National Unit Specification: General Information

SCOTTISH QUALIFICATIONS AUTHORITY

UNIT Problem Solving (Higher)

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NUMBER D01E 12

COURSE

SUMMARY
This core skills unit seeks to develop skills in solving complex problems. These include the ability to analyse a complex situation or issue, devise a plan for addressing this, carry out the plan and evaluate what has been done and achieved. During the evaluation, candidates will be required to draw conclusions and make recommendations.

OUTCOMES
1 Analyse a complex situation or issue.
2 Plan, organise and carry out a complex task.
3 Review and evaluate a complex problem solving activity.

RECOMMENDED ENTRY
While entry is at the discretion of the centre, candidates would normally be expected to have attained Problem Solving (Intermediate 2).

CREDIT VALUE
1 Credit at Higher.

CORE SKILLS
Information on the automatic certification of core skills is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

The attainment of this unit will lead to the automatic award of:

- Problem Solving at Higher.

Administrative Information

Superclass: HB

Publication date: December 1998

Source: Scottish Qualifications Authority

Version: 01

National unit specification: statement of standards

UNIT Problem Solving (Higher)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

Note on the range for the unit
At this level, candidates should be dealing with a complex problem solving activity.

A complex problem solving activity is one which is likely to involve:

- an unfamiliar context
- analysis of complex or unfamiliar variables and clarification of the relationships between these
- management of a complex task involving a large number of variables. This task may require a plan which involves branching, ie. more than one strand of activity. The plan may also involve opportunities to review and adjust the initial strategy.

OUTCOME 1
Analyse a complex situation or issue.

Performance Criteria
a) Identify the critical factors involved in a complex situation or issue.
b) Assess the relevance of these factors to the complex situation or issue.
c) Develop an approach to deal with the complex situation or issue.
d) Justify the proposed approach with specific reference to all critical factors.

Evidence Requirements
Oral and/or written evidence that the following analysis has been undertaken:

PC(a)
Evidence that the candidate has:
- identified at least four critical factors involved in the situation or issue
- identified the relationships between factors. (Factors may be variables and/or any constraints which affect the situation or issue).

PC(b)
Evidence that a minimum of four critical factors have been prioritised in terms of their relevance to the situation or issue.

National unit specification: statement of standards (cont)

UNIT Problem Solving (Higher)

PC(c)
Evidence that the candidate has developed an approach by:
either
- evaluating the situation or issue, summarising, explaining and/or drawing conclusions

or
- developing a strategy to deal with the situation or issue.

PC(d)
Evidence that the candidate has justified the strategy/approach developed. The justification should make specific reference to the critical factors or evidence involved, such as resources and time available. Alternatively, the justification may involve comparison with other possible approaches.

At this level, candidates may devise a new approach or select and/or modify a standard existing approach.

OUTCOME 2
Plan, organise and carry out a complex task.

Performance Criteria

a) Develop a plan which incorporates at least four factors.
b) Identify and obtain resources.
c) Carry out the task, meeting all the requirements of the plan.

Evidence requirements
Evidence that the candidate has planned and organised a complex task as follows:

PC(a) and (b)
Oral and/or written evidence that the candidate has developed a plan for carrying out a complex task. The task should be undertaken in an unfamiliar context and include a minimum of four factors, with unfamiliar relationships between these factors. The plan should identify resources allocated to appropriate stages of the task. Resources should include at least two unfamiliar resources, and may require some searching.

Resources may be defined as any source materials, information, equipment, technology or facilities which may be used in carrying out the task.

PC(b) and (c)
Evidence of actual performance which shows that the candidate has decided how the task will be managed and carried out the task, including obtaining and using the identified resources.

National unit specification: statement of standards (cont)

UNIT Problem Solving (Higher)

OUTCOME 3
Review and evaluate a complex problem solving activity.

