

SQA Advanced Unit Specification

General information for centres

Unit title: Computing: Planning

Unit code: HR74 47

Unit purpose: This Unit is designed to enable candidates to develop generic knowledge and practical skills in the stages and techniques of planning. It is aimed at candidates following an SQA Advanced in Computing group award programme and hence the skills and techniques used should be such as to support the planning of computing tasks.

On completion of the Unit the candidate should be able to:

1. Produce a precise specification from a given brief.
2. Derive a detailed design for the required specification.
3. Produce a test plan for the required specification.

Credit points and level: 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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre, however it is recommended that candidates should have the Core Skill of Problem Solving at SCQF level 4. This may be evidenced by the possession of any relevant National Units or comparable competence gained informally or by suitable work experience.

Core skills: This Unit gives automatic certification of the following Problem Solving core skill elements:

- ◆ Critical Thinking at SCQF level 6

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Context for delivery: This Unit is included in the framework of a number of SQA Advanced Certificate and SQA Advanced Diploma group awards. It is recommended that it is taught and assessed within the context of the particular group award to which it contributes. It is strongly recommended that this Unit be delivered in advance of, or in conjunction with **one** of the following (associated) SQA Advanced Units:

HR8L 48: Software Development: Event Driven Programming
HP2L 48 Software Development: Object Oriented Programming
HT0C 48 Software Development: Developing for the WWW
HR72 47: Multimedia: Developing Multimedia Applications
HP2Y 47 Computer Networks: Building Local Area Networks

An appropriate approach to integrated delivery of the two units should be considered. This will probably take the form of a common case study to be used for both Units; the investigation, analysis and design stages as required by this Unit, followed by implementation in the relevant additional unit which is being delivered alongside/subsequently.

Assessment: It is strongly recommended that a holistic approach to assessment should always be considered and developed in conjunction with this Unit and the associated Unit.

This may be achieved using a single on-going case study, following the investigation, analysis and design stages, as prescribed by this Unit, then, following the implementation stages as prescribed by the relevant associated Unit being delivered alongside.

The achievement requirements are inherent in the evidence requirements.

Assessments for all outcomes are open book.

Assessors must assure themselves of the authenticity of each candidate's submission.

Unit specification: statement of standards

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The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Produce a precise specification from a given brief

Knowledge and Skills

- ◆ Analyse the problem from a given brief
- ◆ Identify the requirements from a given brief
- ◆ Identify the constraints from a given brief
- ◆ Verify the specification against a given brief

Evidence requirements

This Outcome will be assessed by the production of a Requirement Specification Document.

This assessment is open book.

Assessors must assure themselves of the authenticity of each candidate's submission.

Outcome 2

Derive a detailed design for the required specification

Knowledge and Skills

- ◆ Developing a design solution for the specification using a recognised approach
- ◆ Creating a top level design
- ◆ Developing a detailed design using an appropriate iterative planning technique
- ◆ Designing sub-tasks from the top level design using an appropriate technique(s)
- ◆ Producing documentation to support the process used in the design

Evidence requirements

This Outcome should be assessed by the production of the design document, which will control the implementation of the design. Depending on the methodology used by the Centre and the requirements of the given brief, the documentation will vary accordingly.

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As this Unit is intended to be offered in conjunction with a suitable SQA Advanced Unit, then the selected documentation should be presented in a format appropriate to the area identified by the brief and the planning approach to be used.

This assessment is open book.

Assessors must assure themselves of the authenticity of each candidate's submission.

Outcome 3

Produce a test plan for the required specification

Knowledge and Skills

- ◆ Selecting appropriate techniques and methods to test the design
- ◆ Defining test cases required to test the design
- ◆ Preparing sample data to test the defined cases

Evidence requirements

Evidence must be produced in the form of documentation to show that the candidate can prepare a test strategy suitable for testing the design solution.

As a minimum, this will consist of:

- ◆ A statement and brief description of the selected test technique to be used appropriate for the design.
- ◆ A statement and brief description of the selected test methods to be used appropriate for the design.
- ◆ A brief justification should be produced to document the approach taken
- ◆ A list of all components to be tested.
- ◆ Batches of test data to test each of the listed components.

This assessment is open book.

Assessors must assure themselves of the authenticity of each candidate's submission.

