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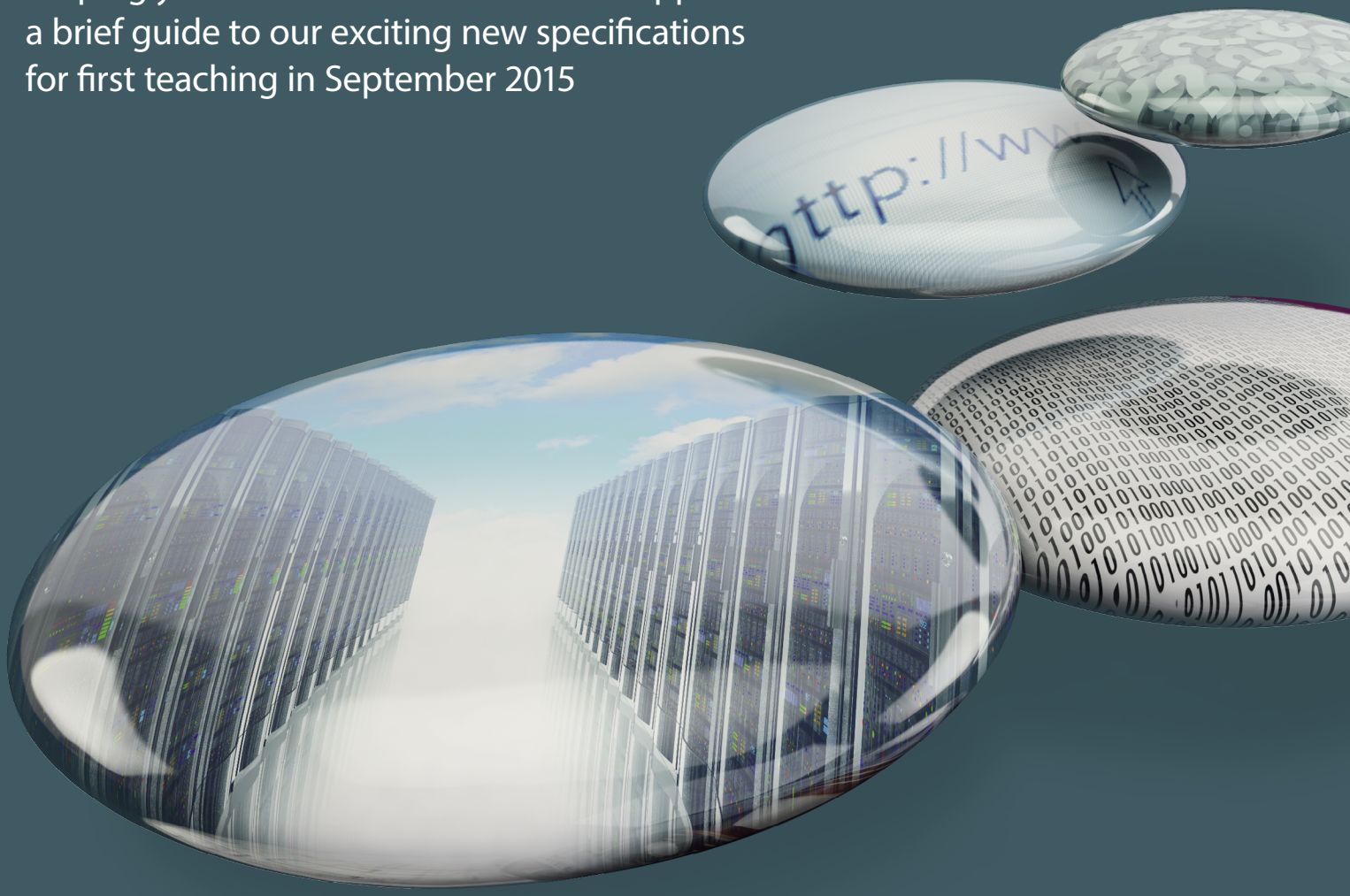
AS AND A LEVEL
COMPUTER SCIENCE