Performance Criteria
a) Identify relevant and sufficient criteria on which to base evaluation.
b) Identify, gather and collate relevant evidence to support evaluation.
c) Evaluate effectiveness of strategy or strategies used, explaining the relevance of the evidence.
d) Evaluate the effectiveness of the strategy or strategies in terms of the original brief.
e) Draw conclusions with recommendations.
f) Justify conclusions and recommendations.

Evidence requirements
Oral and/or written evidence which shows that the candidate has reviewed and evaluated a complex problem solving activity as described in PCs (a) – (f).

The candidate must evaluate all stages of the problem solving activity, including initial analysis of the situation, planning and organising the task, and the outcome of the activity. The evaluation should include reference to any modifications to the strategy during the course of the activity or to alternative strategies considered. Reference to the original brief should be clear.

For PC (e), the candidate must draw valid conclusions about the effectiveness of the strategy. In drawing conclusions, all of the evidence should be considered coherently, with no major aspect omitted.

For PC (f), the candidate must make recommendations related to the problem solving activity. The full set of conclusions should be drawn on in making recommendations for one or more of the following:

- improvement to a product, process, system or event
- possible use of an alternative strategy
- additional evidence gathering
- further investigation
- further work.

National unit specification: support notes

UNIT Problem Solving (Higher)

This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

GUIDANCE ON CONTENT AND CONTEXT
The content and context for this core skills unit should be appropriate to the personal and vocational needs of the candidate.

Core skills units are stated at five levels of attainment, with activities becoming progressively more demanding in breadth and depth, and in the extent of individual autonomy required. The appendix to this unit shows the relationship between the levels in Problem Solving.

This unit provides opportunities for the automatic certification of Problem Solving at Higher. Problem Solving is a collective term for the abilities that people bring to bear in tackling a wide range of issues and problems in their daily lives.

The core skill components identified within Problem Solving are Critical Thinking, Planning and Organising and Reviewing and Evaluating. This Problem Solving unit covers the core skill components in three outcomes.

Structure of National Units in Problem Solving Core Skills

Core skill component	Skill	Outcome
Critical Thinking	being able to analyse situations and suggest courses of action	1
Planning and Organising	being able to plan and organise work and carry it through to completion	2
Reviewing and Evaluating	being able to reflect on what has been done and to draw conclusions for the future	3

The unit provides opportunities for candidates to develop skills in solving complex problems. The problems are considered ‘complex’ because they involve situations or issues where variables may be complex or unfamiliar, relationships need to be clarified and where the task management itself is complex.

National unit specification: support notes (cont)

UNIT Problem Solving (Higher)

The context should interest candidates and allow them to demonstrate achievement as specified in the three outcomes. The range of contexts in which Problem Solving can be developed is very wide and may involve, for example, investigating; inventing; improving performance or learning; devising a study or other programme; or taking part in organising a placement, visit or other event. Such contexts can be found in virtually all curricular and vocational areas.

GUIDANCE ON TEACHING AND LEARNING APPROACHES

The learning and teaching approaches should encourage candidates to identify evidence of their attainment in problem solving skills and to look for opportunities to transfer their skills to other situations in their overall curriculum and life. There should be a balance between teacher/lecturer exposition and candidates' experiential learning. Where appropriate, arrangements should be made to ensure that there are no artificial barriers to learning. The nature of the candidate's learning needs should be taken into account when planning learning experiences.

The three core skill components of Critical Thinking, Planning and Organising, and Reviewing and Evaluating can be seen as stages in the process of tackling issues and problems. Open-ended, investigative approaches to learning will support the development and application of these skills.

National unit specification: support notes (cont)

UNIT Problem Solving (Higher)

The core skill component of Critical Thinking at Higher is about candidates being able to analyse a complex situation or issue.

Candidates are required to identify the factors involved in the situation or issue. Factors should include variables and the relationships between them. Candidates should assess the relevance of these factors to the situation or issue. Once the relevance of the factors is decided, candidates should develop an approach to deal with the situation or issue. The approach could be either an evaluation of the situation or issue or a strategy to deal with the situation or issue. An evaluation might include the candidates summarising, explaining, and/or drawing conclusions. A strategy might be a technique, a procedure or a course of action.

