

# **GCE Subject Level Guidance for Computer Science**

May 2014

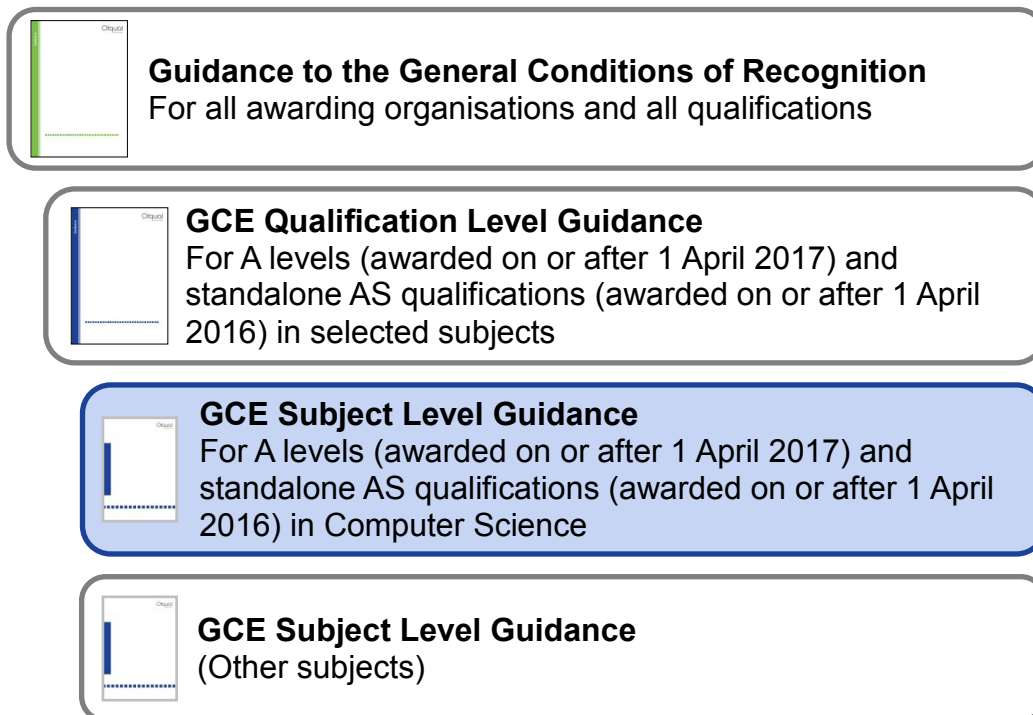
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## Introduction

### About this document

This document (highlighted in the figure below) is part of a suite of documents which outlines our guidance for awarding organisations offering GCE Qualifications.



This document sets out guidance which applies to the following qualifications:

- all GCE A levels in Computer Science awarded on or after 1 April 2017; and
- all standalone GCE AS qualifications in Computer Science awarded on or after 1 April 2016.

This guidance supports the GCE Subject Level Conditions and associated requirements for Computer Science<sup>1</sup>.

This document constitutes guidance for the purposes of section 153 of the Apprenticeships, Skills, Children and Learning Act 2009 (the '2009 Act') and Condition GCE(Computer Science)1.2.

An awarding organisation has a legal obligation under the 2009 Act to have regard to this guidance in relation to each GCE Qualification in Computer Science that it makes available or proposes to make available. Condition GCE(Computer

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<sup>1</sup> [www.ofqual.gov.uk/documents/gce-subject-level-conditions-computer-science/](http://www.ofqual.gov.uk/documents/gce-subject-level-conditions-computer-science/)

Science)1.2 imposes the same obligation in respect of the guidance below which is issued under that Condition.

An awarding organisation should use the guidance to help it understand how to comply with the GCE Subject Level Conditions and associated requirements for Computer Science.

## **Guidance set out in this document**

<p>This document provides guidance on assessment objectives for GCE Qualifications in Computer Science.</p>
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## Guidance on assessment objectives for GCE Qualifications in Computer Science

Condition GCE(Computer Science)1.2 allows us to specify requirements and guidance relating to assessment objectives for GCE qualifications in Computer Science.

We published our requirements in relation to assessment objectives in *GCE Subject Level Conditions and Requirements for Computer Science*, and reproduce them in the table below.