Helping you make the most of the new approach –
a brief guide to our exciting new specifications
for first teaching in September 2015



ocr.org.uk/alevelcomputerscience

OCR
Oxford Cambridge and RSA

WHAT THE REFORM MEANS FOR YOU

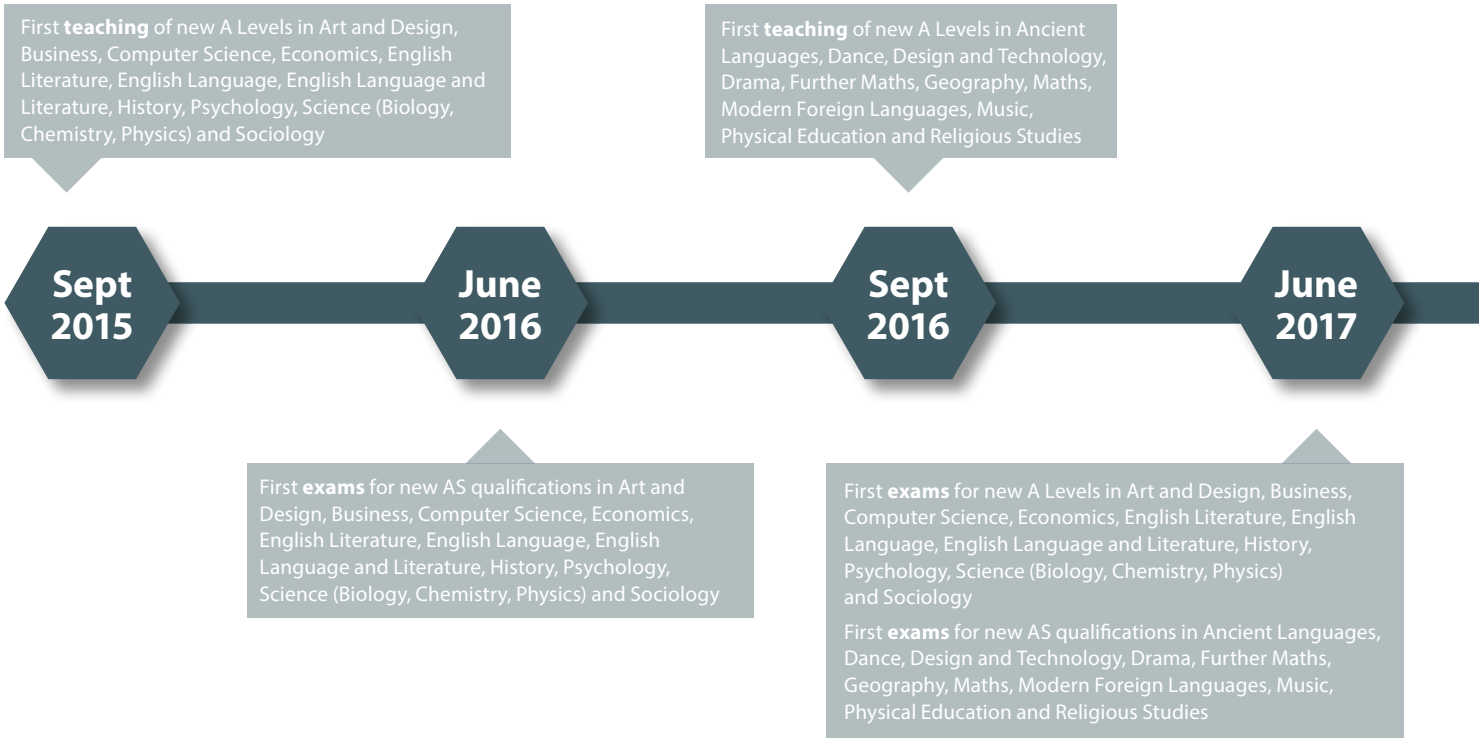
In February 2013 the former Secretary of State for Education, Michael Gove, asked Ofqual to implement changes leading to new A Levels. The Government has stated that the purpose of taking A Levels is primarily for entry to university and that some changes are needed so students are better prepared to start their university course.

We now know that, for first teaching in September 2015, we'll have reformed A Levels in named subjects including Computer Science, followed by more subjects for first teaching a year later.

