

**TECHNOLOGICAL STUDIES
STANDARD GRADE**

Guidance on Assessment

Application of Technology Assignment

November 2005

**National Qualifications
Standard Grade Technological Studies
Application of Technology Assessment Guidance
(Credit and General Levels in and after 2004)**

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Section 1 Introduction

Technological Studies is an exciting and interesting subject, which allows a candidates' natural curiosity to be stimulated, directed and taken forward. Technological Studies aims to provide candidates with an opportunity to appreciate and experience modern technology at first hand and to develop informed attitudes to society's use of technology.

The Application of Technology (AT) element has been included in the Standard Grade course to facilitate the application of knowledge, understanding and skills in a purposeful way, to solve problems in a technological environment. The term 'Application of Technology' refers to the ability to use learned material in new and realistic technological situations. This includes the application of such things as laws and theories, rules, methods, and concepts and principles in order to solve technological problems. The Application of Technology assignment contributes to this by allowing candidates to apply the problem solving process to resolve a given technological challenge.

SQA will issue an assessment bank of Application of Technology assignments, covering the topic areas of *Applied Electronics* and *Programmable Control*. However, for the purposes of the external assessment, grading of the Application of Technology element will be based on candidate performance in only **one** summative Application of Technology assignment. That is, either an 'Applied Electronics' or 'Programmable Control' AT Assignment should be used to grade the Application of Technology element. AT Assignments are to be internally marked and are subject to external moderation.

Candidates should be prepared for undertaking the Application of Technology assignment by in the first case experiencing teacher-led and directed examples of the application of technology. The Specimen Application of Technology assignments have been provided to facilitate this process and also provide an opportunity for candidates to familiarise themselves with the structure, parameters and assessment requirements of the Application of Technology assignments. Application of Technology assignments in the assessment bank can also be used for learning and teaching purposes. However, the assignment used for the final grading of the Application of Technology element must have remained entirely confidential within the Centre.

Application of Technology assignments have been specifically designed to facilitate achievement and not to unduly penalise a candidate who has performed badly in a sub-element. With the exception of AT3, teacher assistance may be provided but only after a sub-element has been completed, submitted and marked. Teacher assistance is in effect retrospective and is set in the context of allowing a candidate to progress onto the next sub-element and thereby having access to the full range of marks available for that sub-element. (See 3.1 – Managing the Assignment)

The Application of Technology assignment is internally assessed and will be subject to external moderation by SQA. The assignment should take no longer than 5 hours to complete but can be conducted at any time during the course. However, the grade for the assignment must be submitted to SQA by 31 March in the year a candidate is presented for the external assessment.

This document must be read in conjunction with the *National Qualifications Revised Standard Grade Arrangements in Technological Studies: General and Credit Levels in and after 2003 (SQA, May 2001)*.

Section 2 Conditions for Assessment of the Application of Technology

2.1 General

The Application of Technology element is internally assessed and will be subject to external moderation. Candidate performance is directly assessed against the criteria given in Section 4 of this document and in accordance with the Extended Grade Related Criteria (EGRC) of *National Qualifications Revised Standard Grade Arrangements in Technological Studies: General and Credit Levels in and after 2003* (SQA, May 2001).

2.2 Elements and Grades

There are seven assessable sub-elements in the Application of Technology (AT) assignment. Each AT sub-element is marked individually in accordance with candidate performance and as per the Assessment Criteria given in Section 4. There are a maximum of 4 marks available for each sub-element. Sub-element marks are entered on the back page of the *EX5 Flyleaf: Assessment Record* together with teacher commentaries.

The overall grade for the Application of Technology is determined by totalling the candidate's marks for each of the sub-elements. The total mark is then compared with the marks range in the table below and the corresponding grade awarded.

Marks Range	Grade
23 - 28	1
17 - 22	2
11 - 16	3
5 - 10	4
0 - 4	5

Note: A candidate who *does not* attempt *any* of the Application of Technology sub-elements, will be deemed not to have completed the course in respect of the element. Such a candidate will not receive a grade for this element and will therefore not receive an overall award for the subject.

2.3 Application of Technology Assessment Bank

SQA will issue and maintain a bank of Application of Technology problem assignments covering 'Applied Electronics' and 'Programmable Control' topic areas. Each assignment pack will consist of a problem statement and associated series of assignment sheets for each of the seven assessment activities.

