

SQA Advanced Graded Unit specification

General information for centres

This Graded Unit has been validated as part of the SQA Advanced Certificate and SQA Advanced Diploma in Electronics. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Graded Unit title: Electronics: Graded Unit 1

Graded Unit code: HT15 47

Type of Graded Unit: Examination

Assessment Instrument: Closed-book examination

Credit value: 1 SQA Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from National 1 to Doctorates.*

Purpose: This Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the SQA Advanced Certificate and SQA Advanced Diploma in Electronics.

- ◆ Develop knowledge, understanding and skills in a range of core electrical, analogue electronics and digital electronics principles and technologies at SQA Advanced level (these studies in core electronic and electrical principles are underpinned by a mandatory Unit in Mathematics).
- ◆ Develop candidates' ability to apply analysis and synthesis skills to the solution of electronic problems.
- ◆ Develop learning and transferable skills (including Core Skills).
- ◆ Develop a range of Communication knowledge and skills relevant to the needs of electronic incorporated engineers.

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Recommended prior knowledge and skills: It is recommended that the candidate should have completed or be in the process of completing the following Units relating to these specific aims prior to undertaking this Graded Unit:

- ◆ *Analogue Electronic Principles* (HP47 47)
- ◆ *Combinational Logic* (HP3G 47)
- ◆ *Sequential Logic* (HP3Y 47)
- ◆ *DC and AC Principles* (HP46 47)
- ◆ *Engineering Mathematics 1* (HP48 46)
- ◆ *Communication: Practical Skills* (HP4A 47)

Core Skills: There are no Core Skills embedded in this Graded Unit specification.

Assessment: This examination-based Graded Unit is Electronics: Graded Unit 1. It will consist of a written examination of three hours.

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Administrative Information

Graded Unit code: HT15 47
Graded Unit title: Electronics: Graded Unit 1
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History of changes:

Version	Description of change	Date

Source: SQA

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our Centre Feedback Form.

Unit specification: instructions for designing the assessment task and assessing candidates

Graded Unit title: Electronics: Graded Unit 1

Conditions of assessment

The assessment is based on an examination paper consisting of six, 25 mark questions with candidates being allowed to answer any four out of the six questions. The written examination paper should last three hours.

The examination should be conducted under closed-book conditions.

The grade given will reflect the candidate's achievement on the first assessment event. A candidate may wish to retake the Graded Unit but this should be based on a significantly different examination.

The examination should be unseen and the assessment should be conducted in controlled and invigilated conditions.

Instructions for designing the assessment task:

The examination should be designed to assess the candidate's critical knowledge and understanding of the topics relating to the specific aims which this Graded Unit is designed to cover. The questions and corresponding marks should be designed in accordance with the ranges indicated in the table that follows. However, the overall total mark for the examination is 100.

Topic	Level of knowledge/ understanding	Weighting/ Mark Allocation
Analogue Electronic Principles	Describe applications of semiconductor diodes Describe transistor applications Describe linear operational amplifier applications	30%

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Topic	Level of knowledge/ understanding	Weighting/ Mark Allocation
Combinational Logic	Draw truth tables for common logic gates and derive combinational logic expressions in various forms Interpret TTL and CMOS data sheets and be able to use these devices in digital systems	30%
Sequential Logic	Describe the operation of sequential logic devices	
Single Phase AC Circuits	Solve single phase ac circuit problems using complex notation	20%
Mathematics for Engineering 1: Electronics and Electrical	Apply algebraic techniques to manipulate expressions and solve equations commonly found in engineering Carry out operations involving complex numbers Analyse trigonometric functions and their graphs	10%
Communication: Practical Skills	Respond to written information on a complex vocational issue Produce written information in a prescribed format on a complex vocational issue	10%

The structure of each question should normally conform to the following marking structure:

Knowledge and understanding	5 marks
Applications	10 marks
Analysis and synthesis	10 marks

The structure of the paper should follow the following format:

- ◆ two questions majoring on Analogue Electronics
- ◆ two questions majoring on Digital Electronics
- ◆ two questions majoring on Electrical Principles

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The examination will be marked out of 100. Assessors will aggregate the marks achieved by the candidate to arrive at an overall mark for the examination. Assessors will then assign a grade to the candidate for this Graded Unit based on the following grade boundaries:

- ◆ A = 70% – 100%
- ◆ B = 60% – 69%
- ◆ C = 50% – 59%

Guidance to centres

Centres are encouraged to study this Electronics: Graded Unit 1 specification and any associated specimen paper carefully before embarking on the writing of any SQA Advanced Certificate in Electronics Examination paper.

The main purpose of the Electronics: Graded Unit 1 specification is to assess candidates' abilities to solve problems which involve the integration of some knowledge and skills from the three main Electronics areas of Analogue Electronics, Digital Electronics and Electrical Principles. In addition, limited opportunities are also provided to assess some Communication and Mathematical skills, although any such assessment of these skills should be set within the context of Electronics.

Integration involves an ability to apply knowledge, understanding and skills. This does not mean that the Electronics: Graded Unit 1 Examination should not involve some recall of knowledge only that this should be limited to avoid duplication with what is being assessed in individual Units.

Experience shows that candidates often have great difficulty in transferring knowledge, understanding and skills from one subject area to solve problems in another area of study. Candidates tend to compartmentalise knowledge, understanding and skills into subject areas with considerable reluctance to transfer across subject boundaries. Yet, in the Electronics industry, an ability to apply knowledge, understanding and skills from different subject areas to solve complex electronics problems is a vital skill. The Electronics: Graded Unit 1 provides opportunities to develop these critical transferability and problem solving skills. The Unit, as well as consisting of a 3-hour Examination, includes a notional study time of 37 hours to allow candidates to practice problem solving. Centres should use a range of formative assessments to support such skills development.

Centres are also strongly recommended not to limit opportunities for the transferability of knowledge, understanding and skills within Electronics to the Electronics: Graded Unit 1 only but to seek opportunities for the consolidation of these critical skills throughout the whole SQA Advanced Certificate and SQA Advanced Diploma in Electronics.

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.