At this level, candidates may devise a new approach or select and/or modify a standard existing approach. Candidates are expected to justify the chosen approach, for example, in terms of accounting for the factors or evidence involved, resources and time available, and/or by comparison with other possible approaches.

Example:

Complex situation: analysing the effectiveness of a current promotion campaign

Factors:
- criteria for analysing effectiveness of campaign
- validity of evidence drawn from the analysis
- time available for analysis
- purpose of the promotion campaign
- accessibility of information on promotion campaign

Assess the relevance of the critical factors and prioritise them

Approach to analysing the effectiveness of the current promotion campaign:
- obtain information
- identify purpose
- analyse effectiveness
- reach conclusions on effectiveness

Justification of approach in terms of:
- evidence requirements
- resources available
- time available
- comparison with other approaches

National unit specification: support notes (cont)

UNIT Problem Solving (Higher)

The core skill component of Planning and Organising at Higher is about candidates having the ability to plan, organise and complete a complex task. The task should be complex in that it involves a large number of variables, unfamiliar contexts and unfamiliar relationships.

The candidates are expected to develop a plan, identify and obtain resources to carry out the plan, then carry out the task. At this level, the plan could involve branching, with more than one strand of activity running at the same time, with opportunities for the candidates to review and possibly adjust their strategies.

Candidates should identify and obtain resources from a wide range that includes unfamiliar resources and possibly requires search. Resources might include sources of information, set procedures, people, equipment or physical resources. Candidates are expected to decide how the task will be managed. This could include allocation of tasks in a group context. Then they are expected to carry out and complete the task.

Example:

Complex task: to analyse the effectiveness of a current promotion campaign

Plan

1 identify purpose of the promotion campaign
2 decide on time available for analysis
3 prepare a time-line – duration of plan, start and end dates
4(a) search for and prioritise information
4(b) fix interim deadlines for time-line
5 choose criteria for analysing effectiveness of campaign - 4(b) continues
6 analyse effectiveness of campaign - 4(b) continues
7 reach conclusions on effectiveness

Identify and obtain resources

- background information on campaign topic - texts, journals, articles in the press, on radio and television
- information on organisation of promotion campaign
- establish time available for task
- resources for presenting conclusions, access to information technology

Carry out plan

Opportunities for developing Planning and Organising can occur in all curricular and vocational fields. In all cases, the development of Planning and Organising benefits from the use of open-ended approaches to learning. The teaching and learning approaches should encourage candidates to identify the evidence of their attainment and to look for opportunities to transfer their skills to other situations in their overall curriculum and life.

National unit specification: support notes (cont)

UNIT Problem Solving (Higher)

The core skill component of Reviewing and Evaluating at Higher is about candidates having the ability to review and evaluate a complex problem solving activity. A complex problem solving activity is one where the factors involved may be numerous, complex or unfamiliar, where relationships need to be clarified and where the task management itself is complex.

Candidates are expected to evaluate the effectiveness of the strategy based on evidence they have gathered from all stages of the activity - analysing the situation, planning and organising the task, and the outcome of the activity. The evaluation should include reference to any modifications the candidates have made to the strategy during the course of the activity or to alternative strategies they may have considered. At this level, candidates may devise their own criteria for evaluation or adopt/adapt a set of established criteria.

Candidates should identify possible sources of evidence and gather evidence from these sources in order to draw conclusions and make recommendations. While gathering evidence, candidates might consider using qualitative or quantitative methods, comparisons with other systems, impact studies, product testing, market research.

Finally, the candidates draw conclusions based on the evidence they have gathered and make recommendations. When drawing conclusions, candidates should consider all the evidence coherently, with no major aspect omitted, and the full set of conclusions should be drawn on in making recommendations. Recommendations could include suggestions for improvements to the product, process, system or event, for further work, for more investigation, for additional evidence gathering, for use of an alternative strategy.

