



# A-Level Computer Science Course Details

AQA Examination Board  
Specification: 7517

September 2022

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# Expectations

- Buy laptop if you can as this is a highly desired item for the course – approx. £400 would be enough of a machine specification
- The laptop is particularly useful for downloading software as we progress through the course.
- Vital for the Year 13 Computer Science practical project where the most successful projects have been done on personal laptops which allow for different coding languages and libraries to be loaded.

# Computer Science – Course structure

- The course is a linear 2 year course, so both years have to be completed to get a qualification.
- The course is divided up to tackle AS material in Year 12, and A2 material in Year 13. This is deliberate to make allowances to the level of difficulty at different stages of the course.
- Example of above – fundamentals of programming at AS level is done as procedural language (top-down approach). Fundamentals of programming at A2 level includes coding in an object oriented language (bottom-up approach)
- Example of above – fundamentals of data structures at AS level includes built-in and user defined data types. Fundamentals of data structures at A2 level includes the complex abstract data structures – stacks, queues, trees, graphs etc.

# Computer Science AS examination – structure of papers

## Assessments

### Paper 1

#### What's assessed

This paper tests a student's ability to program, as well as their theoretical knowledge of computer science from subject content 1–4 above.

#### Assessed

- On-screen exam: 1 hour 30 minutes
- 50% of AS

#### Questions

Students answer a series of short questions and write/adapt/extend programs in an electronic answer document provided by us.

We will issue preliminary material, a skeleton program (available in each of the programming languages) and, where appropriate, test data, for use in the exam.



### Paper 2

#### What's assessed

This paper tests a student's ability to answer questions from subject content 5–9 above.

#### Assessed

- Written exam: 1 hour 30 minutes
- 50% of AS

#### Questions

A series of short-answer and extended-answer questions.

## **Key Assessments Year 12 Computer Science AS course 2020-21:**

- End of topic test – October - Fundamentals of Programming
- End of topic test – November - Computational thinking
- End of topic test – January - Data Representation
- End of topic test – March – Computer Systems
- End of topic test – May – Computer Organisation & Architecture
- End of topic test – June – Communication and Networks
- Y13 Entrance Exam – July - Paper 1
- Y13 Entrance Exam – July - Paper 2

Note – the Y13 Entrance exam is internally assessed and represents two standard AS examination papers of 1.5 hours each as detailed on the previous slide 4.

Although external exams exist at AS, these are not entered. However these are useful for providing progress information and a grade which needs to be at least pass standard for year 13 study. This grade is used as a UCAS predictive grade on the UCAS system.

# Computer Science – AS Topics covered

AS topics covered:

- ? Fundamentals of programming
- ? Fundamentals of data structures
- ? Systematic approach to problem solving
- ? Theory of computation
- ? Fundamentals of data representation
- ? Fundamentals of computer systems
- ? Fundamentals of computer organisation and architecture
- ? Consequences of uses of computing
- ? Fundamentals of communication and networking

# Final external Computer Science A-Level examination – structure of papers

## Assessments

### Paper 1

#### What's assessed

This paper tests a student's ability to program, as well as their theoretical knowledge of computer science from subject content 10–13 above and the skills required from section 22 above.

#### Assessed

- On-screen exam: 2 hours 30 minutes
- 40% of A-level

#### Questions

Students answer a series of short questions and write/adapt/extend programs in an electronic answer document provided by us.

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### Paper 2

#### What's assessed

This paper tests a student's ability to answer questions from subject content 14–21 above.

#### Assessed

- Written exam: 2 hours 30 minutes
- 40% of A-level

#### Questions

Compulsory short-answer and extended-answer questions.

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### Non-exam assessment

#### What's assessed

The non-exam assessment assesses student's ability to use the knowledge and skills gained through the course to solve or investigate a practical problem. Students will be expected to follow a systematic approach to problem solving, as shown in section 22 above.

#### Assessed

- 75 marks
- 20% of A-level

## **Key Assessments Year 13 Computer Science A2 course 2021-22:**

- End of topic test – October – Object Orientation and Functional Programming
- Practical Project – October - Project Definition
- End of topic test – November – Database Fundamentals and SQL
- Pre-planned examination (PPE1) – January – Paper 1
- Pre-planned examination (PPE1) – January – Paper 2
- Practical Project – January - Project Review
- End of topic test – February – Abstract Data Structures
- End of topic test – March – Fundamentals of Algorithms
- End of topic test – April – Regular Languages
- Practical Project – April – Final project submission to AQA
- End of topic test – May – Internet
- Y13 AQA A-level Exam – June - Paper 1
- Y13 AQA A-level Exam – June - Paper 1

Note – the Y13 A-Level examination represents two standard A-Level examination papers of 2.5 hours each as detailed on the previous slide 7



# Computer Science – A2 Topics covered

A2-Level topics covered:

- ? Fundamentals of programming
- ? Fundamentals of data structures
- ? Fundamentals of algorithms
- ? Theory of computation
- ? Fundamentals of data representation
- ? Fundamentals of computer systems
- ? Fundamentals of computer organisation and architecture
- ? Consequences of uses of computing
- ? Fundamentals of communication and networking
- ? Fundamentals of databases
- ? Big Data
- ? Fundamentals of functional programming
- ? Systematic approach to problem solving
- ? Non-exam assessment – the computing practical project

Some subject content is developed further from AS to A2.  
Some topic areas are new in A2.