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Administrative Information

Unit code:	HR74 47
Unit title:	Computing: Planning
Superclass category:	CB
Original date of publication:	August 2017
Version:	01

History of changes:

Version	Description of change	Date

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

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SQA Advanced Unit specification: support notes

Unit title: Computing: Planning

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the Centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit has the following objectives:

1. To provide candidates with an understanding of the basic principles, stages and activities involved in planning for a hardware or software product.
2. To provide candidates with practical experience of the skills required in the preparation for the creation of a hardware or software product.
3. To allow candidates to produce a test plan appropriate to the requirements specification.
4. To allow a candidate to produce a test plan to be applied to the design and which is capable of being applied to the implementation at a later stage.

The Unit has been designed to be capable of being delivered alongside the following Units in the SQA Advanced in Computing group awards:

HR8L 48: Software Development: Event Driven Programming
HP2L 48 Software Development: Object Oriented Programming
HT0C 48 Software Development: Developing for the WWW
HR72 47: Multimedia: Developing Multimedia Applications
HP2Y 47 Computer Networks: Building Local Area Networks

As such, details of the specific contents and context for delivery and completion are left to the individual Centre to decide. However, guidance as to the minimum documentation and standards required in order to achieve a pass in the Unit are in the evidence requirements for each of the Outcomes.

Although the Unit may be delivered on its own, it is part of the SQA Advanced Computing group awards and is aimed at candidates on such programmes of study. It is likely therefore, that the Unit will normally be presented as part of an SQA Advanced Computing group award in conjunction with any one from the range of Units stated.

If it is to be delivered in conjunction with one of these Units, the concepts contained in this Unit will normally precede the accompanying Unit. Please refer to the 'Recommended Prior Knowledge and Skills' section.

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By the end of the Unit, candidates should have acquired a broad understanding of the fundamental analysis and design techniques involved in the planning for a hardware or software product.

Technical or Networking Support Streams

It would be expected that a candidate studying within the Technical or Networking Support streams would undertake this Unit in conjunction with:

HP2Y 47 Computer Networks: Building Local Area Networks

It may be delivered either prior to the identified Unit, or run in parallel with it. Likewise, it is recommended that the assessment of this Unit be integrated with the relevant development Unit.

The stages of the selected product planning may be delivered in conjunction with development concepts. Thus it is strongly recommended that this Unit precedes or runs concurrently with one of the selected Unit where a series of simple practical exercises in design techniques can be implemented.

A single and coherent case study approach is expected, with the task broken down into several identifiable and assessable stages. This allows the assessor the opportunity for regular and controlled monitoring of the development of the candidates' abilities of the Knowledge and Skills sections, and allowing time for remediation. Note: this Unit **only** covers the analysis and design stages of the selected product development Life Cycle. However, testing is applied to the design stage and is taken forward to the implementation stage in any accompanying Unit.

Candidates should always be encouraged to consider solutions to problems, document the design and test the design, before implementing the solution on the chosen platform.

During the teaching process, candidates may be provided with partial solutions for which design and testing needs to be completed. Such an approach is **not** acceptable for assessment. Candidates must **not** be issued with partially completed documentation. The purpose of this unit is to introduce a number of planning skills associated with the product development life cycle.

The deliverables within this stream could be:

Outcome 1 - Functional (User) Requirements and Non Functional Requirements (constraints)

Outcome 2 - The production of the design document, which will control the implementation of the design. Depending on the methodology used by the Centre and the requirements of the given project brief, the documentation may vary accordingly.

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Outcome 3 - Documentation to show that the candidate can prepare a test strategy suitable for testing the design solution. As a minimum, this should consist of:

- ◆ A statement and brief description of the selected test technique to be used appropriate for the project brief.
- ◆ A statement and brief description of the selected test methods to be used appropriate for the project brief.
- ◆ A brief justification should be produced to document the approach taken
- ◆ A list of all cases to be tested.
- ◆ Sets of test data to test each of the listed cases.

Software Development, Multimedia, Internet and Information Management Streams

It would be expected that a candidate studying within the Software Development, Multimedia, Internet and Information Management streams would undertake this Unit in conjunction with one of the following:

HR8L 48: Software Development: Event Driven Programming

HP2L 48 Software Development: Object Oriented Programming

HT0C 48 Software Development: Developing for the WWW

HR72 47: Multimedia: Developing Multimedia Applications

It may be delivered either prior to the identified Unit, or run in parallel with it. Likewise, it is recommended that the assessment of this Unit be integrated with the relevant development Unit.

