

# **Group Award Specification for:**

## **SQA Advanced Diploma in Computing: Software Development**

**Group Award Code: GM92 48**

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# 1 Introduction

This is the Arrangements Document for the Group Award(s) in SQA Advanced Diploma in Computing: Software Development. This document includes background information on the group award, its aims, details of the group award structure, and guidance on delivery.

## 1.1 Rationale for the Group Award

The SQA Advanced Diploma in Computing: Software Development Group Award is designed to equip candidates with the knowledge, understanding and skills required for success in current and future employment or for progression to further academic and/or professional qualifications.

The development units have been designed to allow flexibility in both the development environments chosen and in the target platforms. This should provide learners with the opportunity to develop their programming and design skills using 'in vogue' technologies, such as mobile applications.

The Information and Communication Technologies: Sector Skills Assessment 2012 (UK Commission for Employment and skills) emphasises the continuing need for software professionals within the sector.

*'Software Professionals are the largest occupational group with nearly one in five (19 per cent or 141,000) in the sector workforce employed in these occupations.'*

The report also highlights the increasing need for software professionals outside of the sector

*'Software Professionals' is the fifteenth largest occupational group in the UK with employment of 327,000 people across the economy (141,000 of whom are employed within the Information and communication technologies sector itself).'*

Technology Insights 2012 (e-skills UK) predicts that the demand for software professionals will continue to dominate the occupational area.

*'When asked to speculate on the likely nature of future IT & Telecoms related recruitment difficulties, employers responding to the National Academy survey most often thought that problems would be most apparent when seeking to fill positions for: Programmers and Software Development professionals followed by Web design and development professionals and, to a lesser extent, IT User Support Technicians.'*

The reports mentioned above reinforce the findings of the lead developer's consultations with representatives of major vendors (Microsoft, Apple and Oracle) and with a range of software professionals. These findings highlighted the need for a range of generic skills including:

- ◆ problem solving
- ◆ inter-personal skills
- ◆ innovative thinking

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There is also a considerable demand for software professionals with specific technical skills — the most commonly required being:

- ◆ SQL
- ◆ C
- ◆ C#
- ◆ .NET
- ◆ Java
- ◆ SQL
- ◆ SVR
- ◆ ASP
- ◆ JavaScript
- ◆ Agile
- ◆ HTML

The majority of these technical skills are dependent on a thorough understanding of the object-oriented paradigm which is at the core of the award. The generic nature of the majority of the units allows the incorporation of a wide range of the technical skills currently in demand.

The award has been designed so that it can be geared towards the technical skills required to undertake a number of professional vendor qualifications. For example, if Java is adopted as the main development language, the core units of the award encompass the skill sets in Oracle's Java SE 7 Programmer 1 certification. The vendor options in the award currently include units that could be used towards both the MCSD: Windows Store Apps and MCSD: Web Applications certification.

### 1.2 Target client groups

This *SQA Advanced Diploma in Computing: Software Development* award is suitable for a range of learners including:

- ◆ school leavers or apprentices who wish to embark on a course which will lead to either higher education or IT industry employment
- ◆ employed or unemployed adults with appropriate NQGs (NCs) or vocational skills wishing to train for a career as a software professional
- ◆ learners completing the SQA Advanced Certificate in Computing vocational qualification with a view to progressing to university or employment as a software professional

### 1.3 Employment opportunities

The core units within the *SQA Advanced Diploma in Computing: Software Development* are used to provide specific training in both object-oriented programming and design, and in database design and development. The generic nature of the updated units allows centres to gear the skill development to the particular training requirements of employees.

The award supports the indirect route to employment via articulation into higher education programmes, as detailed in the next section.

### 1.4 Articulation into higher education programmes

Articulation arrangements exist between a number of Scottish, UK and international universities where SQA Advanced Certificates and Diplomas will be accepted as advanced entry to either the second or third year of a related degree programme. Depending on the specific degree programme, certain units may be required as part of the SQA Advanced Certificate/Diploma. The optional section of the framework is sufficiently broad to ensure that centres are able to comply with reasonable articulation requests. A high proportion of our candidates have articulated to degree programmes and successfully completed them.

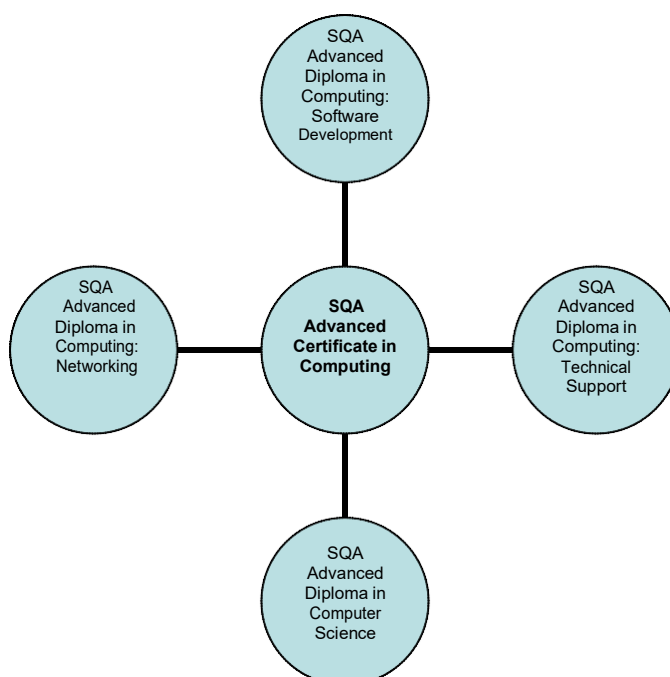
### 1.5 Professional bodies

SQA Advanced Certificates and Diplomas are recognised by many professional bodies. Candidates achieving an SQA Advanced Certificate/Diploma may meet the professional body entry requirements. Candidates may also gain partial and full exemptions to professional body exams.

### 1.6 Relationship with other awards

This award is part of a suite of SQA Advanced Diplomas. The relationship between the awards is illustrated in the diagram below.

**Figure 1: SQA Advanced Diploma in Computing: Software Development: relationship with other awards**



The SQA Advanced Certificate is embedded within all of the SQA Advanced Diplomas, and (largely) constitutes the first year of each programme. Each SQA Advanced Diploma in offers a particular specialism that reflects recognised vocational or academic progression paths. The awards have similar structures and equivalent demands (in terms of practical or cognitive competencies) but each seeks to provide different skills sets and underpinning knowledge.

## 2 Qualification structure

This Group Award is made up of 30 SQA Credits. It comprises 240 SCQF credit points, of which 64 are at SCQF level 8 in the mandatory section, including an *SQA Advanced Certificate in Computing* Graded Unit 1 of 8 SCQF credit points at SCQF level 7 and an *SQA Advanced Diploma in Computing: Software Development* Graded Unit 2 of 16 SCQF credit points at SCQF level 8. A mapping of Core Skills development opportunities is available in Section 5.3.

### 2.1 Structure

In order to achieve the *SQA Advanced Diploma in Computing: Software Development* Group Award the candidate must achieve 14 mandatory credits and 16 optional credits from Groups 1, 2 and 3.