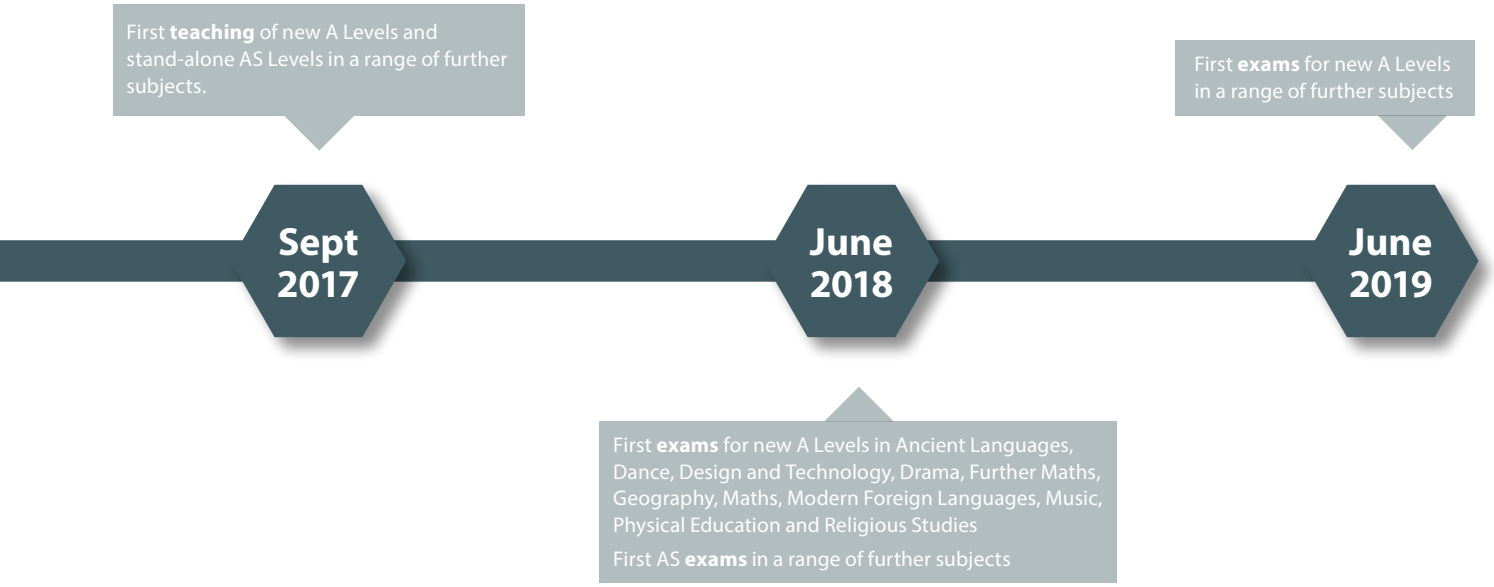
We've been busy developing specifications to engage and enthuse you and your students, and we're working hard to create high-quality resources. This summary brochure introduces you to the new AS and A Level Computer Science qualifications and shows you how we can help make the transition easier.

- **Changes to assessment**
  There's now only one examination series each year for AS and A2 units. Students in England, Wales and Northern Ireland will only be able to sit OCR AS and A2 exams in the June examination series. These changes apply to all OCR A Level qualifications, including Applied A Levels.
- **Coursework**
  Schools and colleges are still able to complete coursework at any time during the academic year to the requirements of the specification; however, since September 2013, coursework can now only be submitted for moderation in the June examination series.

A LEVEL TIMELINE



- **Northern Ireland and Wales**
  While the Northern Ireland and Welsh Governments are still to provide information on their plans, OCR's current position is that since September 2013, there'll now be only one examination series each year for both AS and A2 units. Students in Wales and Northern Ireland will only be able to sit OCR current AS and A2 Level exams in the June examination series. For more details about changes to current A Levels, go to **ocr.org.uk/alevelreform.**
- **A Levels from 2015 – linear assessment**
  New A Levels will be fully linear so assessment of a student's knowledge and understanding of the whole course takes place at the end of two years of study. (There'll be no exams in January.) The first assessment of two-year courses that start in September 2015 will be in June 2017. It's proposed that the first assessment of the new AS qualification will take place in June 2016.
- **Proposed changes for AS Levels**
  The new AS Level qualifications, for first teaching in September 2015, won't count towards the final grade of an A Level, but will be separate, stand-alone qualifications in their own right. The new AS qualifications will remain broadly at their current standard. In some subjects, it may be appropriate for the AS to be designed to be co-taught with the first year of the A Level. The first assessment of the new AS Levels is planned for June 2016.



WHY CHOOSE OCR?

Choose OCR and you've got the reassurance that you're working with one of the UK's leading awarding bodies. Our new AS and A Level Computer Science qualifications have been developed in consultation with teachers, employers and higher education to provide students with qualifications that are relevant to them and meet their needs.

