

## **SQA Advanced Unit specification: general information**

**Unit title:** Software Development: Developing Websites for Multiplatform Use (SCQF level 8)

**Unit code:** HR9L 48

**Superclass:** CB

**Publication date:** August 2017

**Source:** Scottish Qualifications Authority

**Version:** 01

### **Unit purpose**

This Unit is designed to develop a broad knowledge of the concepts, principles, boundaries and scope of software development using client and server-side scripting languages for optimised website production. These will be reinforced by developing the practical skills required in using industry structures and the features of scripting languages in the creation of software solutions to interactive web based problems. The similarities between scripting and traditional/Object Oriented Programming (OOP) languages will be highlighted. This Unit forms part of an SQA Advanced Qualification in Computing, although it can also be used as a standalone Unit by candidates wishing to acquire software development skills using scripting languages required for a range of device usage.

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

- 1 Describe the scripting features used in the development of websites optimised for multiplatform use.
- 2 Design a website for specified devices using the principles of software planning and design.
- 3 Use appropriate tools and techniques to optimise websites developed for specified devices.
- 4 Utilise server-side scripting including database processing of requests.

### Recommended prior knowledge and skills

Access to this Unit will be at the discretion of the centre, however it is recommended that candidates have prior experience of using computer systems or studied a programming language at NQ level. This may be evidenced by possession of: SQA Advanced Unit HP6L 47: Information Technology: Applications Software 1 or SQA Advanced Unit HR9X 47: Developing Mobile Web Based Applications: An Introduction. However, it is recommended that a candidate has completed or is in the process of completing SQA Advanced Unit HR9X 47 Developing Mobile Web Based Applications: An Introduction. Alternatively, candidates should have some practical work experience and some appreciation of the role of web design and production.

### Credit points and level

2 SQA Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8\*)

*\*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.*

### Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

### Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The assessment exemplar for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable Instrument of Assessment. Centres wishing to develop their own assessments should refer to the assessment exemplar to ensure a comparable standard. Assessment exemplars are available on SQA's secure website.

### 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

Describe the scripting features used in the development of websites optimised for multiplatform use.

#### Knowledge and/or Skills

- ◆ Document Object Model (DOM)
- ◆ Client and server-side scripting
- ◆ Methods of embedding scripts
- ◆ Fundamentals of security issues associated with websites

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can describe:

- ◆ the DOM functionality for a range of multiplatform devices
- ◆ the differences between client and server-side scripting highlighting a couple of examples of the usage of each
- ◆ suitable methods used to embed scripts within web pages that will work on a range of devices
- ◆ some of the different scripting languages used and highlight their advantages and disadvantages dependant on the type of device and industry structure
- ◆ code to handle specified events, eg touch screen, push, slide, zoom and key interaction
- ◆ current security issues

This is an open-book assessment that should take place under supervised conditions. Assessors must assure themselves of the authenticity of each candidate's submission.

### Outcome 2

Design a website for specified devices using the principles of software planning and design.

#### Knowledge and/or Skills

- ◆ Scoping a project
- ◆ Design specifications
- ◆ Understanding of device requirements
- ◆ User expectations
- ◆ Analysis
- ◆ Design techniques
- ◆ Algorithms
- ◆ Graphical solutions
- ◆ Project plans
- ◆ Testing

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills in the design and production of a website using the principles of software planning and design. This assessment is integrated with Outcomes 3 and 4.

### Outcome 3

Use appropriate tools and techniques to optimise websites developed for specified devices.

#### Knowledge and/or Skills

- ◆ Implement the design using appropriate programming concepts
- ◆ Generate code to handle specified events, eg touch screen, push, slide, zoom and key interaction
- ◆ Manipulate the use of cookies
- ◆ Implement security issues in web development for use on specified devices

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills in using appropriate tools and techniques to implement websites developed for a range of platforms.

This task is integrated with Outcomes 2 and 4; please see the Evidence Requirements for Outcome 4. Assessors must assure themselves of the authenticity of each candidate's submission.

### Outcome 4

Utilise server-side scripting including database processing of requests.

#### Knowledge and/or Skills

- ◆ Generate code to read data from the database from a specific device
- ◆ Generate code to insert data including records into the database from a specific device
- ◆ Generate code to delete data including records from the database from a specific device
- ◆ Generate code to update data including records in the database from a specific device

#### Evidence Requirements

Outcomes 2, 3 and 4 should be assessed by means of a project. The project should be given to the candidate in the form of a project brief from which the candidate produces the design documentation in Outcome 2, subsequently producing the code in Outcomes 3 and 4. The project may take the form of a website, an e-commerce type application or a viable proposal from the candidate subject to the assessor's agreement that this meets SCQF level 8. The candidate could also choose to redevelop an existing website produced by them during an earlier Unit.

Achievement in Outcome 2 will be evidenced by the production of a design document to be integrated with Outcomes 3 and 4. The design document should include a prototype of the website including optimisation for mobile use, a detailed design including algorithms, modules of all scripts including the definition of all events and their handlers in the design and a test plan and test history showing expected and actual results.