Please note that if a learner chooses units from Group 2 only, a maximum of 9 credits can be taken. If they choose from Group 3 only, a maximum of 7 credits can be taken.

The mandatory section of this Group Award incorporates 64 SCQF credit points at SCQF level 8 which satisfies the SQA Design Principles.

#### Mandatory Units — Total of 14 credits

Candidates must pass all of the following units.

Unit title	Code	SCQF credit points	SCQF level	SQA Credit value
Developing Software: Introduction	HP1R 47	8	7	1
Professionalism and Ethics in Computing	HP29 47	8	7	1
Computer Systems Fundamentals	HP1T 47	8	7	1
Troubleshooting Computer Problems	HP1V 47	8	7	1
Team Working in Computing	HP1X 47	8	7	1
Computing: Graded Unit 1 (Exam)	HR9J 47	8	7	1
Software Development: Object Oriented Programming	HP2L 48	16	8	2
Systems Development: Object Oriented Analysis and Design	HP2M 48	16	8	2
Software Development: Data Structures	HP2K 48	16	8	2
Computing: Software Development: Graded Unit 2 (Project)	HT8C 48	16	8	2

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### Optional Units — Total of 16 credits

Learners must select at least 16 credits selected from one or more of the following groups of optional units.

Group 1: Specialist options (up to 16 credits)

Group 2: General options (up to 9 credits)

Group 3: Vendor Units (up to 7 credits)

These rules of combination ensure that the aims and objectives of the award are achieved, irrespective of the route through the award. For example, by limiting the general options to 9 credits, all candidates are required to complete at least 21 credits directly related to the subject area.

Group 1 specialist options should be seen as the non-mandatory credits which are fundamental to giving the Group Award its distinctive emphasis on software development. Group 2 general options give centres a degree of flexibility in course design, eg options to include mathematics, networking and hardware. Group 3 units are dedicated vendor qualifications. See the following section for further information on vendor provision.

Note that a local option is included in Group 2 (general options). Up to four credits can be selected from any area, subject to the design rules and rules of combination defined above. This is consistent with the current awards and reflects the preferences of centres so that they can customise the awards to their local circumstances.

Unit title	Code	SCQF credit points	SCQF level	SQA Credit value
<b>Group 1 — Specialist Options (Up to 16 credits)</b>				
Artificial Intelligence for Computer Games	HT00 48	16	8	2
Data Security	J1S1 47*	8	7	1
Database Design Fundamentals	HP2G 47	8	7	1
Databases: Introduction	HR89 47	8	7	1
Developing Mobile Web Based Applications: An Introduction	HR9X 47	16	7	2
Human Computer Interaction	HR8C 47	8	7	1
Relational Database Management Systems	HP2J 48	8	8	2
Scripting for Interactivity	HP2D 48	8	8	2
Self-Describing Data (XML)	HP2H 48	8	8	1
Software Development: Applications Development	HR6X 47	16	7	2
Software Development: Developing Small Scale Standalone Applications	HP2N 47	16	7	2
Software Development: Developing Websites for Multiplatform Use	HR9L 48	16	8	2
Software Development: Programming Foundations	HP2P 47	8	7	1
Software Development: Programming in PL/SQL	HT0G 48	16	8	2

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Unit title	Code	SCQF credit points	SCQF level	SQA Credit value
Software Development: Rapid Applications Development and Prototyping	HP2F 48	16	8	2
Software Development: Systems Foundations	HR8K 47	16	7	2
SQL: Introduction	HP2E 47	8	7	1
Systems Development: Introduction	HR8M 47	8	7	1
Systems Development: Testing Software	HR8P 47	8	7	1
Systems Development: User Centred Design	HR8T 47	8	7	1
Team Development	HT0H 48	8	8	1
User Interface Design	HR9Y 47	8	7	1
Web Development: Dynamically Generated Content	HP2T 48	16	8	2
Web Development: Producing a Data Driven Website	HT0L 48	8	8	1
Web Development Fundamentals	HR7M 47	8	7	1
Web Development: Essential Content	HT05 47	8	7	1
Routing Technology	HP1J 48	16	8	2
Networking Technology	HP1M 48	16	8	2
Professional Career Development in the IT Industry	HT06 47	8	7	1
Data Flow	J3CP 47*	8	7	1
Agile Development: Introduction	J54E 47*	8	7	1
Application Security	J54X 47*	8	7	1
Programming for Data	J552 48*	8	8	1
Penetration Testing	J7YE 47*	8	7	1



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Unit title	Code	SCQF credit points	SCQF level	SQA Credit value
<b>Group 2 — General Options (Up to 9 credits)</b>				
Building an e-Business	HR7V 47	8	7	1
Client Operating Systems	HP27 47	16	7	2
Cloud Computing	HP1Y 47	8	7	1
Digital Forensics	J0L3 47*	8	7	1
Computer Hardware: Hardware Installation and Maintenance	HR91 47	16	7	2
Computer Networking: Fundamentals	HR87 47	8	7	1
Computer Networking: Practical	HP20 47	8	7	1
Computer Networks: Building Local Area Networks	HP2Y 47	16	7	2
Computing: Introduction to Project Management	HP21 47	8	7	1
Computing: PC Hardware and Operating System Essentials	HP24 47	8	7	1
Computing: PC Hardware and Operating System Support	HR88 47	8	7	1
Configuring a Desktop Operating System	HR85 47	16	7	2
Convergence Technologies	HP25 48	16	8	2
Digital Culture: Online Collaboration	HR83 48	8	8	1
Digital Culture: Online Communications	HR81 47	8	7	1
Digital Culture: Web 2.0 Applications	HR82 46	8	6	1
E-Commerce: Publishing Web Sites	HR1V 47	16	7	2
Entrepreneurship in the Creative Industries	HR7G 48	8	8	1
Ethical Hacking	J0L2 47*	8	7	1
*Preparing to Start a Business	HR3E 47	8	7	1
Handling Information as a Resource	HR8A 47	8	7	1
Intrusion Prevention Systems	HR8D 47	8	7	1
Information Technology: Information Systems and Services	HR92 47	8	7	1
Mail Server Management	HP30 47	8	7	1
Mathematics for Computing 1	HP1H 47	8	7	1
Mathematics for Computing 2	HR6T 48	8	8	1
Mathematics for Interactive Computing: Essential Techniques	HR7R 47	8	8	1
Mathematics: Calculus and Matrices for Computing	HR7E 47	8	7	1
Managing a Web Server	HR8E 47	8	7	1
Mobile Technology	HR8F 48	8	8	1
Machine Learning	J1CP 48	16	8	2

