner to produce a single extended system design and realisation task independently. It builds on the systems developed throughout the specification and the requirement to relate practical circuit design and construction to knowledge and understanding within Components 1 and 2.

Centres are to be praised for their effort in presenting candidates' work for moderation and for recording the marks online.

#### **Tasks**

**Comments on tasks/questions relating to candidate performance/meeting assessment criteria**

#### **System Planning**

The candidates of most centres produced a very good range of projects. However, in some centres all candidates' work seems to have focused on a common theme. Candidates should focus on an individually identified problem to analyse to enable them to write a design specification. This should result in a wide range of tasks within those centres and give candidates greater sense of ownership of their work.

#### **System Development**

The candidates of many centres this year showed a high standard of rigorous sub-system testing. These centres set up their sub-systems on breadboard and showed excellent photographic evidence of the test instruments in use. The results were then analysed logically.

Some reports, however, tended to be observational with limited account of the testing that took place. For each sub-system a test reading should be provided with the output activated and non-activated.

Awarding accurate marks is critical to ensure that candidates receive fair and consistent reward for the work produced. Banded mark descriptors help to determine the correct band where a candidate's work fits. However, some centres awarded top marks for development when there were less than five different sub-systems developed.

Centres that choose to carry out tests on circuit simulations should note that results are only valid if real components such as LM741 or BC548 are used rather than the generic IC1 and Q1.

When using a flowchart program, simulation tests should be carried out for the sub-routines and/or main program, including screenshots of the results.

The final circuit should be one complete system where there is signal transfer between each sub-system, rather than between two independent systems.

## **System Realisation**

Centres had to build actual physical circuits again this year. Centres generally either produced their circuits on breadboard or PCB. If centres produce the final circuit on PCB, then a layout showing the candidate's modifications to any software generated layout should be included. For both breadboard and PCB circuits clear photographs of the final physical circuit must be included.

To gain the full range of marks for system realisation candidates must have very well organised physical circuit layout (rather than a circuit diagram) with wires and components arranged vertically/horizontally to a high standard.

As was the case with sub-system testing, many centres this year showed a high standard of final circuit testing using appropriate test equipment. Many included in depth analysis and comparison of their numerical results with their quantitative specifications. Some of the testing however, tended to be observational with limited use of test equipment. The recording of test results tended to lack detail and the analysis of the results was superficial.

## **Evaluation**

Good practice evaluations made valid critical and objective evaluation of performance against their numerical specifications. The evaluations compared the system against the design specification and made suggestions for improvements.

Some centres over awarded marks in this category because the original specification did not have realistic measurable parameters. This resulted in simplistic evaluations.

## **Task marking**

### **Comments on approaches to internal marking**

The assessment of the work was within tolerance for most centres but in some centres adjustments to marks were required.

Some centres provided candidates with a prescriptive template. This should be avoided where possible as this guidance can limit the mark awarded to the candidate.

Most centres provided detailed annotation of candidates' work. The annotation on the scripts and/or mark scheme greatly aided the moderation process.

Centres that did not provide annotation this year could consider providing an indication on the mark scheme of which level descriptors were or were not achieved. This would be very helpful in justifying marks awarded by the centre during the moderation process.

## Supporting you

### Useful contacts and links

Our friendly subject team are on hand to support you between 8.30am and 5.30pm, Monday to Friday.

Tel: 029 2240 4254

Email: [electronics@eduqas.co.uk](mailto:electronics@eduqas.co.uk)

Qualification webpage: <https://www.eduqas.co.uk/qualifications/electronics-gcse/>

See other useful contacts here: [Useful Contacts | Eduqas](#)

### CPD Training / Professional Learning

Access our popular, free online CPD/PL courses to receive exam feedback and put questions to our subject team, and attend one of our face-to-face events, focused on enhancing teaching and learning, providing practical classroom ideas and developing understanding of marking and assessment.

Please find details for all our courses here: <https://www.eduqas.co.uk/home/professional-learning/>

### Regional Rep Team

Our regional team covers all areas of England and can provide face-to-face and online advice at a time which is convenient to you.

Get in contact today and discover how our team can support you and your students.

[Regional Support Team | Eduqas](#)

### Eduqas Qualifications

We are one of the largest providers of qualifications for schools, academies, sixth form and further education colleges across England, offering valued qualifications to suit a range of abilities. Each and every one of our qualifications is carefully designed to engage students and to equip them for the next stage of their lives.

We support our education communities by providing trusted qualifications and specialist support, to allow our students the opportunity to reach their full potential.



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<sup>i</sup> ***Please note that 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.***