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can utilise server-side scripting including database processing of requests. Candidates will also produce a prototype with working, functional and an active set of scripts written for specified platforms, which:

- ◆ is implemented in an appropriate scripting language suitable for mobile devices
- ◆ demonstrates the use of control structures and modularity
- ◆ demonstrates the use of client and server based objects
- ◆ includes appropriate comments
- ◆ generates code based on user interaction dependant on device
- ◆ makes use of alerts
- ◆ includes form data which should be validated at the client side. Data should be transferred using the POST or GET method to be processed by the web server
- ◆ has events which include:
  - screen events, eg touch, push, slide and zoom
  - page events
  - key events
  - change events
  - button events
  - submit event

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- ◆ includes cookie(s) to store the users name or other relevant details, eg score
- ◆ includes suitable security measures
- ◆ includes the code generated as specified in Outcome 4

This is an open-book assessment that should take place in unsupervised conditions. Assessors must assure themselves of the authenticity of each candidate's submission.

### Unit specification: support notes

#### **Unit title:** Software Development: Developing Websites for Multiplatform Use (SCQF level 8)

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 80 hours.

The centre has the option of working with websites produced at an earlier stage by the candidate. If this option is used, then the allocated time for optimising the site is 40 hours.

#### **Guidance on the content and context for this Unit**

The content of this Unit is based on Web Development. With the change in how people use the internet, the Unit has been developed to recommend to centres to teach the development of websites not just for desktop computers but for other devices such as mobile phones, hand held devices and television.

Mobile use is growing quickly. 20% of Christmas (2011) shopping in the UK was carried out on a mobile device. Mobile users require access to corporate information and services of varying types, depending on their role and responsibilities. When you design a website to work on a mobile device, you must consider your users' needs, behaviours, and expectations.

This Unit has been developed with a view towards scripting rather than towards the more formal languages such as Java. The intention of the Unit is to keep the Outcomes as generic as possible to allow the Unit to be delivered using suitable scripting and web development languages, to accommodate for HTML and CSS (eg Java, JavaScript, HTML5, CSS, Visual basic, C++ and Action Script) for specific devices that are available (eg Windows Mobile, Blackberry, iPhone, iPad, Android, etc). One of the main aims of the Unit is for candidates to give consideration to the challenges of designing for different devices and the support for different technologies and screen specifications within their project.

Outcome 1 concentrates on the fundamentals of multiplatform mobile technology which design and computer professionals should have an understanding of and the medium in which mobile technology operates.

It should be stressed to the candidate that this style of project used in this Unit can still benefit from the traditional principles of software engineering. Areas that may be covered could include — browser detection, date and time manipulation, clocks, calendars, passwords, mathematical functions, etc.

It is recommended that the project covers how devices utilise interactive events such as push, touch, zoom and slide screen events. It should also cover page, key, submit and button events.

The type of project undertaken by the candidate may include an e-commerce style 'shopping cart' that accesses a database of products. If this style of project is undertaken the candidate would not be required to activate any means of credit or debit card payment.

Another type of project may be an online quiz where a database of questions can be accessed randomly. Candidates can also use a website previously designed, developed and produced by them earlier and optimise this for mobile use.

### Guidance on the delivery of this Unit

It is expected that a candidate is either studying this Unit in conjunction with or following the completion of the SQA Advanced Unit HR9X 47 Developing Mobile Web Based Applications: An Introduction.

Delivery of the Unit would be best served by completing Outcome 1 first. Outcome 1 could be assessed by means of a report. The topics covered could be delivered in such a way that the practical uses and implications of the content of the Outcome are made clear to candidates.

The remaining Outcomes should be assessed via a project. Integration of Outcomes 2, 3 and 4 will provide a more holistic approach more akin to the production of a software product.

It is recommended that centres could use a Web Server of a current standard to accommodate server-side scripting. Database access can be done by giving the candidate a predefined database or by the candidate composing a database relevant to their chosen project. The actual database package used could be at least ODBC (Open Database Connectivity), JDBC (Java Database Connectivity) or CFML (ColdFusion Markup Language) compliant.

### Guidance on the assessment of this Unit

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

### Assessment Guidelines

**Outcome 1** Describe the scripting features used in the development of websites optimised for multiplatform use.

This Outcome concentrates on the fundamentals of multiplatform mobile technology which design and computer professionals should have an understanding of and the medium in which mobile technology operates. Different technologies should be compared outlining advantages and disadvantages. Relevant protocols can be shown with emphasis on current and emerging standards. Suitable diagrams of various structures can be used to illustrate basic system configuration(s).

Outcome 1 could be assessed by means of a report covering a description of the scripting features required for developing websites for multiplatform mobile devices. The report should deal with the user experience and how scripting is utilised on a range of devices. Candidates should develop research techniques in sourcing information.

This is an open-book assessment that should take place in a supervised environment. Assessors must assure themselves of the authenticity of each candidate's submission. Reference will be permitted to textbooks, hand-outs or other material that candidates have prepared for themselves.



