Key stage 3 and GCSE Computer Science subject knowledge certificate

National Centre for Computing Education

teachcomputing.org

Key stage 3 and GCSE Computer Science subject knowledge handbook

Your guide to gaining the Key stage 3 and GCSE subject knowledge certificate.

Contents

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Welcome to the Key stage 3 and GCSE Computer Science subject knowledge certificate.

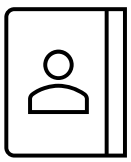
Hello! You've taken the first step on the *National Centre for Computing Education Certificate in Key stage 3 and GCSE Computer Science subject knowledge*. We aim to support you through your learning journey, to make developing your computer science (CS) subject knowledge as easy as possible for you.

This CPD programme aims to help all teachers, including those from non-specialist backgrounds, to gain the knowledge and skills needed to teach up to and including GCSE Computer Science. It provides a variety of NCCE courses and resources to suit your learning needs including:

- **Face-to-face courses**, delivered by your local Computing Hub
- **Live remote CPD**: courses delivered "face-to-face" over a series of short online sessions
- **Online CPD**: courses that you can complete at your own pace
- **Certification**, so your knowledge and skills are recognised professionally

Once you have completed your CPD, there is a 30-minute, multiple choice test consisting of 25 questions taken from a question bank covering the whole of the GCSE computing curriculum. If you pass the test you will be notified immediately; if not, you will be given a second opportunity to sit the test. After that, there is **no limit to the number of times you can attempt the test**, but there will be a 48-hour reflection period after each attempt. All questions within the Handbook and test that contain code use OCR Pseudocode. You can find a guide to OCR Pseudocode here.

Support



You can access support through:

- Computing Hubs, who provide local support for teachers across England.
- STEM Learning Community, with over 20,000 members the community is available for educators to collaborate, ask questions and gain support.
- Isaac Computer Science – designed for both student and teachers, the platform covers comprehensive subject knowledge for both GCSE and A Level computer science, including videos and questions to check your knowledge.

- Communities of practice run by Computing at School, which are local networks of computing teachers that share expertise, resources, and best practice to encourage strong and effective teaching.
- This handbook provides a few questions for each topic, in the style of the final assessment, for you to use to help assess your own learning. It also links to the CPD courses and other resources from the NCCE that you can use to develop your understanding of each topic area.

You can check your progress through by accessing your Dashboard on the Teach Computing website.

If you are employed by a state maintained secondary school, you may also be eligible for a subsidy.

Getting started

If you are new to computing we recommend starting with our "New to computing" pathway. This is designed for teachers who are new to computing. This learning pathway will start you on your way with Key stage 3 and GCSE Computer Science.

There are 4 alternative Pathways you can choose from:

- New to algorithms and programming PDF
- New to computer systems PDF
- Preparing to teach GCSE computer science PDF
- Advanced GCSE Computer Science PDF

For those of you who are more familiar with the computing curriculum you can:

- Use the GCSE specifications course map to identify courses in areas that you feel you need to develop
- Pick courses by using the later sections in this handbook, in which the GCSE syllabus is separated into 8 different topic areas:
    - Algorithms
    - Computer Systems
    - Data and Information
    - Design and Development
    - Impact of Technology
    - Networks
    - Programming
    - Safety and Security

You can find all the courses and book onto them through the Teach Computing courses page.

Finally, we anticipate updating this handbook as new courses and CPD becomes available. If you have any feedback to help us improve the document, please send it to: info@teachcomputing.org with 'Subject Knowledge Handbook feedback' in the subject line.

Self-Study

To ensure you're confident in your knowledge of the full breadth of subject knowledge, we recommend self-study is woven into your journey, using this handbook to support your learning journey.

Once you have completed a face-to-face, live remote or online course, it's recommended you review the content within this handbook, explore the sample assessment questions, conduct further reading using resources provided and explore the wider CPD offer.

Isaac Computer Science now covers both GCSE and A Level content, you can freely access the platform throughout your journey to support your subject knowledge enhancement. Click here to access Isaac Computer Science.

Algorithms

Description

You will learn that an algorithm is a set of instructions that need to be followed in a particular order to solve a problem. At GCSE level you will need to be able to comprehend, design, create and evaluate algorithms.