**\*Refer to History of Changes for information.**

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Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Multi User Operating Systems	HR77 47	8	7	1
Multimedia: Developing Multimedia Applications	HR72 47	16	7	2
Network Concepts	HR8G 47	16	7	2
Personal Development Planning	HP6M 47	8	7	1
Project Management for IT	HR7J 47	8	7	1
Providing Support to Users	HR8H 47	8	7	1
Network Security Concepts	HX00 47	16	7	2
Technical Support: Supporting Users – Hardware	HP31 47	8	7	1
Technical Support: Supporting Users - Software	HP32 47	8	7	1
Troubleshooting a Desktop Operating System	HR86 47	16	7	2
Work Role Effectiveness	HR0M 47	24	7	3
Work Role Effectiveness	HR0P 48	24	8	3
Working in IT	HR8X 48	16	8	2
Workplace Communication in English	HR1C 46	8	6	1
Bring Your Device (BYOD): Introduction	HR9P 47	8	7	1
Using Software Applications Packages	HR0A 47	8	7	1
Information Technology: Applications Software 1	HP6L 47	8	7	1
Computing: Planning	HR74 47	8	7	1
Digital Skills	HR9W 47	8	7	1
Data Science	HR9V 48	16	8	2
<b>Group 3 — ‘Vendor’ Options (Up to 7 credits)</b>				
Technical Specialist: Web Applications Development with Microsoft.NET Framework 4	HR93 48	30	8	3.5
Technical Specialist: Windows 7: Configuring	HT02 48	24	8	3
Technical Specialist: Windows Communication Foundation Development with Microsoft.NET Framework 4	HR98 49	9	9	1
Technical Specialist: Windows Applications Development with Microsoft.NET Framework 4	HR99 49	15	9	1.5
Technical Specialist: Accessing Data with Microsoft.NET Framework 4	HR9F 48	15	8	1.5
Technical Specialist: Microsoft SharePoint 2010, Application Development	HR9H 49	15	9	1.5
Database Design and Programming in SQL	HR9N 47	15	7	1.5
Database Programming with PL/SQL	HT8Y 48	15	8	1.5

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<b>Group 4 — Local Option (Up to 4 credits permitted)</b>				
Software Development: Event Driven Programming	HR8L 48*	16	8	2
3D Modelling and Animation	HT0D 48*	16	8	2
Software Development: Developing for the WWW	HT0C 48*	16	8	2
Hardware Concepts	HT0F 46*	8	6	1
Operating System Concepts	HT0E 46*	8	6	1
Software Development: Data Structures and Performance	HT90 48*	8	8	1
Software Development: Programming Paradigms	HT91 48*	8	8	1
Web Development: Advanced Web Scripting Concepts	HT92 48*	8	8	1
Software Development: Object Oriented Programming-Advanced Concepts	HT93 48*	8	8	1
Web Development: Essential Content	HT05 47*	16	7	2
Compositing and Motion Graphics	J12G 47*	8	7	1
Managing a Web Server	HP2V 48*	16	8	2
Web Technologies 1: HTML and CSS	J1GK 47*	8	7	1

**\*Refer to History of Changes for information.**

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The SCQF level Descriptors have five characteristics which provide a reference point for determining the level of a qualification, learning programme, module or unit of learning or for the recognition of prior learning. They are not intended to give precise or comprehensive statements of required learning for individual qualifications.

Each level is described in terms of its characteristic general outcomes under five broad headings. These are:

- ◆ Knowledge and understanding – mainly subject-based
- ◆ Practice (applied knowledge and understanding)
- ◆ Generic cognitive skills – eg evaluation, critical analysis
- ◆ Communication, numeracy and IT skills
- ◆ Autonomy, accountability and working with others

There are a range of SCQF level 7 units that have been designed as feeder units for the *SQA Advanced Diploma in Computing: Software Development*. These will help learners develop the underlying programming and development skills required for the mandatory SCQF level 8 units. These units include:

Unit title	Code	SCQF Credit Points	SCQF Level	SQA Credit Value
Developing Software: Introduction	HP1R 47	8	7	1
Software Development: Developing Small Scale Standalone Applications	HP2N 47	16	7	2
Software Development: Programming Foundations	HP2P 47	8	7	1
Software Development: Systems Foundations	HR8K 47	16	7	2
Systems Development: Introduction	HR8M 47	8	7	1
Systems Development: Testing Software	HR8P 47	8	7	1
Systems Development: User Centred Design	HR8T 47	8	7	1

All of the mandatory SCQF level 8 units encompass a wide range of the knowledge and understanding characteristics required for a SCQF level 8 qualification. Learners will also apply this knowledge and understanding in designing and implementing software solutions to given problems. The project allows the learners to manage resources in undertaking the project and then critically evaluate both their own effectiveness in undertaking an autonomous development and the software solution produced. Learners will need to use a range of standard and specialised applications throughout their studies. This will include using some advanced and specialised skills associated with software development. The Software Development: Data Structures mandatory unit also allows them to use and evaluate numerical and graphical data to understand and trace searching and sorting algorithms. The Team Development optional unit can be used to develop working with others skills, such as taking continuing account of own and others' roles, responsibilities and contributions in carrying out and evaluating tasks.

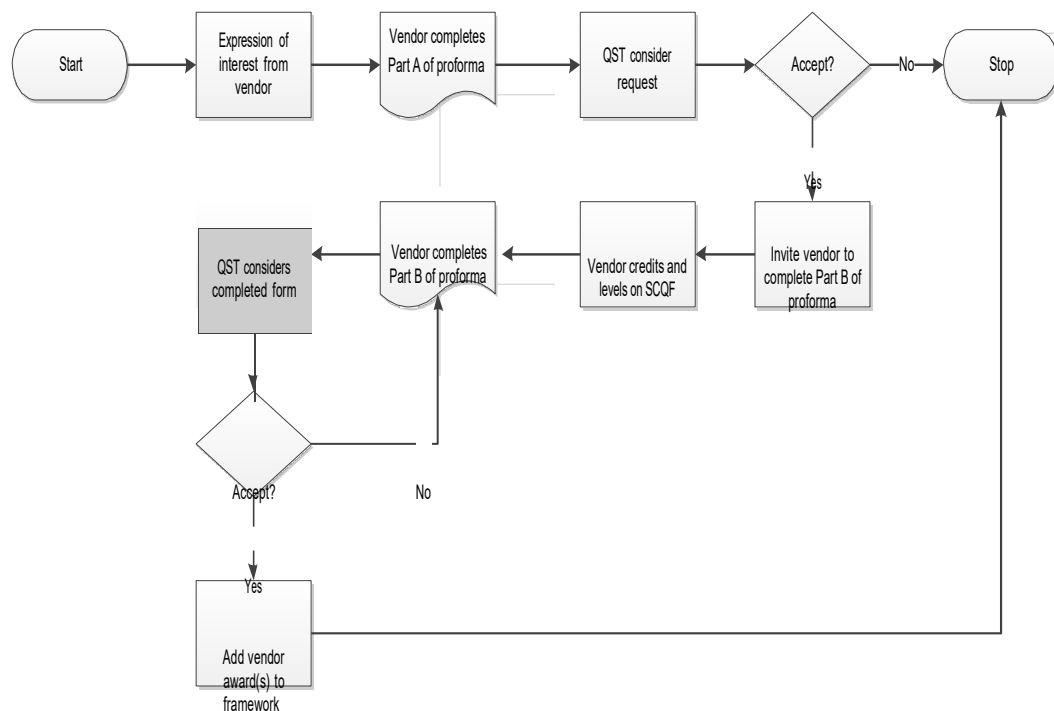
### 2.2 Inclusion of vendor qualifications within the SQA Advanced Diploma in Computing: Software Development

SQA has agreed to participate in a pilot project to evaluate the feasibility of directly accrediting vendor qualifications within this award. This pilot has the approval of SQA's Qualification Committee, chaired by the Director for Qualifications.

