



## COMPUTER SCIENCE

### OCR GCSE Computer Science (9-1)

#### Why is the study of GCSE Computer Science important?

Computer Science is the study of the principles and use of computers. You will study the four cornerstones of Computational Thinking, these are crucial as they can be applied to any computer science context and will provide firm foundations for other topics within the subject. From this, key programming constructs can be learnt, allowing you to develop programming skills in more than one environment, this will help you to understand key similarities between different programming environments and develop key skills in problem-solving and debugging. These skills will be further consolidated and mastered in text-based programming languages throughout your study, applying the cornerstones of Computational Thinking in a wealth of scenarios to develop your problem-solving skills. Computer Science theory is also explored, looking 'under the bonnet' of the computer systems that you use on a day-to-day basis. Key systems hardware are investigated, including how networks are formed, the inherent security risks that networked devices produce and how to mitigate against these risks. Computer Security is currently one of the biggest risks to national security, is relevant, interesting, and provides you with the knowledge that can help you become a responsible e-citizen. Your study of Computer Science will encourage you to think deeply and help you more effectively to become a resilient problem solver that understands the technological world in which we live – a great life skill that all universities and employers will appreciate.

Across your study, you will explore fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation. You will analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs. Furthermore, the subject will teach you to think creatively, innovatively, analytically, logically and critically and understand the impacts of digital technology on the individual and to wider society. Lessons will provide a wide range of opportunities for practical application of key concepts through a chosen programming language as well as plentiful opportunities for you to investigate how computers work. In addition, there will be opportunities for an extended discussion about the ethical, moral and social implications of technology in society. Computer Science offers significant challenges, this is because it is a subject that encourages technological progress and breaking new ground, but this is what makes it exciting! Can you apply the concepts, knowledge and skills you have learnt in a creative way that others haven't thought of before? Can you identify an area of computer science that provides further technological development? Seems challenging – but you are going to love it! Computer Science will expand your mind!

Big Questions will be explored such as are the developments in artificial intelligence affecting job prospects and opportunities? Is technology creating a digital divide that further disadvantaged people in developing countries? Can you create a program for a specific scenario to solve a problem? What opportunities and issues does the internet develop? All of these questions are key and can be explored by understanding key computer science concepts both through theory and practical application. I bet you can't wait to get started?

## **What skills will the study of GCSE Computer Science teach you?**

You are a citizen in this world and you need to know how to solve problems using technology and the key concepts involved in the technology that we have become so dependent on. It will teach you to...

- Apply computational thinking techniques (abstraction, decomposition, pattern recognition, algorithms) in a range of scenarios to solve problems.
- Develop resilience by not being afraid of challenges when solving problems, but breaking them down and keep trying.
- Be creative in a subject that may not be renowned for it – there is no limit to creativity when you create the solution.
- How to act responsibly online to ensure that you and others stay safe online.
- Identify the key programming constructs (sequence, selection, iteration) required to solve a problem.
- Apply the key programming constructs (sequence, selection, iteration) to any programming language.
- Work independently and as part of a team to solve complex problems.
- Construct reasoned arguments to ethical, social and moral problems that have arisen due to technology and communicate these in an effective way.
- Identify links between different elements of computer science
- Evaluate different methods of representing data and decide on the most suitable method for presentation/storage

## **How does your study of GCSE Computer Science support your study in other subjects?**

The study of any subject in our curriculum takes full advantage of links with other subject areas- we term these as interdisciplinary links and we make the most of them because we know that deep learning requires the transference of knowledge and skills from one topic to another. Once you can transfer your learning across topics and subject areas then you are really mastering what you know and how to apply your understanding and skills.

Computer Science touches on so many other subjects such as mathematics as you develop skills in problem-solving, including decomposition (breaking down problems), abstraction (removing unnecessary detail from a problem) and pattern recognition. All of these skills will support your teaching in Mathematics as these are very important in being able to solve mathematics problems in a range of contexts. There are also links with Science as binary logic can be applied to electrical circuits in Physics and much of the technology from Computer Science can be mapped back to core principles of Science. For example, how sensors are used to monitor motion, force and/or pressure. You will learn methods of thinking and research that are widely applicable to other subject areas helping your thinking in all subjects.

## **How can you deepen your understanding of GCSE Computer Science?**

Across Year 7 to 13, students engage in the Bebras Challenge. This is a national competition run by Oxford University that assesses Computational Thinking skills. Students have the opportunity to take part in this competition and if they are in the 10% nationally, they will be invited to Oxford University to take part in a new challenge.

## How are you assessed in GCSE Computer Science?

Throughout the Computer Science course, you are assessed using the following assessment objectives which ensure that you can cumulatively build your subject understanding in preparation for future GCSE and A Level study. There are half termly assessment points each year that we term Praising Stars©. For younger years we base our assessment on our subject mapping of the age-related expectations across the curriculum, assessing students' performance at their current stage of study against expectation. At GCSE we make informed predictions informed by our holistic assessment of their progress against the key assessment objectives and their aspirational GCSE targets. These are also the basis for any appropriate support and intervention.

### Key Assessment Objectives

- **AO1** - Demonstrate knowledge and understanding of the key concepts and principles of Computer Science.
- **AO2** - Apply knowledge and understanding of key concepts and principles of Computer Science
- **AO3** - Analyse problems in computational terms:
  - to make reasoned judgements
  - to design, program, evaluate and refine solutions.

## How can GCSE Computer Science support your future?

Computer Science is offered at most post 16 centres, colleges and prestigious universities either as single honours or a joint honours subject studied alongside other disciplines e.g. Computer Systems Engineering, Computer Games Design, Computer Science & Artificial Intelligence, Mathematics & Computer Science and Computer Forensics. The very fact that you have been able to study Computer Science e.g. computational thinking will help your future application be they for colleges, universities, apprenticeships or employment.

Careers that the study of Computer Science supports include:

- Database administrator
- Software Developer
- Web Application Developer
- Computer Systems Analyst
- Mobile App Developers
- Information Security Analyst
- Computer Network Architect
- Software Tester
- Network Manager

## GCSE Computer Science Course Overview

Term	Year 1	Year 2
Autumn 1	Algorithms and problem solving	Networks
Autumn 2	Representing data in computer systems	Networks 2
Spring 1	Programming fundamentals	System security
Spring 2	Producing robust solutions	Ethical, legal, cultural and environmental impacts of digital technology
Summer 1	Systems architecture	Knowledge retention and recall
Summer 2	Memory and Storage	Exam paper 1 and 2