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**Outcome 2** Design a website for specified devices using the principles of software planning and design.

Achievement in this Outcome will be evidenced by the production of a design document to be integrated with Outcomes 3 and 4. The design document should include a description of the user expectations, determining who will use the site, how the site will be used and identify the user tasks to operate the site.

The design document should include a prototype of the website use, a detailed design including algorithms, modules of all scripts including the definition of all events and their handlers in the design and a test plan and test history showing expected and actual results. A list of the user's requirements and expectations should be delivered with solutions to answering the design problems.

It is suggested that prototypes will be produced for the more complex areas of the site and as development proceeds. This should assess the functionality and workability of the site before the completion of the project. Expected duration of time involvement will be dictated by the candidate's choice of brief — a new site or an existing site.

**Outcome 3** Use appropriate tools and techniques to optimise websites developed for specified devices.

The practical aspects of the use of the appropriate tools in design production and the user activity techniques in the development of the mobile site should be assessed at this stage of the project.

**Outcome 4** Utilise server-side scripting including database processing of requests.

Assessment will be the evidence provided of a working optimised website.

It is recommended that the project covers how devices utilise interactive events such as push, touch, zoom and slide screen events. It should also cover page, key, submit and button events.

The server-side scripting containing the commands should be passed to a relevant interpreter depending on the chosen device of the candidate. The functionality and workability of the events, actions, interaction, server-side scripts and database processing will be assessed on completion of the final project. The project planning, design and production can be assessed as the project develops, allowing the Unit to be assessed in parts.

The assessment for Outcomes 2, 3 and 4 are unsupervised open-book. Assessors must assure themselves of the authenticity of each candidate's submission.

### Online and Distance 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).

Further advice can be found on our website

<http://www.sqa.org.uk/files/nq/AQAopen-distance.pdf>.

### Opportunities for developing Core Skills

In this Unit, candidates will develop skills valued by employers. Candidates will be involved in the research, planning, design and production in response to a brief. These are good opportunities for developing aspects of the Core Skills:

- ◆ Communication
- ◆ ICT
- ◆ Problem Solving

The opportunity should be taken during this Unit to emphasise that the employability skills, and the relevant Core Skills indicated above, are skills that apply to a wide range of employment opportunities.

### 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](http://www.sqa.org.uk/assessmentarrangements).

## History of changes to Unit

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.

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

### General information for candidates

#### **Unit title:** Software Development: Developing Websites for Multiplatform Use (SCQF level 8)

This Unit is designed to introduce you to an understanding of the fundamentals of optimising and developing websites for multiplatform devices such as mobiles. The Unit begins by introducing the features that integrate software components, hardware components and an operating system that affect the production of online websites for a device. You will be introduced to the key concepts of: the Document Object Model; client-side scripting, server-side scripting; the occurrence of security holes in the various scripting languages and how they are dealt with. This Unit is intended for candidates undertaking an SQA Advanced Qualification in Computing or a related area that requires knowledge of developing a mobile website.

On completion of this Unit, you should be able to:

- 1 Describe the scripting features used in the development of websites optimised for multiplatform use.
- 2 Design a website for specified devices using the principles of software planning and design.
- 3 Use appropriate tools and techniques to optimise websites developed for specified devices.
- 4 Utilise server-side scripting including database processing of requests.

Mobile use is growing quickly. 20% of Christmas (2011) shopping in the UK was carried out on a mobile device. Mobile users require access to corporate information and services of varying types, depending on their role and responsibilities. When you design a website to work on any device, you must consider your users' needs, behaviours, and expectations.

When designing the project, you should:

- ◆ consider the expectations of users, particularly mobile users. A mobile user who has used a mobile device for e-mail expects other applications on a mobile device to operate as effectively, efficiently, and seamlessly as e-mail
- ◆ determine who will use the site and how
- ◆ consider the goal of mobile users as they use the application
- ◆ identify the tasks that users need to complete
- ◆ map out the most efficient ways to complete the tasks. In your mapping, identify the task sequence and the core set of features that an optimised application must contain.
- ◆ identify the additional application features that are desirable but not central to most users' needs

Outcome 1 — will be assessed by a report or a verbal presentation.

Outcomes 2, 3 and 4 — are practical in nature. For Outcome 2 you will be required to produce a design for a website optimised for mobile use utilising the principles of software engineering.

Outcome 3 — will introduce you to the aspects of the use of client and server based objects, event handling and the use of cookies. This Outcome will also introduce you to some of the dynamic aspects of html and the fundamentals of a web scripting language.

Outcome 4 — will introduce you to server-side scripting including online database processing.

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On completion of this Unit you should be able to extend the experience to cater for e-commerce, optimised websites or other advanced web based applications usage. You should also be able to describe a range of multiplatform scripting features of devices.

This Unit is aimed at the following possible job roles or those with an interest in:

- ◆ Interface design
- ◆ Computer programming
- ◆ Interactive design
- ◆ Graphic design
- ◆ Information architecture
- ◆ Brand design and development
- ◆ Visual design
- ◆ Website design