Previously, vendor qualifications were accredited through credit transfer, whereby shadow units were created, based on vendor curricula, and candidates were awarded these SQA units on the basis of their vendor achievements. However, this system placed the onus on SQA to revise these shadow units whenever vendors changed their certifications.

The pilot programme places the responsibility for recognition on to the vendors. Vendors are required to credit and level their qualifications using SCQF, and then propose these awards for inclusion in this framework. Their inclusion, or otherwise, will be decided by the appropriate Qualifications Support Team (QST).<sup>1</sup>

**Figure 2: The Vendor Accreditation Process**



The Qualifications Committee has imposed a cap on the contribution of vendor awards to national qualifications. The cap is 25% (7 credits for an SQA Advanced Diploma). This limit applies to all vocational qualifications with direct recognition of third-party awards, based on SCQF. This rule will be reviewed when the pilot is evaluated.

It is the responsibility of each vendor to accredit their awards on SCQF. This may be done by any one of the SCQF-accreditation bodies in Scotland.

<sup>1</sup> During the development phase, the Qualifications Design Team (QDT) will decide on the inclusion of specific vendor qualifications. This task will be taken over by the QST once the award is operationalised.

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Grouping 3 within the qualification structure shows the accredited vendor qualifications at the time of writing. It is anticipated that more vendor awards will be added as and when they are accredited through this process. When a specific vendor award is accredited but found to be similar to an existing (generic) SQA Advanced Unit, these units (the vendor unit and the SQA Advanced Unit) will be grouped into an excluded combination to ensure that candidates cannot double count their knowledge or skills.

All decisions regarding the accreditation of vendor units (for inclusion in this framework) and excluded combinations will be made by the Qualifications Support Team for SQA Advanced awards.

This pilot programme will be evaluated in summer 2013, when final decisions will be made regarding its continuation.

### **3 Aims of the qualification**

The principal aim of this qualification is to prepare candidates for employment in the field of Software Development. It has been designed to provide a distinctive route within the suite of SQA Advanced Computing awards. The award adopts the object-oriented paradigm as its key focus, reflecting current and anticipated demands from both degree programmes and employment opportunities.

#### **3.1 General aims of the qualification**

The general aims of this award are to:

- 1 develop candidates' knowledge and skills in planning, developing and evaluating
- 2 develop employment skills and enhance candidates' employment prospects, particularly relating to the IT industry
- 3 enable progression within the Scottish Credit and Qualifications Framework
- 4 develop study and research skills
- 5 develop transferable skills including Core Skills
- 6 provide academic stimulus and challenge, and foster an enjoyment of the subject
- 7 support learners' continuing professional development

#### **3.2 Specific aims of the qualification**

The specific aims of this award are to:

- 8 prepare students for employment in an IT/Computing-related post at technician or professional level in a software development role
- 9 develop a range of specialist technical software development skills and knowledge in programming and systems development
- 10 prepare students for progression to further study in Computing, Software Development, Software Engineering or a related discipline
- 11 develop an awareness of professional IT issues such as legal and ethical considerations

### 3.3 Graded Unit

The Qualifications Design Team (QDT) selected an examination as the SCQF level 7 Graded Unit for the *SQA Advanced Certificate in Computing* combined with a project as the SCQF level 8 Graded Unit for each of the *SQA Advanced Diploma in Computing* awards. This option was chosen for several reasons, including:

- ◆ continuity: the Graded Units for SQA Advanced Diploma frameworks are project based
- ◆ QDT preference: the QDT supports the use of projects for SQA Advanced Diplomas
- ◆ stakeholder support: Heads of Computing support the use of projects for the SQA Advanced Diplomas
- ◆ Higher Education articulation: a project facilitates progression to degree courses, as it supports both scholarly activities and independent learning The examination used for the SQA Advanced Certificate in Computing helps to prepare candidates for a style of assessment commonly used in degree programmes
- ◆ employer preference: employers express a preference for a project, as it allows the learner to gain familiarity with scenarios simulating real-life experiences

The Graded Units for this award are designed to provide evidence that the candidate has achieved the following aims of the *SQA Advanced Diploma in Computing: Software Development*:

- ◆ To develop candidates' knowledge and skills in planning, developing and evaluating
- ◆ To develop study and research skills
- ◆ To develop transferable skills including Core Skills
- ◆ To provide academic stimulus and challenge, and foster an enjoyment of the subject
- ◆ To prepare students for employment in an IT/Computing-related post at technician or professional level in a software development role
- ◆ To develop a range of specialist technical software development skills and knowledge in programming and systems development
- ◆ To prepare students for progression to further study in Computing, Software Development, Software Engineering or a related discipline
- ◆ To develop an awareness of professional IT issues such as legal and ethical considerations



## 4 Recommended entry to the qualification

Entry to this qualification is at the discretion of the centre. The following information on prior knowledge, skills, experience or qualifications that provide suitable preparation for this qualification has been provided by the Qualification Design Team as guidance only.

Learners would benefit from having attained the skills, knowledge and understanding required by one or more of the following qualifications and/or experience:

- ◆ Passes in two relevant National Courses at SCQF level 6 together with three relevant subjects at National 5
- ◆ A related National Certificate at SCQF level 6
- ◆ A relevant combination of vocational awards at appropriate levels
- ◆ A mix of the above

For example, a school leaver may be expected to possess two SCQF level 6 level passes, (such as Computer Science and English) together with three passes at National 5 (such as Mathematics, Business Administration and History).

A college entrant would be expected to have completed a relevant National Certificate programme such as *Digital Media Computing* at SCQF level 6 or *Computer Games Development* at SCQF level 6. A combination of level 6 and Level 5 National units would also be appropriate. For example, a college entrant may possess a *National Certificate in Mobile Technology* at SCQF level 5 together with individual unit passes at SCQF level 6.

Given the range of vocational awards available to learners, applicants who possess a range of smaller vocational qualifications should also be considered. For example, possession of relevant National Progression Awards (NPA), such as PC Passport and *Computer Games Development* at SCQF level 6, may be considered appropriate for entry to this award.

Applicants with a mixture of the above should also be considered for entry. For example, a candidate who possessed a pass in Computing Science at SCQF level 6 together with one or more relevant NPA awards at SCQF levels 5 or 6 would, most likely, have the necessary knowledge and skills to benefit from undertaking this award.

Equivalent qualifications from other awarding bodies may also be acceptable as would suitable vendor certifications.

Mature candidates with suitable work experience should also be considered subject to the Core Skill entry profile detailed in Section 4.1.

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Entry onto the second year of this award is at the discretion of the centre. For direct entry into Year 2 of the *SQA Advanced Diploma in Computing: Software Development* award candidates should have successfully passed the *SQA Advanced Certificate in Computing* award (GM8K 47) or qualify for credit transfer using the recognised SQA quality procedures to ensure that the learner is credited with the appropriate SCQF units. As the *SQA Advanced Certificate in Computing* is a 12-credit award, it is recommended that candidates top up their qualifications with an additional relevant 3 SQA Credits prior to articulating to the second year of the award. It is highly recommended that candidates have demonstrated practical skills in developing simple applications. This could be demonstrated by successful completion of the 2-credit level 7 feeder unit *Software Development: Developing Small Scale Standalone Applications* (HP2N 47).