The areas covered in the GCSE curriculum are:

- creating algorithms to solve problems, decomposing problems into smaller, easier to solve parts, and abstracting away complexity
- representing algorithms using pseudocode and flowcharts
- tracing and debugging algorithms to see what they do and fix faults
- evaluating algorithms and comparing different algorithms
- key algorithms - searching, sorting
- data structures

Self-assessment

Below are examples of the questions in the final test. Answers can be found on page 32.

1. When designing an algorithm identify the **FALSE** statement:

Possible responses:			
A	The sequence of steps is important	**C**	An algorithm can have parallel processes
B	An algorithm can be run on a computer	**D**	An algorithm can be represented in a number of ways

2. What number will be output if the user enters 4 in the following program?

```
value = int(input("enter a number:"))
count = value
for i = 0 to count
        value = value + value
```

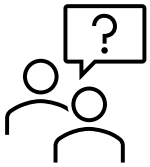
print("The answer is " + str(value))

Possible responses:			
A	60	**C**	64
B	80	**D**	32

3. When searching unsorted data which of the following options is the most efficient?

Possible responses:			
A	Linear search	**C**	Merge sort followed by binary search
B	Bubble sort followed by binary search	**D**	Binary search

Further support



CPD from the NCCE

You will find all our courses on the Teach Computing website, we're highlighted some useful courses below, focusing on algorithms.

Face to face and remote courses:

- **Representing algorithms using flowcharts and pseudocode** builds initial confidence in using the key building blocks of sequence, selection and iteration, and learn to apply algorithmic thinking. Available remotely. This course is also available aligned to the OCR or AQA specifications.
- **Search and sort algorithms** - An understanding of algorithms is fundamental to success in GCSE computer science. This course will teach you how algorithms manipulate data to achieve desired aims. Available remotely.
- **Higher attainment in GCSE computer science - meeting the challenge of exams** explores how to apply algorithmic thinking within an exam context. You will learn how to decompose problems and create algorithms using pseudocode. Available remotely.

Online courses:

- **Programming 101: An Introduction to Python for Educators** will take you through elementary concepts such as sequence, selection, repetition as well as introducing functions. Finally, you'll apply these skills in a program to solve a simple problem.

- **Programming 102: Think Like a Computer Scientist** is appropriate for more confident Python programmers. You will delve more deeply into algorithms including several common search and sort algorithms. During the course you'll learn how to:
  - break down problems into more manageable parts using functions which take parameters and output return values
  - interpret algorithms expressed in plain English, in pseudocode and as flowcharts, and represent algorithms in these forms.

Resources from the NCCE

Isaac Computer Science: the following content is available from the Isaac platform on algorithms:

- Searching algorithms – binary and linear searches
- Sorting algorithms – bubble and merge sorts

Teach Computing CPD materials - extract from the searching and sorting algorithms course:

- Using playing cards to compare insertion, bubble and merge sorts.

Other suggestions:

BBC Bitesize KS3 introduces the topic of Algorithms and Computational Thinking.

BBC Bitesize KS4 provides greater depth on the topics of Algorithm Production, Common Algorithms and Computational Thinking, aligned to the main GCSE specifications.

These videos from Harvard University's introduction to Computer Science course cover sorting and searching algorithms.

- Lecture on arrays and sorting algorithms (with David Malan)
- Bubble sort (with Doug Lloyd)
- Insertion sort
- Binary search
- Linear search

Computer systems

Description

You will learn what a computer is and how the constituent parts function together as a whole. You will need to understand that a computer system is a combination of hardware (the physical parts of a computer) and software (the programs that run on a computer) working together. The areas covered in the GCSE curriculum are:

- Systems
- Logic
- Hardware
- Software
- Architecture
- Communication & Coordination

Self-assessment

Below are examples of the questions in the final test. Answers can be found on page 32.

1. Which of the following is **NOT** a function of the Operating System?

Possible responses:			
A	Transfers programs in and out of memory	**C**	Provide a user interface
B	Organise file system	**D**	Compress a video for use on the internet

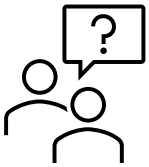
2. Identify the factors that affect CPU performance.