We're part of the Cambridge Assessment Group, Europe's largest assessment agency and a department of the University of Cambridge. Cambridge Assessment plays a leading role in developing and delivering assessments throughout the world, operating in over 150 countries.

We work with a range of education providers, including schools, colleges, workplaces and other institutions in both the public and private sectors. Over 13,000 centres choose our A Levels, GCSEs, and vocational qualifications including Cambridge Nationals, Cambridge Technicals and Cambridge Progression.

We believe in developing specifications that help you bring the subject to life and inspire your students to achieve more. They're designed to be straightforward and accessible, so you can tailor the delivery of the course to suit your students' needs.

We have a proven track record of providing innovative, high-quality ICT, Computing and Computer Science qualifications and were the first awarding body to have accredited GCSE and Entry Level Computing qualifications.

MEET THE TEAM

We have a dedicated team of people working on our new Computer Science qualifications, including:

Robert Leeman

Subject Specialist, Computer Science and ICT

Vinay Thawait

Subject Specialist, Computer Science and ICT

Find out more about our Computer Science and ICT team at **ocr.org.uk/computerscienceteam** or follow us on Twitter **@OCR_ict.**

HAVE ANY QUESTIONS AND WANT TO TALK TO US? WANT TO FIND OUT MORE?

Our aim is to assist you however we can. As well as giving you a toolkit of support services and resources to choose from, we're also here to help you with specialist advice, guidance and support for those times when you simply need a more individual service. Here's how to reach our Customer Contact Centre:

By phone: **01223 553998**

By Twitter: **@OCR_ict**

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INTRODUCING…
AS AND A LEVEL COMPUTER SCIENCE

(FROM SEPTEMBER 2015)

OUR VISION

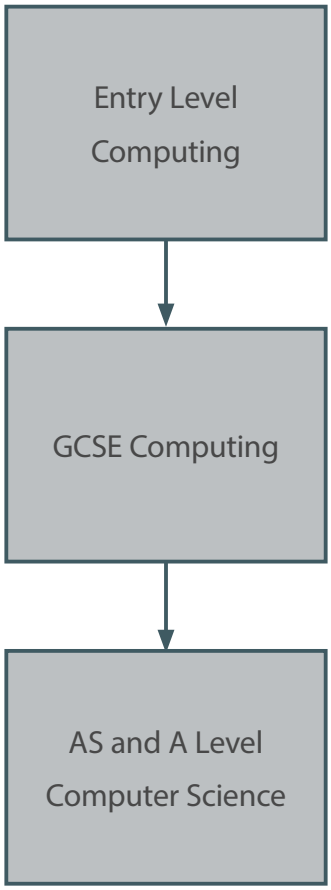
Our Computer Science qualifications will, above all else, be relevant to the modern and changing world of computing, and they will also be relevant to the higher education community. These qualifications can be tailored to the needs of your students and have an open-source ethos allowing you to use any programming language that meets the needs of the course.

Computer Science is a practical subject where students can apply the academic principles learned in the classroom to real-world systems. It's an intensely creative subject that combines invention and excitement, that can look at the natural world through a digital prism. Our Computer Science qualifications will value computational thinking, helping students to develop the skills to solve problems, design systems and understand the power and limits of human and machine intelligence.

These are the concepts that lie at the heart of our Computer Science qualifications. They will be the best preparation for students who want to go on to study Computer Science at a higher level and will also provide a good grounding for other subject areas that require computational thinking and analytical skills.

PROGRESSION PATHWAYS

The new specifications will have a clear pathway from Entry Level through GCSE and on to A Level, which will enable students to progress from Key Stage 3 through to Key Stage 4 and on to AS and A Level.



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COURSE OVERVIEW

WHY CHOOSE OCR AS AND A LEVEL COMPUTER SCIENCE?

Our AS and A Level Computer Science qualifications will inspire and challenge students to apply the knowledge they gain with the creative and technical skills they acquire.

Here are some of the key benefits of our new Computer Science specifications for you and your students:

- The new qualifications will be focused on programming, will build on our GCSE Computing and emphasise the importance of computational thinking as a discipline.
- There'll be an expanded maths focus, much of which will be embedded within the course.
- The ICT content of the new specifications will be appropriate to a Computer Science qualification.
- Computational thinking will be at the core of the new specifications.
- The AS will consist of two components, which will be externally assessed and weighted at 50% each.*
- The A Level will consist of three components, two of which will be externally marked question papers making up 80% of the qualification.
- The other 20% will be the coursework project, which will retain its current qualities but will be more focused, with a greater emphasis on coding and programming with a simple assessment model and marking criteria.