## 4.1 Core Skills entry and exit profile

The Core Skill entry profile provides a summary of the associated assessment activities that exemplify why a particular level has been recommended for this qualification. The information should be used to identify if additional learning support needs to be put in place for learners whose Core Skills profile is below the recommended entry level or whether learners should be encouraged to do an alternative level or learning programme.

Core Skill	Recommended SCQF entry level	Associated assessment activities	SCQF exit level
Communication	SCQF level 5	The Core Skill of 'Communications' at SCQF level 6 can be developed comfortably and naturally within the mandatory units <i>Team Working in Computing</i> and <i>Professionalism and Ethics in Computing</i> , but have been signposted rather than embedded.	SCQF level 6
Numeracy	SCQF level 5	The Qualification Design Team have embedded the Core Skill of 'Numeracy' at SCQF level 5 within the mandatory unit <i>Computer Systems Fundamentals</i> . A selection of 'Mathematics' units which have Numeracy embedded at SCQF level 6 are also included in the framework as optional units for centres wishing to offer a higher Core Skill exit level (refer to end of Section 4.1 for more information).	SCQF level 5
Information and Communication Technology (ICT)	SCQF level 5	The Core Skill of 'ICT' at SCQF level 6 is embedded in the mandatory unit <i>Team Working in Computing</i> .	SCQF level 6
Problem Solving	SCQF level 5	The Core Skill component of 'Critical Thinking' which is part of the Problem Solving Core Skill is embedded within the mandatory unit of <i>Developing Software: Introduction</i> . The Core Skill of 'Problem Solving' at SCQF level 6 is embedded in the mandatory unit <i>Troubleshooting Computing Problems</i> .	SCQF level 6
Working with Others	SCQF level 5	The Core Skill of 'Working with Others' at SCQF level 6 is embedded in the mandatory unit <i>Team Working in Computing</i> .	SCQF level 6

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Core Skills can be embedded or signposted within units. Embedded is where the development of a Core Skill is incorporated into the unit and where the unit assessment also covers the requirements of Core Skill assessment at a particular level. Units that have embedded Core Skill(s) will be automatically certificated upon successful completion of the unit assessments.

Signposted means identifying opportunities within the unit for developing Core Skills other than those that can be summatively assessed and certificated. This allows the development of the Core Skills through teaching and learning to be utilised and these opportunities are highlighted within the unit support notes to those delivering and managing the units.

Additional opportunities to attain the Core Skill of Numeracy at a higher SCQF level exist in the following units:

- HR7E 47     *Mathematics: Calculus and Matrices for Computing*  
(embedded — SCQF level 6)
- HP1H 47     *Mathematics for Computing 1* (Using Number embedded — SCQF level 6, Using Graphical Information embedded — SCQF level 5)
- HR7R 47     *Mathematics for Interactive Computing: Essential Techniques*  
(signposted — SCQF level 6)

## **5 Additional benefits of the qualification in meeting employer needs**

This qualification is designed to meet a specific purpose and what follows are details on how that purpose has been met through mapping of the units to the aims of the qualification. Through meeting the aims, additional value has been achieved by linking the unit standards with those defined in National Occupational Standards and/or trade/professional body requirements. In addition, significant opportunities exist for learners to develop the more generic skills, known as Core Skills through doing this qualification.

## SQA Advanced Diploma

### 5.1 Mapping of qualification aims to units

To ensure that the aims of the national qualification are met, the QDT has ensured that all specific aims are covered by the core units defined in the award. Optional units will, however, play pivotal a role in extending the learner's depth of understanding with reference to specific aims.

- 1 To develop candidates' knowledge and skills in planning, developing and evaluating
- 2 To develop employment skills and enhance candidates' employment prospects, particularly relating to the IT industry
- 3 To enable progression within the Scottish Credit and Qualifications Framework
- 4 To develop study and research skills
- 5 To develop transferable skills including Core Skills
- 6 To provide academic stimulus and challenge, and foster an enjoyment of the subject
- 7 To support learners' continuing professional development
- 8 To prepare students for employment in an IT/Computing-related post at technician or professional level in a software development role
- 9 To develop a range of specialist technical software development skills and knowledge in programming and systems development
- 10 To prepare students for progression to further study in Computing, Software Development, Software Engineering or a related discipline
- 11 To develop an awareness of professional IT issues, such as legal and ethical considerations

Unit title and code	Aims										
	1	2	3	4	5	6	7	8	9	10	11
Developing Software: Introduction (HP1R 47)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Professionalism and Ethics in Computing (HP29 47)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Computer Systems Fundamentals (HP1T 47)	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Troubleshooting Computer Problems (HP1V 47)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Team Working in Computing (HP1X 47)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Computing: Graded Unit 1: Exam (HR9J 47)		✓	✓	✓	✓	✓	✓	✓	✓	✓	
Software Development: Object Oriented Programming (HP2L 48)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Systems Development: Object Oriented Analysis and Design (HP2M 48)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Software Development: Data Structures (HP2K 48)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Computing: Software Development: Graded Unit 2: Project (HT8C 48)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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### 5.2 Mapping of National Occupational Standards (NOS) and/or trade body standards

IT and Telecoms Professional National Occupational Standards (NOS) have been developed in parallel with and as part of the IT Professional Competency Model — e-skills Procom. E-skills Procom is being established as the industry recognised, internationally relevant training framework for organising courses and qualifications. It defines knowledge, understanding, and competencies for seven broad disciplines. The disciplines are:

- 1 sales and marketing
- 2 business change
- 3 programme and project management
- 4 solutions architecture
- 5 solution development and implementation
- 6 information management and security
- 7 IT service management and delivery

The content of disciplines 1–3, while important to the IT&T sectors, do not fall within the scope of e-skills UK for NOS. Consequently these will not formally be recognised as NOS as is the case for disciplines 4–7. To maintain the relationship these NOS have been numbered to reflect the relationship to e-skills Procom. Within each discipline there exist a number of sub-disciplines. Within each sub-discipline the competences relating to a particular role have been defined.

This is an example of a structure and as there are many more optional units available then this is not an exhaustive list.