## Non-exam assessment (NEA) Practical project

- **Non-exam assessment**

### **What's assessed**

The non-exam assessment assesses student's ability to use the knowledge and skills gained through the course to solve or investigate a practical problem. Students will be expected to follow a systematic approach to problem solving, as shown in section 22 above.

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### **Assessed**

- 75 marks
- 20% of A-level

## A-level: NEA Background

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- We included an open-ended NEA project as it:
  - is an opportunity to work on a significant task from start to finish
  - leads on to the type of work students will be required to complete in HE
  - Allows students to work on a project that matches their interests, ability and previous experience
  - can bring together skills developed in various parts of the course.
- Can be completed using any programming language(s), not just the ones that students can use for Paper 1
- Expected to be completed in the second year of the A-level (but this is not a requirement)

## A-level: What's different about this NEA?

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- Slimmed down documentation requirements
- More marks allocated to the programming that the student has done (56%)
- The level of complexity concept, used in the previous A-level Computing has been removed
- There is now the opportunity to do investigative projects as an alternative to developing a system for an end user
- No expectation that a particular software development methodology is used or documented

## A-level: NEA mark allocations

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Analysis	9 marks
Documented design	12 marks
Technical solution (Completeness of solution (Techniques used	42 marks 15 marks) 27 marks)
Testing	8 marks
Evaluation	4 marks
<b>Total</b>	<b>75 marks</b>

## A-level: Example NEA tasks

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- A simulation eg of a business or scientific nature, or an investigation of a well-known problem such as the game of life
- A solution to data processing problem for an organisation, eg membership systems
- The solution of an optimisation problem, eg production of a rota, shortest-path problems, route finding
- A control system, operated using a device such as an Arduino board
- A website with dynamic content, driven by a database back-end
- An app for a mobile phone or tablet
- Investigating machine learning algorithms
- Investigating an area of data science using, for example, Twitter feed data or online public data sets

## 5.3 Assessment weightings

The marks awarded on the papers will be scaled to meet the weighting of the components. Students' final marks will be calculated by adding together the scaled marks for each component. Grade boundaries will be set using this total scaled mark. The scaling and total scaled marks are shown in the table below.

### AS

Component	Maximum raw mark	Scaling factor	Maximum scaled mark
Paper 1	75	x1	75
Paper 2	75	x1	75
Total scaled mark			150

### A-level

Component	Maximum raw mark	Scaling factor	Maximum scaled mark
Paper 1	100	x1.5	150
Paper 2	100	x1.5	150
NEA	75	x1	75
Total scaled mark			375

# Computer Science – Key resources

**AQA website** covers specification and also has other support advice and past papers

<https://www.aqa.org.uk/subjects/computer-science-and-it/as-and-a-level/computer-science-7516-7517>

Online resources – many e.g.

Code academy      <https://www.codecademy.com/login>

Snakify      [https://snakify.org/en/lessons/print\\_input\\_numbers/](https://snakify.org/en/lessons/print_input_numbers/)

Python      <https://www.learnpython.org/en/Welcome>

Dbsqlite      <https://sqlitebrowser.org/>

Haskell      <https://www.haskell.org/platform>

Foldoc      <https://foldoc.org/>



# CS Key resources - online

[www.python.org](http://www.python.org) is the main website for finding out about python coding. The program can be downloaded for free so pick the correct installation for your machine (32/64 bit and Windows/Mac). **Ensure you pick the latest version of Python 3** (not Python 2 which has different formatted commands).

<https://docs.python.org/3/> - is online documentation to support you with researching any python commands you need to know. Simply enter the search string and read on.

<https://www.codecademy.com/learn/python> is a useful website particularly for learning python as a beginner. You can sign up for free and run the online tutorial which is advertised as 13 hours.

<https://www.mrfraser.org> the website Mr. Fraser is a useful resource for Computer Science and has a wealth of resources at A-Level. As a student you need to sign in to the site but the resources are free.

<https://coderbyte.com/> - this website allows you to practice challenges in coding and algorithms

<https://www.lucidchart.com/pages/> is a website to help with drawing flowcharts and structure diagrams using a good software package

<https://www.draw.io/> is a free website for drawing flowcharts using a good software package

<https://www.bbc.co.uk/news/technology> - British Broadcasting Corporation – News and information regarding technology and IT

<http://www.legislation.gov.uk> - UK government – Information about UK legislation and subsequent updates and amendments

<https://www.computerweekly.com/> - home of the famous technical magazine – “Computer Weekly”

<https://foldoc.org/> - learn the meaning of any computing term It includes definitions of acronyms, jargon, programming languages, tools, architecture, operating systems, networking, theory, standards, mathematics, telecoms, electronics, institutions and companies, projects,

<https://www.jobserve.com/gb/en/jobseekers> the popular website for technical and IT related jobs

<https://www.cwjobs.co.uk/> widespread technical jobs both permanent and contractor

# Computer Science – Key resources - Textbooks

PGOnline material – very clearly written by Rob Heathcote. Books can be purchased separately for AS or A2 or there is a combined book for the whole course

<https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/?tab=textbooks>

Hodder Education – A-Level Computer Science by Bob Reeves

Python programming (Third Edition) for the Absolute Beginner – Michael Dawson

(although it says absolute beginner in the title it actually covers a lot of different concepts in python).