*The AS will not have a coursework component.

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AT A GLANCE

Here's a brief look at the course units and the content for our AS and A Level Computer Science qualifications.

AS COMPUTER SCIENCE

01 COMPUTING PRINCIPLES

This component will be a traditionally marked and structured question paper with a mix of question types: short-answer, longer-answer, and levels of response mark-scheme-type questions. It will cover the characteristics of contemporary systems architecture and other areas including the following:

- The characteristics of contemporary processors, input, output and storage devices
- Software and software development
- Programming
- Exchanging data
- Data types, data structures and algorithms
- Legal, moral, ethical and cultural issues.

02 ALGORITHMS AND PROBLEM SOLVING

This component will be a traditionally marked and structured question paper and will include a mix of question types: short-answer, longer-answer, and levels of response mark-scheme-type questions.

There'll be a short scenario/task contained in the paper, which could be an algorithm or a text page-based task, which will involve problem solving.

Other areas covered include the following:

- Elements of computational thinking
- Problem solving and programming
- Algorithms.

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A LEVEL COMPUTER SCIENCE

01 COMPUTER SYSTEMS

This component will be a traditionally marked and structured question paper with a mix of question types: short-answer, longer-answer, and levels of response mark-scheme-type questions. It will cover the characteristics of contemporary systems architecture and other areas including the following:

- The characteristics of contemporary processors, input, output and storage devices
- Software and software development
- Exchanging data
- Data types, data structures and algorithms
- Legal, moral, cultural and ethical issues.

02 ALGORITHMS AND PROGRAMMING

This component will be a traditionally marked and structured question paper with two sections, both of which will include a mix of question types: short-answer, longer-answer, and levels of response mark-scheme-type questions.

SECTION A

Traditional questions concerning computational thinking:

- Elements of computational thinking
- Programming and problem solving
- Pattern recognition, abstraction and decomposition
- Algorithm design and efficiency
- Standard algorithms.

SECTION B

There'll be a scenario/task contained in the paper, which could be an algorithm or a text page-based task, which will involve problem solving.

03 PROGRAMMING PROJECT

External postal moderation or repository.

Students and/or centres select their own user-driven problem of an appropriate size and complexity to solve. This will enable them to demonstrate the skills and knowledge necessary to meet the Assessment Objectives. Students will need to analyse the problem, design a solution, implement the solution and give a thorough evaluation.

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ASSESSMENT OVERVIEW AND OBJECTIVES

AS COMPUTER SCIENCE ASSESSMENT OVERVIEW – FIRST EXAM JUNE 2016

Component		
01 Computing principles	Mix of question types: including short-answer, longer-answer, and levels of response mark-scheme-type questions.	**Characteristics of contemporary systems architecture:** Operating systems **Software and software development:** Introduction to programming **Exchanging data:** Databases, networks and web technologies **Data types, representation and structures:** Using Boolean algebra **Legal, moral, ethical and cultural issues** Computing-related laws
02 Algorithms and problem solving	Traditional questions concerning computational thinking. Mix of question types: including short-answer, longer-answer, and levels of response mark-scheme-type questions. There will be a short scenario/task contained in the paper, which could be an algorithm but will involve problem solving.	**Elements of computational thinking:** Understanding computational thinking **Problem solving and programming:** Programming techniques Software development methodologies **Algorithms:** Analysis and design

ASSESSMENT

Component	Assessment	Weighting	Marks and duration
01 Computing principles	Externally marked question paper	50%	70 marks / 1 hr 15 mins
02 Algorithms and problem solving	Externally marked question paper	50%	70 marks / 1 hr 15 mins