The stages of the selected software planning may be delivered in conjunction with development concepts. Thus it is strongly recommended that this Unit precedes or runs concurrently with one of the selected Unit where a series of simple practical exercises in design techniques can be implemented.

A single and coherent case study approach is expected, with the task broken down into several identifiable and assessable stages. This allows the assessor the opportunity for regular and controlled monitoring of the development of the candidates' abilities of the Knowledge and Skills sections, and allowing time for remediation. Note, this Unit **only** covers the analysis and design stages of the selected Development Life Cycle. However, testing is applied to the design stage and is taken forward to the implementation stage in any accompanying Unit.

Candidates should always be encouraged to consider solutions to problems, document the design and test the design, before implementing the solution in the chosen platform.

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During the teaching process, candidates may be provided with partial solutions for which design and testing needs to be completed. Such an approach is **not** acceptable for assessment. Candidates must **not** be issued with partially completed documentation. The purpose of this unit is to introduce a number of planning skills associated with the development cycle.

The deliverables within this stream could be –

Outcome 1 - Functional (User) Requirements and Non Functional Requirements (constraints)

Outcome 2 - The production of the design document, which will control the implementation of the design. Depending on the methodology used by the Centre and the requirements of the given project brief, the documentation may vary accordingly.

Outcome 3 - Documentation to show that the candidate can prepare a test strategy suitable for testing the design solution. As a minimum, this should consist of:

- ◆ A statement and brief description of the selected test technique to be used appropriate for the project brief.
- ◆ A statement and brief description of the selected test methods to be used appropriate for the project brief.
- ◆ A brief justification should be produced to document the approach taken
- ◆ A list of all cases to be tested.
- ◆ Batches of test data to test each of the listed cases.

Summary

The list of associated units identified (above) is not exclusive , however, if a different SQA Advanced unit is delivered in conjunction with this unit the candidate **may not** achieve the complete core skill of Problem Solving at SCQF level 6.

Although the Unit is capable of being delivered on its own, it is likely that it will be delivered in conjunction with one of the identified Units. Where this is the case, then it may be delivered either prior to the relevant Unit, or run in parallel with it. Likewise, it is recommended that the assessment of this Unit be integrated with the relevant Unit.

The stages of the selected planning method may be delivered in conjunction with accompanying unit concepts. Thus it is strongly recommended that this Unit precedes or runs concurrently with a Unit where a series of simple practical exercises in design techniques can be implemented.

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A single and coherent case study approach is expected, with the task broken down into several identifiable and assessable stages. This allows the assessor the opportunity for regular and controlled monitoring of the development of the candidates' abilities of the Knowledge and Skills sections, and allowing time for remediation. Note, this Unit **only** covers the analysis and design stages of a development cycle. However, testing is applied to the design stage and is taken forward to the implementation stage in the accompanying Unit.

Candidates should always be encouraged to consider other solutions to problems, document the design and test the design, before implementing the solution in the chosen platform or targeted area.

During the teaching process, candidates may be provided with partial solutions for which design and testing needs to be completed. Such an approach is **not** acceptable for assessment. Candidates must **not** be issued with partially completed documentation. The purpose of this unit is to introduce a number of skills associated with and supporting the planning process.

This Unit is intended to enable candidates to develop generic knowledge and practical skills in the stages and techniques of program planning. It has been contextualised for the SQA Advanced Certificate in Games Development award, where the emphasis is on developing skills appropriate to a digital entertainment domain. All of the standard good practice criteria are stressed throughout the module, but with a games development flavour.

It forms part of the SQA Advanced Certificate in Games Development award and should be delivered within the context of the Group Award.

Instruments of assessment

Outcome 1: Produce a precise specification from a given brief.

Outcome 2: Derive a detailed design for the required specification.

Outcome 3: Produce a test plan for the required specification.

All of the assessment instruments are open-book and of a practical nature.

Assessors must ensure that all candidate submissions for the practical assessments are the work of the candidate. The level of work required for the assessments is inherent in the evidence requirements.