Example:

Complex problem solving activity: analysing the effectiveness of a current promotion campaign

Criteria chosen for evaluation:

- quantitative evidence used to evaluate effectiveness
- qualitative (impact) evidence used to evaluate effectiveness
- comparisons drawn with previous campaigns on similar topics
- comparisons drawn with current campaigns on other topics

Evidence gathered for the evaluation:

- evidence generated according to the individual candidate's task

Conclusions and recommendations:

Suggestions for:

- improvements to the campaign
- further market research
- product testing
- additional evidence gathering
- use of an alternative approach.

National unit specification: support notes (cont)

UNIT Problem Solving (Higher)

GUIDANCE ON APPROACHES TO ASSESSMENT

Where appropriate, arrangements should be made to ensure that there are no artificial barriers to assessment. The nature of candidates' special needs should be taken into account when selecting assessment instruments, and possibilities for alternative arrangements considered.

If this unit is being used in conjunction with other units or courses, evidence of attainment should be gathered, wherever possible, from naturally occurring activities within these.

A staff observation checklist should be used where the candidate generates evidence of problem solving activities outwith the centre. The checklist may usefully provide supporting evidence for any of the activities related to Outcomes 1 – 3 and should be used accordingly.

Where the Problem Solving unit is being combined with another unit to create an enhanced learning and teaching programme, care must be taken to ensure that all aspects of each unit are covered and adequate time must be allowed for the coverage of both units. Such a programme would create opportunities to consolidate the skills gained in this unit.

Evidence should be indexed to the relevant outcome, performance criteria and evidence requirements of the Problem Solving unit and should be collated and retained for assessment and moderation purposes.

Suggested assessment instruments

Outcome 1

All PCs. Response to a restricted response question for each performance criterion would be suitable.

Outcome 2

PC (a), PC (b) Response to a restricted response question for each performance criterion would be suitable.
PC (b), PC (c) Video recording, or entries in a personal log of carrying out the task, would be suitable for recording performance evidence.

National unit specification: support notes (cont)

UNIT Problem Solving (Higher)

Outcome 3
All PCs Response to a restricted response question for each performance criterion would be suitable.

Information on suggested assessment instruments	
restricted response question	candidate response should be more discursive than a short answer but not lengthy; restricted responses typically would vary between a few sentences and a paragraph in length
log	candidate demonstrates outcome of learning in a particular context, entries in a log record evidence, noting aspects such as targets, dates when targets achieved, actions, contacts.

Certification of Critical Thinking, Planning and Organising, and Reviewing and Evaluating recognises that candidates have demonstrated an appropriate level of skill in a particular context and there is an implication that, in contexts that contain knowledge and understanding accessible to the candidate, transfer is reasonably likely. However, it must also be recognised that familiarity with a context influences the candidate's ability to develop and transfer the skill.

This core skill unit is aided by National Assessment Bank materials which provide assessment materials exemplifying the evidence required for achievement of the core skill.

In cases where the candidate has had to complete a core skills unit to meet the requirements of a Scottish Group Award, that unit will be counted as a unit credit within the Scottish Group Award as well as being counted towards meeting the core skills profile required.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements* (SQA, 1998).

Core skills units **Appendix**

Problem Solving: progression chart

	Access 2	Access 3	Intermediate 1	Intermediate 2	Higher
Nature of problem	Simple recurring problem solving activity	Simple problem solving activity	Straightforward problem solving activity	Non-routine problem solving activity	Complex problem solving activity
Critical Thinking	Analyse an identified familiar situation or issue	Analyse a simple situation or issue	Analyse a straightforward situation or issue	Analyse a non-routine situation or issue	Analyse a complex situation or issue
Planning and Organising	Plan, organise and carry out a familiar simple task	Plan, organise and carry out a simple task	Plan, organise and carry out a straightforward task	Plan, organise and carry out a non-routine task	Plan, organise and carry out a complex task
Reviewing and Evaluating	Review and evaluate a simple recurring problem solving activity	Review and evaluate a simple problem solving activity	Review and evaluate a straightforward problem solving activity	Review and evaluate a non-routine problem solving activity	Review and evaluate a complex problem solving activity