- AT1** Create appropriate system diagrams to analyse a given problem.
- AT2** Produce a specification from a given brief.
- AT3** Generate a possible solution to a given problem.
- AT4** Select and justify the use of appropriate components to meet the specification.
- AT5** Use computer simulation software.
- AT6** Develop/build and test a solution.
- AT7** Evaluate the solution.

An Application of Technology assignment should take no longer than 5 hours to complete.

2.4 Selecting an Application of Technology assignment for external grading

For the purposes of the external assessment, grading of the Application of Technology element will be based on candidate performance in only **one** AT assignment ie either an ‘Applied Electronics’ or a ‘Programmable Control’ AT Assignment.

In selecting an assignment for grading the Application of Technology element, centres may:

- select a single assignment to assess a whole class
- select different assignments to assess various candidates in a class
- allow candidates to select their own topic for assessment (ie either Applied Electronics or Programmable Control), and issue an assignment accordingly.

2.5 Conducting the Application of Technology Assignment

Application of Technology assignments in the assessment bank can be used for learning and teaching purposes. However, the assignment or assignments used in a centre for the final assessment of the Application of Technology element must have remained entirely confidential and must not have been previously seen by candidates in any way.

Centres must ensure that the Application of Technology assignment on which a candidate’s element grade is based is:

- conducted under appropriate assessment conditions. It should be noted that Knowledge and Understanding is **not** directly assessed in the AT element. Therefore, candidates may use reference materials such as data sheets as required.
- entirely the candidate’s own work – with the exception of AT3, teacher assistance may only be provided retrospectively (see Section 3.1 – Managing the Assignment)
- carried out by an individual candidate (no team or group work is permitted)
- only **one** complete Application of Technology Assignment (ie sub-element grades from different assignments cannot be mixed)
- an assignment the candidate has **not** seen or used in any previous class work, assessment preparation or other teaching or learning activities.

The timing of grading for the Application of Technology element is at the discretion of the presenting centre. However, the overall grade for the assignment must be submitted to SQA by **31 March** in the year a candidate is presented for the external assessment.

Section 3 Guidance on Assessment

3.1 Managing the Assignment

The Application of Technology assignments have been designed to stimulate candidates and promote the application of the problem solving process to a given technological problem. Candidates must analyse a situation, construct and test a solution, and then evaluate it.

Candidates should be prepared for these tasks, initially, by experiencing a teacher-led example of the Application of Technology. The specimen or assessment bank assignments are ideal for this purpose and should be used to familiarise candidates with the structure and assessment parameters of the AT assignments as laid down by SQA. Candidates should only be allowed to attempt the summative assignment after being adequately prepared, ideally having undertaken at least the specimen assignments. It is therefore crucial that candidates are familiar with the structure, conduct and assessment requirements of each sub-element of the AT assignment.

It is important that teachers manage the assignments effectively and are able to intervene where necessary to allow a candidate to progress through the sub-elements. However, AT3 is the only sub-element that allows teacher prompts to be given *during* the summative assessment. The assessment criteria for AT3 takes account and allows for this input. In all other sub-elements, assistance may only be given to allow a candidate to move on to the next sub-element. For example, if a candidate is having severe difficulties in generating a specification for the problem, then teacher assistance may be given, but this must obviously be reflected in the marks awarded for that sub-element. It is also important to note that this will not affect the marks allocated in any *subsequent* sub-element. In providing teacher assistance, the candidate should be able to progress to the next sub-element and have access to the full range of marks available ie candidate progression and achievement must not be impeded by poor performance in previous sub-elements.

It should be noted that there are **no marks available** for model-building. Accordingly, it is strongly advised that centres provide pre-built models and have them available for candidates undertaking AT assignments.

3.2 Classroom management

The management of the AT assignments is considered a critical feature of the course and it is expected that each centre will make appropriate arrangements according to their available resources, circumstances and candidate cohort.

In order to facilitate the classroom management, the sub-elements of the Application of Technology assignment will be produced on separate pages. This will allow teachers to issue each sub-element when required and in the appropriate sequence. It also serves to maintain confidentiality.

All centres will be able to accommodate sub-elements AT1, AT2, AT3, AT4 and AT7 naturally in the classroom environment. For AT5 and AT6, the management of these sub-elements will be dependent on local resources. For example, it may be necessary to schedule candidate time on computers at a time when other candidates are working through AT3 and AT4. A centre may conduct an Application of Technology assignment with some candidates whilst others are continuing with coursework, however, the same rules of confidentiality apply.