		<i>A level</i>	<i>AS</i>
<b>AO1</b>	Demonstrate knowledge and understanding of the principles and concepts of computer science, including abstraction, logic, algorithms and data representation	30-40%	35-45%
<b>AO2</b>	Apply knowledge and understanding of the principles and concepts of computer science, including to analyse problems in computational terms	30-40%	35-45%
<b>AO3</b>	Design, program and evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions	30-40%	20-30%

We set out below our guidance for the purposes of Condition GCE(Computer Science)1.2. This guidance explains how we expect awarding organisations to interpret these assessment objectives in terms of:

- the discrete ‘elements’ within each assessment objective which questions and tasks could target and/or seek to credit – our expectation is that each and every question/task should target or seek to credit at least one of these elements, and may target or seek to credit multiple elements across one or more assessment objectives;
- the coverage expectations, such as in relation to the different elements within each assessment objective and how those elements should be sampled over time; and
- the key areas of emphasis in each assessment objective and the particular meaning for the subject of any key terms and phrases used; defined terms are shown in bold text, followed by their definitions.

In line with the obligations set out in Condition GCE(Computer Science)1.2, we expect awarding organisations to be able to demonstrate how they have had regard to this guidance. For example, an awarding organisation could map how it has regard to the guidance as it:

- develops its sample assessment materials;
- delivers the qualification;
- develops and applies its approach to sampling the elements into which the assessment objectives are divided; and
- monitors the qualification to make sure it addresses all elements appropriately.

AO1: Demonstrate knowledge and understanding of the principles and concepts of computer science, including abstraction, logic, algorithms and data representation			30-40% (A level) 35-45% (AS)
Strands	Elements	Coverage	Agreements and definitions
n/a	1a – Demonstrate knowledge of the principles and concepts of abstraction, logic, algorithms, data representation or others as appropriate	Full coverage in each set of assessments (but not every assessment)	<ul style="list-style-type: none"> <li>■ The knowledge and understanding from the course of study may include, for instance, facts, definitions and explanations. Some tasks may target and/or permit candidates to show knowledge and understanding in combination – for instance, the requirement to define or explain a term in their own words, such as explaining floating point representation.</li> <li>■ It is appropriate to combine principles and concepts in each element, as they are inter-related and do not represent a difference in terms of standards.</li> <li>■ No more than one-third of the marks for AO1 should be awarded for pure recall. This includes marks awarded for questions that target other elements and AOs.</li> </ul>
	1b – Demonstrate understanding of the principles and concepts of abstraction, logic, algorithms, data representation or others as appropriate	Full coverage in each set of assessments (but not every assessment)	

AO2: Apply knowledge and understanding of the principles and concepts of computer science, including to analyse problems in computational terms			30-40% (A level) 35-45% (AS)
Strands	Elements	Coverage	Agreements and definitions
n/a	1a – Apply knowledge and understanding of the principles and concepts of computer science	Full coverage in each set of assessments (but not every assessment)	<ul style="list-style-type: none"> <li>■ The application should relate principally to:               <ul style="list-style-type: none"> <li>□ novel situations that are not clearly indicated in the specification, such as application of a number base conversion to a specific value;</li> <li>□ developing further material that is covered in the specification; or</li> <li>□ making links between such types of material, which are not signalled in the specification.</li> </ul> </li> <li>■ Knowledge and understanding are inter-connected here and should not usually be separated.</li> <li>■ <b>Analysis</b> includes, but is not limited to, analysis of a problem in the sense of requirements analysis and the building of abstract models of real-world objects or phenomena. The analysis should entail, for instance:               <ul style="list-style-type: none"> <li>□ deconstructing an issue so as to consider its component parts in terms that can be addressed through automated computation;</li> <li>□ making linkages and connections and understanding their impact; and</li> <li>□ constructing logical chains of reasoning.</li> </ul> </li> <li>■ Problems should be defined broadly to encompass tasks, goals or objectives.</li> </ul>
	1b – Analyse problems in computational terms	Full coverage in each set of assessments (but not every assessment)	



AO3: Design, program and evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions			30-40% (A level) 20-30% (AS)
Strands	Elements	Coverage	Agreements and definitions
n/a	1a – Design computer systems that solve problems	Full coverage in each set of assessments (but not every assessment)	<ul style="list-style-type: none"> <li>■ At least 40% of marks for AO3 should relate to element 1b; the programming tasks here may use pseudo-code as well as formal computing languages.</li> <li>■ The requirement to make ‘reasoned judgements and conclusions’ is included within element 1c because any evaluation inherently includes these skills.</li> <li>■ Carrying out ‘testing’ is likely to be within element 1c of AO3, but does not represent its full extent. (By contrast, theoretical explanation of testing would be within AO2.)</li> <li>■ The use of <b>computer</b> here is intended to suggest a broad range of possibilities, not a narrow emphasis on a particular approach; equally, it is not intended to refer explicitly to hardware systems as opposed to software-based processes (or equivalents).</li> </ul>
	1b – Program computer systems that solve problems	Full coverage in each set of assessments (but not every assessment)	
	1c – Evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions	Full coverage in each set of assessments (but not every assessment)	

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Published by the Office of Qualifications and Examinations Regulation in 2014

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