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A LEVEL COMPUTER SCIENCE ASSESSMENT OVERVIEW – FIRST EXAM JUNE 2017

Component		
01 Computer systems	Mix of question types: including short-answer, longer-answer, and banded mark-scheme-type questions.	**The characteristics of contemporary processors, input, output and storage devices** Components of a computer and their uses **Software and software development:** Types of software and the methodologies used to develop them **Exchanging data:** How data is exchanged between different systems **Data types, data structures and algorithms** How data is represented and stored in different structures and the use of different algorithms **Legal, moral, cultural and ethical issues** Laws surrounding the use and ethical issues that can arise from the use of computers
02 Algorithms and Programming	Two sections: **A –** Traditional questions concerning computational thinking. Mix of question types: including short-answer, longer-answer, and levels of response mark-scheme-type questions. **B –** Scenario/task contained in the paper, which could be an algorithm but will involve problem solving. Short-answer, longer-answer questions, and levels of response mark-scheme-type questions.	**Sections A and B** **Elements of computational thinking** What is meant by computational thinking **Problem solving and programming** How computers are used to solve problems and programs can be written to solve them **Algorithms** The use of algorithms to describe problems and standard algorithms
03 Programming project	Candidates and/or centres select their own user-driven problem of an appropriate size and complexity to solve. This will enable them to demonstrate the skills and knowledge necessary to meet the Assessment Objectives.	Analysis of the problem Design of the solution Implementation of the solution Evaluation

ASSESSMENT

Component	Assessment	Weighting	Marks and duration
01 Computer systems	Externally marked question paper	40%	140 marks / 2 hr 30 mins
02 Algorithms and programming	Externally marked question paper	40%	140 marks / 2 hr 30 mins
03 Programming project	Internally assessed, externally moderated	20%	70 marks

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WHAT STAYS THE SAME, WHAT CHANGES?

AS LEVEL

	What stays the same?	What changes?
Structure	Two question papers: 01 – 50%, 02 – 50%	From 100 marks per paper to 70 marks per paper
Content		Less ICT More programming, algorithms and problem solving Computational thinking: • Thinking ahead • Thinking recursively • Thinking procedurally • Thinking logically • Thinking concurrently • Thinking abstractly More maths
Assessment	Traditional question papers No coursework	Modular to linear Task/scenario in Component 02, involving problem solving

A LEVEL

	What stays the same?	What changes?
Structure	80% external, 20% internal/moderated	From four units to three components
Content		Less ICT More programming, algorithms and problem solving Computational thinking: • Thinking ahead • Thinking recursively • Thinking procedurally • Thinking logically • Thinking concurrently • Thinking abstractly More maths
Assessment	Traditional question papers Coursework and the type of projects created by candidates. No restriction on the programming language that teachers use to teach	Modular to linear Scenario in Component 2, Section B, involving problem solving Coursework is now more focused on programming and computational thinking

SUPPORTING YOU ALL THE WAY

We recognise that the introduction of a new specification can bring challenges for implementation and teaching. Our aim is to help you at every stage and we're working hard to provide a practical package of support in close consultation with teachers and other experts so we can help you to make the changes.

For a start, we'll provide a range of high-quality creative resources. Tailored to the needs of each subject, their focus is on supporting creative teaching approaches and progression for all students. We see our resources as a body of knowledge that will grow throughout the lifetime of the specifications. They'll be built on the best practice we've identified from our discussions with the teaching community since the reforms were announced. Please visit our website at **ocr.org.uk/reformresources** to take a look at the types of resources on offer.

Along with subject-specific resources, you'll also have access to a selection of generic resources that focus on skills development and professional guidance for teachers. These include the following:

SKILLS GUIDES – we've produced a set of Skills Guides that aren't specific to Computer Science, but each covers a topic that could be relevant to a range of qualifications – for example communication, legislation and research. Download the guides at **ocr.org.uk/skillsguides.**

ACTIVE RESULTS – a free online A Level results analysis service to help you review the performance of individual students or your whole school. It provides access to detailed results data, enabling more comprehensive analysis of results to give you a more accurate measurement of the achievements of your centre and individual students. For more details, please refer to **ocr.org.uk/activeresults.**

PUBLISHER PARTNER RESOURCES TOO

We're working with Cambridge University Press to publish resources for all the new AS and A Level Computer Science specifications for 2015. We're working together to make sure our resources embed the fundamental content of each specification, while delivering the breadth and depth needed to succeed at A Level and beyond.

You can find more details about our publisher partners and all the resources we're providing on our website at **ocr.org.uk/publisherpartners.**

NEW AND EXCITING MOCK PAPERS SERVICES

EXAMCREATOR

PAST PAPERS AT YOUR FINGERTIPS

We've launched an exciting new online past papers service, 'ExamCreator', that enables you to build your own test papers from past OCR exam questions. Test papers can be created either focusing on single topics or made up from the full range of topics, to produce a complete mock GCSE or A Level exam.