It should be noted that there is a significant degree of flexibility and responsibility for each centre in conducting the Application of Technology assignments. The assignments are an intrinsic part of a problem solving course and each centre should make best use of the available resources in managing and taking full advantage of this aspect of the course.

3.3 Specific Guidance on the Sub-elements

AT1: Success in this sub-element depends on the proper and appropriate use of systems diagrams. It is therefore essential that candidates are fully familiar with their use.

AT2: Candidates will be expected to do more in this sub-element than simply re-write the problem. They should identify new and/or refine existing criteria as appropriate.

AT3: It is essential that teachers present information on how much assistance has been given in this area. This is needed for the allocation of marks.

AT4: The justification of components should be on comparative and/or technical terms. To simply say that “I chose a bulb because I needed light” is not sufficient. There should be some reference to technical specifications for the components.

AT5: Adjustment of range parameters prior to simulation is important.

AT6: Ensure that test evidence is present.

AT7: The best way to score well in this sub-element is to evaluate against the specification and criteria in a well ordered manner.

Section 4 Application of Technology Assignment: Assessment Criteria

Each Application of Technology (AT) assignment pack will consist of a problem statement and an associated series of assignment sheets for each of the seven sub-elements. For course assessment and marking purposes, an Application of Technology assignment should take no longer than 5 hours to complete.

Each AT sub-element is marked individually in accordance with candidate performance as described below.

AT1: Create appropriate system diagrams to analyse a given problem.

Assessment Criteria – For the given problem the candidate will have:	Marks
been unable to complete an appropriate system diagram.	0
completed a system diagram and identified the inputs, processes and outputs.	1
completed an appropriate system diagram and identified the inputs, outputs and sub-systems.	2
completed an appropriate system diagram and identified the inputs, outputs and sub-systems, and the links between them.	3
analysed the problem and created a system diagram, identifying the inputs, outputs, sub-systems, system boundaries, error detection, and feedback loops, where appropriate.	4

AT2: Produce a specification from a given brief.

Assessment Criteria – For the given problem the candidate will have:	Marks
been unable to complete a specification.	0
produced a general specification for the system.	1
produced a specification containing at least 2 measurable criteria.	2
produced a specification that identifies most of the system requirements.	3
created a specification, fully detailing the system requirements.	4

AT3: Generate a possible solution to a given problem.

Assessment Criteria – For the given problem the candidate will have:	Marks
been unable to generate a solution.	0
completed a circuit diagram/flowchart to represent a solution but consistently required prompts.	1
completed a circuit diagram/flowchart to represent a solution but required initial prompts.	2
completed a circuit diagram/flowchart to represent a solution but which required minor corrections.	3
completed a circuit diagram/flowchart to fully represent a solution.	4

AT4: Select and justify the use of appropriate components to meet the specification.

Assessment Criteria – For the given problem the candidate will have:	Marks
been unable to select and justify the appropriate components.	0
named the appropriate devices or components to be used in a solution.	1
selected the appropriate devices or components to be used in a solution.	2
justified the selection and use of some of the devices or components to be used in a solution.	3
justified the selection and use of all of the devices or components to be used in a solution.	4

AT5: Use computer simulation software.

Assessment Criteria – For the given problem the candidate will have:	Marks
been unable to use computer software to simulate a solution.	0
selected and positioned appropriate components/flowchart symbols to simulate a solution.	1
selected, positioned and connected the appropriate components/flowchart symbols to simulate a solution.	2
selected, positioned and connected the appropriate components/flowchart symbols to simulate a solution and adjusted the range parameters prior to simulation.	3
selected, positioned and connected the appropriate components/flowchart symbols to simulate a solution and simulated and evaluated the system.	4

AT6: Develop/build and test a solution.

Assessment Criteria – For the given problem the candidate will have:	Marks
been unable to built/test a solution.	0
built and tested a general solution.	1
built and tested a solution against at least two measurable criteria.	2
built and tested a solution against most of the system requirements.	3
built and tested a solution against all of the system requirements.	4

AT7: Evaluate the solution.

Assessment Criteria – For the given problem the candidate will have:	Marks
been unable to evaluate the solution.	0
evaluated a general solution.	1
evaluated the solution against at least two measurable criteria.	2
evaluated the solution against most of the system requirements.	3
evaluated the solution against all of the specification.	4