Possible responses:			
A	Clock Speed, Number of Cores, RAM Size	**C**	Cache Size, Clock Speed, Number of Cores
B	Cache Size, Clock Speed, ROM Size	**D**	Clock Speed, Number of Cores, ROM Size

3. In Von Neumann architecture what is the purpose of the Memory Data Register?

Possible responses:			
A	Stores data that is being transferred to or from memory	**C**	Stores the current instruction
B	Stores the location in memory that data is to be transferred to or from	**D**	Stores the numbers being used in calculations

Further support



CPD from the NCCE

You will find all our courses on the Teach Computing website, we're highlighted some useful courses below, focusing on algorithms.

Face to face and remote courses:

- **Foundation knowledge of Key Stage 3 and GCSE computer science**, this course will kick start your journey with computer science, you'll explore the fundamentals from data, programming to computer systems. Available face to face and remotely.
- **Introduction to computer systems, networking and security in GCSE computer science** introduces the different components of computer hardware, including devices not instantly recognisable as computers. Available face to face and remote.

Online courses:

- **Understanding Computer Systems** covers what happens inside the machine and how computers turn inputs into outputs. You will learn what the computer operating system does and why you need it. You will also compare software and hardware, understand the importance of the central processing unit (CPU), and address factors that affect computer performance.
- **How Computers Work: Demystifying Computation** provides an understanding of how computers work at a fundamental level. You'll explore system architecture, along with how computers use binary and logic. Once you've examined the von Neumann model of computer architecture and the Fetch-Execute cycle, you'll learn to build a range of simple circuits for maths, and then simulate various logic gates.

Resources from the NCCE

Isaac Computer Science: the following content is available from the Isaac platform on computer systems:

- Boolean logic
- Systems architecture
- Memory and storage
- Hardware
- Software
- Operating systems

Teach Computing CPD materials - Extracts from different elements of the computer systems face to face course:

- Hardware And software
- Input and output devices
- How the CPU works and The FDE Cycle
- Risc and Cisc processors
- Performance of CPU
- Simple assembly programs
- Main memory including virtual memory
- What is data, secondary storage including 'cloud' storage
- Embedded systems

Other Suggestions

BBC Bitesize introduces 3 main topics at GCSE level: systems architecture, memory and storage.

Data and information

Description

You will learn how computers process data and how the resulting information can be used to form judgements and make predictions. You will need to understand how data is stored, organised and used to represent real world artefacts and scenarios. The areas covered in the GCSE curriculum are:

- How numbers, text, images and sound are represented in computer systems
- Units of information from bits to petabytes
- Number systems including binary, decimal and hexadecimal
- How computation is performed
- Lossy and lossless compression methods
- How encryption is used to secure data and information
- Databases
- Learn the difference between data and information

Self-assessment

Below are examples of the questions in the final test. Answers can be found on page 32.

1. What is the denary result of converting 11011101 from Binary?

Possible responses:			
A	221	**C**	223
B	225	**D**	219

2. Identify the **FALSE** statement about bitmap images.

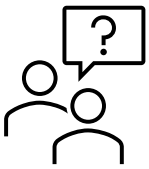
Possible responses:			
A	The image is split into pixels	**C**	A pixel can only have a single colour

B	Pixels store metadata about the whole image	**D**	Each colour is given a unique binary code

3. What is the file size in Kilobits of a sound sampled at 44kHz for 1 minute at 8 bits per sample?

Possible responses:			
A	2640 Kb	**C**	26400 Kb
B	21120 Kb	**D**	2112 Kb

Further support



CPD from the NCCE

You will find all our courses on the Teach Computing website, we're highlighted some useful courses below, focusing on data and information.

Face to face and remote courses:

- **Foundation knowledge of Key Stage 3 and GCSE computer science**, this course will kick start your journey with computer science, you'll explore the fundamentals from data, programming to computer systems. Available face to face and remotely.
- **Supporting GCSE computer science students with grades 1 - 3**, this course explores how to support students targeted grades 1 to 3, including how to use literacy and mathematical skills to support their understanding in computer science; how to improve knowledge and recall; and how to use assessment to improve student attainment. Available remotely.

Online courses:

- **Data Representation in Computing: Bring Data to Life** (Online CPD) explores how computers do interesting things with data. You'll discover how to represent and manipulate text, images and sound, as well as compression and other algorithms.
- **Introduction to databases and SQL** (Online CPD) introduces databases and why we use them, exploring how to use SQL to search and manipulate the data. Along the way, you'll learn about primary keys and table relationships, as well as how to create joins to search multiple tables.