- |  |   |
|--|---|
| 4.1 Systems Architecture                             | 5.1 Systems Development   |
| 4.2 Data Analysis                                    | 5.2 Software Development  |
| 4.3 Human Needs Analysis                             | 5.3 IT/Technology Solution testing                                  |
| 4.4 Systems Analysis                                 | 5.4 Systems Integration   |
| 4.5 Data Design                                      | 5.5 IT/Technology systems installation, implementation and handover |
| 4.6 Human Computer Interaction/ Interface design     | 6.1 Information management  |
| 4.7 Systems Design                                   | 6.2 IT Security management  |
| 4.8 IT/Technology Infrastructure Design and Planning | 6.3 IT Disaster Recovery  |

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Unit title and code	National Occupational Standards															
	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3
Developing Software: Introduction (HP1R 47)		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
Professionalism and Ethics in Computing (HP29 47)														✓	✓	
Computer Systems Fundamentals (HP1T 47)	✓					✓			✓		✓		✓			
Troubleshooting Computer Problems (HP1V 47)	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Team Working in Computing (HP1X 47)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Computing: Graded Unit 1 (HR9J 47)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Software Development: Object Oriented Programming (HP2L 48)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Systems Development: Object Oriented Analysis and Design (HP2M 48)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Software Development: Data Structures (HP2K 48)		✓			✓		✓		✓	✓	✓					
Computing: Software Development: Graded Unit 2: Project (HT8C 48)		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓		



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### 5.3 Mapping of Core Skills development opportunities across the qualification

Unit code	Unit title	Communication		Numeracy		Information Communication Technology (ICT)		Problem Solving			Working with Others	
		Written	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/ Creating information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
HP1R 47	Developing Software: Introduction							Embedded (SCQF 6)				
HP1X 47	Team Working in Computing	Signposted (SCQF 6)	Signposted (SCQF 6)			Embedded (SCQF 6)	Embedded (SCQF 6)				Embedded (SCQF 6)	Embedded (SCQF 6)
HP1V 47	Troubleshooting Computing Problems							Embedded (SCQF 6)	Embedded (SCQF 6)	Embedded (SCQF 6)		
HP1T 47	Computer Systems Fundamentals			Embedded (SCQF 5)	Embedded (SCQF 5)							
HP29 47	Professionalism and Ethics in Computing	Signposted (SCQF 6)	Signposted (SCQF 6)			Signposted (SCQF 6)	Signposted (SCQF 6)					
HP2L 48	Software Development: Object Oriented Programming							Signposted (SCQF 6)	Signposted (SCQF 6)	Signposted (SCQF 6)		
HP2M 48	Systems Development: Object Oriented Analysis and Design							Signposted (SCQF 6)	Signposted (SCQF 6)	Signposted (SCQF 6)		
HP2K 48	Software Development: Data Structures							Signposted (SCQF 6)	Signposted (SCQF 6)	Signposted (SCQF 6)		
HT8C 48	SQA Advanced Diploma in Computing: Software Development: Graded Unit 2 (Project)							Embedded (SCQF 6)	Embedded (SCQF 6)	Embedded (SCQF 6)		

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### 5.3 Mapping of Core Skills development opportunities across the qualification

J552 48	Programming for Data							Embedded (SCQF 6)	Embedded (SCQF 6)	Embedded (SCQF 6)		
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### 5.4 Assessment strategy for the qualification

The units listed below are the mandatory units which, when added to the mandatory *SQA Advanced Certificate in Computing* units, form the 14 mandatory credits for the *SQA Advanced Diploma in Computing: Software Development*.

Unit	Assessment			
	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Software Development: Developing Small Scale Standalone Applications (HP2N 47)	30 question closed-book multiple-choice test	Open-book assessment with candidates providing evidence to demonstrate their knowledge and skills by showing that they can develop test and deploy a sufficiently complex small-scale standalone application		
Software Development: Object Oriented Programming (HP2L 48)	Open-book assessment where candidates will need to provide evidence to demonstrate their Knowledge and/or skills by showing that they can investigate object-oriented programming techniques and apply them appropriately to implement and test a given object-oriented design.			
Systems Development: Object Oriented Analysis and Design (HP2M 48)	Closed-book Assessment Candidates will need to provide evidence to demonstrate their knowledge by showing that they can identify and critically analyse object-oriented concepts, models, techniques and life cycle stages of object-oriented design.			
	Open-book Assessment Candidates will need to provide evidence to demonstrate their knowledge and/or skills by showing that they can analyse a given problem and produce a static and dynamic model for the scenario.			
Software Development: Data Structures (HP2K 48)	Closed-book knowledge based assessment such as an objective test	Supervised open-book algorithm tracing exercises		
		Open-book assessment that may well consist of a series of implementation completion exercises conducted during the delivery of the unit. Candidates should be given the designs and partial classes to allow them to concentrate on implementing the associations and corresponding methods		
SQA Advanced Diploma in Computing: Software Development: Graded Unit 2: Project (HT8C 48)	All Outcomes: Practical Assignment. The candidate will be required to provide documentation which supports evidence of the candidate's ability to plan, develop, implement and evaluate technical skills gained throughout their course.  The project is a complex task which consists of three stages: planning; developing; and evaluating.			

## 6 Guidance on approaches to delivery and assessment

All degree programmes related to software development that are offered in Scotland incorporate the object-oriented paradigm as the prime objective within the first two years of study. This reflects the importance of this paradigm to modern software development. Integrated development environments offered by both vendors and open-source organisations use this paradigm as the fundamental technology in developing software applications and middleware libraries. The *SQA Advanced Diploma in Computing: Software Development* Group Award reflects focus.

There is a wealth of evidence that many learners find learning programming difficult. This Group Award provides a range of SCQF level 7 units that are designed to help build learners' skills in this fundamental software development skill. The SCQF level 7 feeder unit *Software Development: Developing Small Scale Standalone Applications* is specifically designed to allow learners to see how using object libraries can allow them to build interactive applications quickly and efficiently. The unit also allows them to learn about and understand a range of fundamental programming concepts, including the primary constructs (sequence, selection and repetition) and modularity (functions and procedures). In addition, the unit introduces the learner to user-centred design principles.

A number of units within this framework incorporate some entrepreneurial avenues, in the hope that this might provide the impetus for successful candidates to set up or find direct employment in small businesses. This group award's design also ensures that the more traditional route to employment via degree programmes is available for successful candidates.

### 6.1 Sequencing/integration of units

Providing the mandatory units of the award are covered, centres are free to devise their own sequence for delivery of units. It is recommended however that SCQF level 7 units are concentrated in Year 1 with SCQF level 8 units concentrated in Year 2.

Where possible, learners should complete a SCQF level 7 feeder unit before undertaking associated SCQF level 8 unit(s). For example;

The level 7 feeder unit *Software Development: Developing Small Standalone Applications* should be undertaken before tackling the mandatory units *Software Development: Object Oriented Programming* (HP2L 48) and *Systems Development: Object Oriented Analysis and Design* (HP2M 48)

Given the fundamental importance of databases, mobile technology and web-based technology in our everyday lives, it would make sense to try to ensure that learners are exposed to all of these technologies. The framework includes a wide range of units that can allow centres to introduce learners to developing for and using each of these technologies.

It is recommended that where possible assessments should be integrated to reduce the assessment load.