For this Unit, contextualisation is apparent in the delivery rather than the written requirements of the Outcomes. The Unit is delivered in close liaison with either the *Software Development: Structured Programming* or *Software Development: Object-Oriented Programming* Units within this award framework. The requirements brief which underlies that all Outcomes should be the gaming software project developed for that Unit.

Extract from Core skills framework – the three elements of Problem Solving at SCQF level 6

PROBLEM SOLVING: CRITICAL THINKING

SCQF LEVEL 6

<p>General skill</p> <p>Analyse a complex situation or issue</p>
<p>Specific skills</p> <ul style="list-style-type: none">• identify the factors involved in the situation or issue• assess the relevance of these factors to the situation or issue• develop and justify an approach to deal with the situation or issue
<p>Further information</p> <p>Candidates will deal with a situation/issue where variables may be complex or unfamiliar, relationships need to be clarified and the context may be unfamiliar. Within this context, the candidate should identify the variables and the relationships between them, analysing the significance and relevance of each variable. Thereafter the candidate should evaluate the situation - this might include summarising, explaining or drawing conclusions – or identify a strategy (eg a technique, procedure or a course of action) to deal with the situation. They may devise a new approach or select and/or modify an existing approach. The approach must be justified, for example by accounting for the factors or evidence involved; by referring to the resources and time available, and/or by comparison with other possible approaches</p>

General skill

Plan, organise and complete a complex task

Specific skills

- **develop a plan**
- **identify and obtain resources to carry out the plan**
- **carry out the task**

Further information

Candidates should be dealing with a task with a large number of variables in an unfamiliar context where relationships may be unfamiliar. The plan is likely to involve more than one concurrent strand and a review or opportunity to adjust the strategy. The candidate must identify and obtain resources, selecting these from a wide range of familiar and unfamiliar sources, possibly involving a search. The resources will be appropriate to the task and might include sources of information, set procedures, people, equipment and physical resources. The candidate must decide how the task will be managed and carry it out – this could include allocation of tasks in a group context.

General skill

Review and evaluate a complex problem solving activity

Specific skills

- **evaluate the effectiveness of the strategy/strategies**
- **identify and gather appropriate evidence**
- **draw conclusions and make recommendations**

Further information

Candidates will be dealing with an activity where the factors involved may be numerous, complex or unfamiliar, where relationships need to be clarified and where the task management itself is complex.

The candidate must

- analyse the effectiveness of all aspects of a problem solving strategy – ie analysing the situation, planning and organising the task and the outcome of the activity. Evaluation should include reference to any modifications to the strategy during the course of the activity or to alternative strategies considered. Candidates may devise their own criteria for evaluation or adopt/adapt a set of established criteria.
- identify and gather appropriate evidence to support the evaluation – sources of evidence might include use of qualitative/quantitative methods; comparisons with other systems or products; impact studies; product testing, or market research.
- draw conclusions - candidates should consider all the evidence coherently with no major aspect omitted
- make recommendations - the full set of conclusions should be drawn on in making recommendations. Recommendations could include suggestions for improvements to a product, process, system or event; the need for further evidence or in-depth investigation; use of an alternative strategy in future.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

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.

General information for candidates

Unit title: Computing: Planning

In this Unit you will develop the knowledge and learn the skills required to help you plan, design and test a solution to a typical problem within a computing context.

To achieve this you will learn about the various stages involved in developing the solution to a product, the documentation produced to support the development of your solution, and finally the different ways by which your solution may be tested.

Each of these areas of the development process will be delivered and supported by practical exercises to strengthen your knowledge and skills in this area.

If the Unit is to be delivered in conjunction with another associated SQA Advanced Unit, then it is likely that the topics listed above will be integrated with the delivery and assessment of the relevant Unit. This will take the form of an on-going case study. Where the Unit is to be presented on its own, then a similar case study approach may still be adopted but will exclude the final implementation stages.

The skills you will learn in this Unit should prepare you for any Unit which may follow and serve as an initial foundation in planning a solution within computing development. Careful attention to good design and thorough testing of the solution to a problem will form a solid basis in the production of high quality, reliable and efficient product.

Note: this Unit **only** covers the analysis and design stages of a development cycle. However, testing is applied to the design stage and is taken forward to the implementation stage in the accompanying Unit.