Resources from the NCCE

Isaac Computer Science: the following content is available from the Isaac platform on data and information:

- Data capacity
- Storage devices
- Factors affecting performance
- Data types
- Operators
- Database records

Teach Computing CPD materials - extracted from the data and information face to face courses:

- Converting binary to decimal
- Converting decimal to binary
- Converting hexadecimal values
- Data units
- How encryption works

Other suggestions

BBC Bitesize introduces the topic of data representation, the website includes topic overviews, videos and quizzes for the following areas: units; binary and denary; binary addition; binary shifts; hexadecimal; check digits; characters (ASCII and Unicode); images; sound; compression.

Design and development

Description

You will learn what is involved in planning, creating and evaluating computing artifacts. You will need to understand how pseudocode, flowcharts, and structure diagrams are used to design software and how modern design is used to develop software. Areas covered in the GCSE curriculum are:

- design
- implementation
- testing
- refining
- evaluating
- collaborating

Self-assessment

Below are examples of the questions in the final test. Answers can be found on page 32.

1. A student is asked to design a system. The system must generate a multiplication question using two random numbers and ask the user to guess their answer. How many inputs will the finished program need?

Possible responses:			
A	3	**C**	1
B	2	**D**	0

2. An input is supposed to accept numbers between 1 and 10 inclusive. Which of these would be an appropriate set of test data?

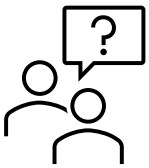
Possible responses:			
A	-1, 0, 1, 5, 10, 20000	**C**	5, 500, 5000
B	1,2,3,4,5,6,7,8,9,10	**D**	1, 10

3. When refining code, which of these programming constructs is likely to help most in reducing the number of lines of code, to make it simpler to read and comprehend?

Possible responses:			
A	Selection	**C**	Arrays
B	Repetition	**D**	2d Arrays

Further support

CPD from the NCCE



You will find all our courses on the Teach Computing website, we're highlighted some useful courses below, focusing on design and development.

Face to face and remote courses:

- **Higher attainment in GCSE computer science - meeting the challenge of exams** explores how to apply algorithmic thinking within an exam context. You will learn how to decompose problems and create algorithms using pseudocode. Available remotely.
- **Python programming: analysis, design and evaluation** follows the software development cycle and explores how to plan, design and evaluate a programming project. Available remotely.

Online courses:

- Programming 102: Think Like a Computer Scientist (online CPD) covers various aspects of computational thinking techniques used to analyse problems and create abstract models.
- Programming 103: Saving and Structuring Data (Online CPD) covers how to save text and binary files, and how to structure data so that programs can interpret it correctly. You will explore various common types of structured files, including CSV and JSON, and also find out how to connect to a SQL database to use it in your Python programs.

Resources from the NCCE

Isaac Computer Science: the following content is available from the Isaac platform on design and development:

- Program Design
- Testing

Other suggestions

BBC Bitesize KS3 introduces algorithm design, examining approaches to solving problems.

BBC Bitesize KS4 goes deeper, with content matched to the main GCSE specifications:

- Investigating the requirements of users before and during the design and production stages
- Decomposition and algorithms how to take a problem, decompose it and design an algorithm to solve it.
- Designing the Iterative design process methodology based on a cycle of prototyping, testing, analysing, and refining a product
- Producing robust programs defensive design and robust programming focuses on safely handling unexpected errors.

Impact of technology

Description

You will learn how computers have brought about many environmental, ethical and legal issues and concerns that increasingly affect all of our daily lives. You will need to understand how individuals, systems and society as a whole interact with computer systems. Areas covered in the GCSE curriculum are:

- Legal implications
- Social issues
- Moral issues

Self-assessment

Below are examples of the questions in the final test. Answers can be found on page 32.

1. Hacking was made illegal by Which UK Law?

Possible responses:			
A	Computer Misuse Act	**C**	RIPA
B	GDPR	**D**	Copyrights & Patents Act

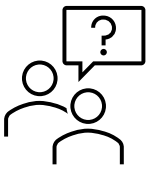
2. Which of the following is a possible **environmental** impact of music streaming services?