You can print tests you've created, use them like traditional exam papers or assign them to students to be taken and marked online. Students are sent an email by the system, telling them a test has been assigned to them and to log in to take the test from any internet-enabled PC. Plus, it could be a great tool for setting homework and tracking the outcomes.

YOU'LL BE ABLE TO:

- Build your own tests using real exam questions
- Filter questions by topic, tier, unit, year, etc
- Select individual questions and sort them to the test you want
- Print off tests as PDF documents to be sat in normal exam conditions – you can print off resource booklets, mark schemes and Examiner's comments too
- Assign tests online
- Gather students into teaching groups, year groups or any other combination to make assignment easier
- Mark online tests on screen and record the results
- Create reports for individual students or whole teaching groups
- Access full telephone and email user support.

Tests created in ExamCreator are supported by the original mark scheme and Examiner reports – broken down by individual question. So a mark scheme is created to specifically support a test that has been built. All the questions are pre-tagged by topic so you don't have to review every question to create focused tests on specific topics.

We've worked with partners 'The Test Factory' to build ExamCreator and we'll continue to support the system going forward.

In summary… ExamCreator could help you create end-of-topic tests for Assessment for Learning, make termly tests to assess retention of knowledge, set mock examinations, or set homework. Remember that it has a built-in reporting system, so could help you track the progress of individual students or teaching groups.

To find out more about the costs and to register as a user, please see the details at **ocr.org.uk/examcreator.**

MOCK EXAM SERVICE (DETAILS TO BE FINALISED)

Most A Level Computer Science students, after 2015, will have significantly fewer chances to experience full examination conditions in preparation for their final exams, due to linearisation and assessment at the end of the course. You'll also have fewer opportunities to assess students' progress under formal examination conditions.

To help fill this gap, we plan to support our A Level Computer Science qualifications with a mock examinations service from April 2016.

The standard service will feature:

- Question papers produced to the same standards as official A Level papers that will be available to download from a secure location
- Well-presented, easy-to-interpret mark schemes
- Examiner's commentary on points to look out for when marking
- Sample answers with Examiner's commentary.

We're planning an enhanced service, including benefits such as Chief Examiner's Standardisation Webinars – live online events hosted by the Chief Examiner providing more detail of the mark scheme and how to apply it – helping you standardise your marking to be closer to a national standard.

FREE A LEVEL REFORM EVENTS

AN INTRODUCTION TO THE NEW SPECIFICATIONS

We're running events throughout the next academic year to help you get to grips with the reformed Computer Science qualifications for first teaching in September 2015.

PRACTICAL EVENTS, CREATED WITH YOU IN MIND

These carefully planned events are designed to help smooth the path to the reformed qualifications and provide you with an understanding of:

- The new Computer Science specification content, structure and assessment
- The differences between the existing and new specifications
- The resources and support available for Computer Science.

They'll give you the opportunity to speak face-to-face with our team, and network and discuss teaching approaches with colleagues.

In 2015, we'll also be running a series of events to help you get ready for first teaching of the reformed qualifications. Watch out for details at **cpdhub.ocr.org.uk.**

To receive more information about dates, both of these events, and the wide range of locations as we release them, please register for A Level reform email updates at **ocr.org.uk/updates.**

Download high-quality, exciting and innovative AS and A Level Computer Science resources from ocr.org.uk/alevelcomputerscience

Free resources and support for our AS and A Level Computer Science qualifications, developed through collaboration between our Computer Science Subject Specialists, teachers and other subject experts, are available from our website. You can also contact our Computer Science Subject Specialists for specialist advice, guidance and support, giving you individual service and assistance whenever you need it.

Meet the team at **ocr.org.uk/computerscienceteam** and contact them at:
01223 553998
computerscience@ocr.org.uk
@OCR_ict

To stay up to date with all the relevant news about our qualifications, register for email updates at **ocr.org.uk/updates**

Computer Science community

The social network is a free platform where teachers can engage with each other – and with us – to find and offer guidance, discover and share ideas, best practice and a range of Computer Science support materials. To sign up, go to **social.ocr.org.uk**

follow us on

facebook.com/ocrexams **linkedin.com/company/ocr** **@OCR_ict** **youtube.com/ocrexams**

PART OF THE CAMBRIDGE ASSESSMENT GROUP

ocr.org.uk/alevelcomputerscience

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