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In selecting combinations of optional units centres are also likely to consider issues such as:

- ◆ articulation arrangements with universities
- ◆ needs of employers
- ◆ resources available to the centre

An example course schedule plan is suggested below, based upon a two-year course, with each year comprising three blocks. Note that centres are free to devise their own alternative course plans:

Year 1		
Block 1	Block 2	Block 3
Developing Software: Introduction (HP1R 47) 1 credit level 7	Professionalism and Ethics in Computing (HP29 47) 1 credit level 7	SQA Advanced Certificate in Computing: Graded Unit 1: Exam (HR9J 47) 1 credit level 7
Computer Systems Fundamentals (HP1T 47) 1 credit level 7	Troubleshooting Computer Problems (HP1V 47) 1 credit level 7	Team Working in Computing (HP1X 47) 1 credit level 7
Systems Development: User Centred Design (HR8T 47) 1 credit level 7	Software Development: Developing Small Standalone Applications (HP2N 47) 2 credits level 7	
Databases: Introduction (HR89 47) 1 credit level 7	Systems Development: Testing Software (HR8P 47) 1 credit level 7	Mathematics for Computing 1 (HP1H 47) 1 credit level 7
Web Development Fundamentals (HR7M 47) 1 credit level 7	Developing Mobile Web Based Applications: An Introduction (HR9X 47) 2 credits level 7	

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### Year 2

Block 1	Block 2	Block 3
Software Development: Object Oriented Programming (HP2L 48) 2 credits level 8		Mathematics for Computing 2 (HR6T 48) 1 credit level 8
Systems Development: Object Oriented Analysis and Design (HP2M 48) 2 credits level 8		Self-Describing Data (XML) (HP2H 48) 1 credit level 8
Software Development: Data Structures (HP2K 48) 2 credits level 8		Web Development: Producing a Data Driven Website (HT0L 48) 1 credit level 8
Computing: Introduction to Project Management (HP21 47) 1 credit level 7	SQA Advanced Diploma in Computing: Software Development: Graded Unit 2 2 credits level 8	
SQL: Introduction (HP2E 47) 1 credit level 7	Relational Database Management Systems (HP2J 48) 2 credits level 8	

	Mandatory Units
	Recommended Feeder Unit

There are a number of units within the framework that could be combined to both help reduce the assessment burden on candidates and provide a more holistic learning experience. Care should be taken, if this approach is adopted, to ensure that candidates have the opportunity to pass each of the grouped units individually. One approach is to use re-assessments that target individual units rather than the grouped units.

Some examples where this approach might be appropriate include:

- ◆ The *Systems Development: User Centred Design* (HR8T 47) Unit could be combined with the *Software Development: Developing Small Scale Standalone Applications* (HP2N 47) Unit. The open-book assessment for the *Systems Development: User Centred Design* Unit could cover some of the requirements for the *Developing Small Scale Standalone Applications* Unit.
- ◆ The delivery of the mandatory *Software Development: Object Oriented Programming* (HP2L 48) Unit should be co-ordinated with the delivery of the mandatory *Software Development: Object Oriented Analysis and Design* (HP2M 48) Unit to help ensure that learners can fully understand the object-oriented paradigm. The assessments for the two units should be separated to avoid the pitfall of failing both units.
- ◆ Aspects of the mandatory *Software Development: Data Structures* (HP2K 48) unit could be integrated with aspects of the mandatory *Software Development: Object Oriented Programming* (HP2L 48) unit illustrating how a class can encapsulate an ADT. The final Outcome of the *Software Development: Data Structures* Unit illustrates how one too many associations in class diagrams can be implemented using standard generic collection classes. The assessments for the two units should be separated to avoid the pitfall of failing both units.
- ◆ The unit *Systems Development: Testing Software* (HR8P 47) could be combined with any of the development units. This would allow learners to conceptualise the importance of testing. Care would need to be taken that candidates can still pass the testing elements of the development unit even if they fail to meet the requirements of the *Systems Development: Testing Software* unit.
- ◆ The requirements for the units *SQL: Introduction* (HP2E 47) and *Relational Database Management Systems* (HP2J 48) could be achieved by undertaking the Oracle Academy vendor award.

### 6.2 Recognition of Prior Learning

SQA recognises that learners gain knowledge and skills acquired through formal, non-formal and informal learning contexts.

In some instances, a full group award may be achieved through the recognition of prior learning. However, it is unlikely that a learner would have the appropriate prior learning and experience to meet all the requirements of a full group award.

The recognition of prior learning may **not** be used as a method of assessing in the following types of units and assessments:

- ◆ SQA Advanced Graded Units
- ◆ Course and/or external assessments
- ◆ Other integrative assessment units (which may or not be graded)
- ◆ Certain types of assessment instruments where the standard may be compromised by not using the same assessment method outlined in the unit
- ◆ Where there is an existing requirement for a licence to practise
- ◆ Where there are specific Health and Safety requirements
- ◆ Where there are regulatory, professional or other statutory requirements
- ◆ Where otherwise specified in an assessment strategy

More information and guidance on the *Recognition of Prior Learning* (RPL) may be found on our website [www.sqa.org.uk](http://www.sqa.org.uk).

### 6.3 Opportunities for e-assessment

The units in this award offer numerous opportunities for e-assessment ranging from the more obvious objective question-based, closed-book assessments to the use of e-portfolios and video for some of the open-book assessments. It is also possible to use social media software to record and facilitate group work where appropriate. Each unit specification includes suggestions of how e-assessments might be used effectively.

As part of an assessment strategy, centres are encouraged to investigate the option of e-assessment to support the programme. E-assessment may take a number of forms, and while it may be feasible in the future to conduct all assessment in an online format, currently some formats are more amenable to e-assessment than others.

The most obvious format is that of objective tests, eg multiple-choice or short-response tests, and some SQA units already have an evidence requirement mandating the use of this type of test.

Below is a sample from within the core units of the group award of where the possibility of e-assessment may exist:

Multiple-choice/Short-response e-assessment opportunities		
Unit title	Code	Outcome
Software Development: Data Structures	HP2K 48	1

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Systems Development: Object Oriented Analysis and Design	HP2M 48	1
Software Development: Developing Small Standalone Applications	HP2N 47	1

E-portfolio opportunities			
Unit title	Code	Outcome	Type
SQA Advanced Diploma in Computing Software Development: Graded Unit (Project)	HT8C 48	All	Project proposal Project Documentation
Software Development: Data Structures	HP2K 48	2,3 & 4	Portfolio of development exercises
Software Development: Object Oriented Programming	HP2L 48	All	Development and testing documentation

## 6.4 Support materials

A range of assessment support packs (ASPs) have been produced for a number of mandatory and optional units in this group award. These packs are available on the SQA secure website and access can be sought through the SQA coordinator in each centre.

## 6.5 Resource requirements

The mandatory SCQF level 8 units in this award will require the use of a modern object-oriented, integrated development environment, such as Eclipse or Microsoft's Visual Studio. Eclipse is an open-source development environment available from [www.eclipse.org](http://www.eclipse.org). The express version of Visual Studio is available as a free download from [www.microsoft.com/visualstudio](http://www.microsoft.com/visualstudio) although the professional versions do offer some benefits. It is envisaged that the mandatory units would best be delivered using either Java or C#.

Centres intending to deliver the optional Units *Relational Database Management Systems* (HP2J 48) and *SQL: Introduction* (HP2E 47) might consider adopting the Oracle Academy. Further information on this is available from [www.sqa.org.uk/mini/27044.html](http://www.sqa.org.uk/mini/27044.html)



## 7 General information for centres

### 7.1 Equality and inclusion

The unit specifications making up this group award have been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners will 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](http://www.sqa.org.uk/assessmentarrangements)

### 7.2 Internal and external verification

All instruments of assessment used within this/these qualification(s) should be internally verified, using the appropriate policy within the centre and the guidelines set by SQA.

External verification will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external verification can be found in *SQA's Guide to Assessment* ([www.sqa.org.uk/GuideToAssessment](http://www.sqa.org.uk/GuideToAssessment)).

## 8 Glossary of terms

**Embedded Core Skills:** is where the assessment evidence for the unit also includes full evidence for complete Core Skill or Core Skill components. A learner successfully completing the Unit will be automatically certificated for the Core Skill. (This depends on the unit having been successfully audited and validated for Core Skills certification.)

**Finish date:** The end of a group award's lapsing period is known as the finish date. After the finish date, the group award will no longer be live and the following applies:

- ◆ Candidates may not be entered for the group award.
- ◆ The group award will continue to exist only as an archive record on the Awards Processing System (APS).

**Graded Unit:** Graded Units assess learners' ability to integrate what they have learned while working towards the units of the group award. Their purpose is to add value to the group award, making it more than the sum of its parts, and to encourage learners to retain and adapt their skills and knowledge.

**Lapsing date:** When a group award is entered into its lapsing period, the following will apply:

- ◆ The group award will be deleted from the relevant catalogue.
- ◆ The group award specification will remain until the qualification reaches its finish date at which point it will be removed from SQA's website and archived.
- ◆ No new centres may be approved to offer the group award.
- ◆ Centres should only enter candidates whom they expect to complete the group award during the defined lapsing period.

**SQA Credit Value:** The credit value allocated to a unit gives an indication of the contribution the unit makes to an SQA Group Award. An SQA Credit value of 1 given to an SQA Unit represents approximately 40 hours of programmed learning, teaching and

## **SQA Advanced Diploma** assessment.

**SCQF:** The Scottish Credit and Qualification Framework (SCQF) provides the national common framework for describing all relevant programmes of learning and qualifications in Scotland. SCQF terminology is used throughout this guide to refer to credits and levels. For further information on the SCQF visit the SCQF website at **[www.scqf.org.uk](http://www.scqf.org.uk)**

**SCQF credit points:** SCQF credit points provide a means of describing and comparing the amount of learning that is required to complete a qualification at a given level of the Framework. One National Unit credit is equivalent to 6 SCQF credit points. One National Unit credit at Advanced Higher and one SQA Credit (irrespective of level) is equivalent to 8 SCQF credit points.

**SCQF levels:** The level a qualification is assigned within the framework is an indication of how hard it is to achieve. The SCQF covers 12 levels of learning. SQA Advanced Certificates and SQA Advanced Diplomas are available at SCQF levels 7 and 8, respectively. SQA Advanced units will normally be at levels 6–9 and Graded Units will be at level 7 and 8. National Qualification Group Awards are available at SCQF levels 2–6 and will normally be made up of National units which are available from SCQF levels 2–7.

**Subject Unit:** Subject units contain vocational/subject content and are designed to test a specific set of knowledge and skills.

**Signposted Core Skills:** refers to opportunities to develop Core Skills arise in learning and teaching but are not automatically certificated.

## History of changes

It is anticipated that changes will take place during the life of the qualification and this section will record these changes. This document is the latest version and incorporates the changes summarised below. Centres are advised to check SQA's APS Navigator to confirm they are using the up to date qualification structure.

**NOTE:** Where a unit is revised by another unit:

- ◆ No new centres may be approved to offer the unit which has been revised.
- ◆ Centres should only enter candidates for the unit which has been revised where they are expected to complete the unit before its finish date.

Version Number	Description	Date
10	<b>Addition of Optional Unit:</b> J1CP 48 Machine Learning added to the framework as an optional unit (group 2).	17/02/25
09	<b>Addition of Optional Unit:</b> J7YE 47 Penetration Testing added to the framework as an optional unit.	27/11/23
08	<b>Addition of Optional Units:</b> Application Security - J54X 47 and Programming for Data - J552 48 added as optional units to Group 1 framework.	04/12/20
07	<b>Addition of Optional Unit:</b> J54E 47 Agile Development: Introduction added as an Optional unit	16/11/20
06	<b>Addition of Optional Unit:</b> J3CP 47 Data Flow added as an Optional Unit	24/03/20
05	<b>Addition of Optional Unit:</b> J1S1 47 Data Security added as an Optional unit.	17/12/19
04	<b>Addition of Optional Units:</b> J1GK 47 Web Technologies 1: HTML and CSS added to Group 4 Options	07/11/18
03	<b>Addition of Optional Units:</b> HR8L 48 Software Development: Event Driven Programming HT0D 48 3D Modelling and Animation HT0C 48 Software Development: Developing for the WWW HT0F 46 Hardware Concepts HT0E 46 Operating System Concepts HT90 48 Software Development: Data Structures and Performance HT91 48 Software Development: Programming Paradigms HT92 48 Web Development: Advanced Web Scripting Concepts HT93 48 Software Development: Object Oriented Programming-Advanced Concepts HT05 47 Web Development: Essential Content J12G 47 Compositing and Motion Graphics HP2V 48 Managing a Web Server  <b>Added to Group 4 Local Options</b>	26/10/18
02	The unit Computer Forensics Fundamentals (HP28 47) has been revised by unit Digital Forensics (J0L3 47). The unit Ethical Hacking Fundamentals (HR90 47) has been revised by unit Ethical Hacking (J0L2 47). Centres should enter candidates for the revised units from 1 <sup>st</sup> August 2018. Centres may continue to enter candidates to HP28 47 or HR90 47, but candidates must have completed and results submitted by no later than 31/07/2021.	June 2018

## **Acknowledgement**

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

## **9 General information for learners**

This section will help you decide whether this is the qualification for you by explaining what the qualification is about, what you should know or be able to do before you start, what you will need to do during the qualification and opportunities for further learning and employment.

As the title of the award indicates, this qualification is about learning how to develop software using modern integrated development environments. Successful completion of the qualification could be your first step towards a challenging and exciting career in software development.

In the first year of the award you will learn about computing in general and how software is at the heart of how computing devices operate. You will also be introduced to the key development skills of analysis, design, implementation and testing and will have the opportunity to start applying these skills to develop and deploy your own small-scale application, which might take the form of a mobile or web-based app.

In the second year of the course, you will be introduced to the object-oriented approach to developing software. This will let you see how you can start to design and develop class libraries both as an individual and within teams. You will learn how to use UML to analyse and design static and dynamic models of software systems. You will use these models to implement solutions using a modern, object-oriented programming language such as Java and/or C#.

On successful completion of the course you should have acquired the skills needed to develop and test small applications, know how to use software libraries and be able to understand how the object-oriented paradigm can help in software re-use. There is an increasing number of employment opportunities with many small businesses seeking individuals with the skills needed to develop and support e-commerce activities, adapt and customise off the shelf application and design and develop small mobile apps. All of these activities use object libraries. You can further expand your employment opportunities by progressing onto a range of computing-related degree courses. Your SQA Advanced Diploma in will allow direct entry to second and third year of a wide number of degree courses in Scotland.

Ideally you should have had some experience using computer systems and have gained some relevant SCQF level 6 qualifications prior to undertaking this qualification but remember entrance to the qualification is at the discretion of the delivery centre. Contact your local centre to discuss if direct entry to the course is advisable or if they would recommend undertaking a feeder course prior to undertaking this qualification.