Possible responses:			
A	More people expect to get music for free, so piracy increases	**C**	Less money will go to the music artists compared to download or CD sales
B	More electricity must be produced, potentially from polluting sources, to power the server farms	**D**	The algorithms that the streaming services use will tend to concentrate people's listening habits on a few popular artists

3. Which feature of a creative commons licence would prevent someone else from taking credit for your work?

Possible responses:			
A	Non-Commercial	**C**	Attribution
B	Non-Derivative	**D**	Share Alike

Further support



CPD from the NCCE

You will find all our courses on the Teach Computing website, we're highlighted some useful courses below, focusing on impact of technology.

Face to face and remote courses:

- **Higher attainment in GCSE computer science - meeting the challenge of exams** explores how to apply algorithmic thinking within an exam context. You will learn how to decompose problems and create algorithms using pseudocode. Available remotely.
- **Supporting GCSE computer science students with grades 1 - 3**, this course explores how to support students targeted grades 1 to 3, including how to use literacy and mathematical skills to support their understanding in computer science; how to improve knowledge and recall; and how to use assessment to improve student attainment. Available remotely.

Online courses:

- **Impact of Technology: How To Lead Classroom Discussions** (online CPD) from the CS Accelerator programme explores the ethical, legal, cultural, and environmental concerns surrounding computer science.

Resources from the NCCE

Isaac Computer Science: the following content is available from the Isaac platform on impact of technology:

- Legislation
- Impacts of technology

Suggested resources

Becoming a Digital Citizen: an Introduction to the Digital Society course from the University of York: Understand the ethical impact of using technology (privacy, inclusion, professionalism) on society.

BBC Bitesize KS4 includes simple tests at the end of each topic.

- The digital divide is the gap between those who have access to the latest technology and those who do not.
- examines the issues surrounding technology, including the difference between something being legal but morally wrong. It identifies what computer scientists need to think about when developing solutions
- Discusses the ethical, legal and environmental impacts of digital technology mapped to the AQA specification
- The internet and freedom of speech
- Design and technology content that is largely applicable to computing, covering social, environmental and economic impacts and challenges

Craig 'n' Dave videos are presented by practising teachers of GCSE computer science includes a collection of videos covering key topics in this area.

Networks

Description

You will learn that a network is two or more computing devices connected, and that networks can be connected using different topologies and architectures. You will need to understand how networks can be used to retrieve and share information and what the associated risks are. Areas covered in the GCSE curriculum are:

- Classification of networks – type, topology, model
- Communication and Coordination
- Protocols
- Security
- Validation and Authentication,
- Encryption and Filtering
- Hardware

Self-assessment

Below are examples of the questions in the final test. Answers can be found on page 32.

1. Which of these protocols operates at the Data Link layer?

Possible responses:			
A	IP	**C**	HTTP
B	SMTP	**D**	Ethernet

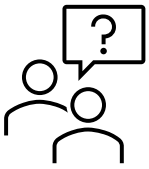
2. A small business wants to network their computers so that they can share peripheral devices between employees. Which topology would give them the most robust network?

Possible responses:			
A	Bus	**C**	Star
B	Mesh	**D**	Ring

3. Which Layer of the TCP/IP model establishes a virtual connection between the two computers?

Possible responses:			
A	Transport	**C**	Network
B	Link (Ethernet)	**D**	Application

Further support



CPD from the NCCE

You will find all our courses on the Teach Computing website, we're highlighted some useful courses below, focusing on networking.

Face to face and remote courses:

- **Fundamentals of computer networks** explains the hardware and network topologies used for data transfer between computers. You'll explore the different types of network, hardware, the different types of topologies and how different transmission media works. Available remotely.
- **The Internet and Cyber-Security** explains how the internet works, the protocols that are needed to transfer data and the importance of staying safe when using the internet. You'll explore various addressing systems including IP and MAC, what DNS is and how it's used, the four-layer TCP/IP model and how protocols are used. Available remotely.

Online courses:

- **An introduction to computer networking for teachers** covers the fundamental knowledge required to understand how computer systems are networked together.
- **Introduction to cybersecurity for teachers** introduces you to the core ideas of cybersecurity, including threats and how to prevent against them.

Resources from the NCCE

Isaac Computer Science: the following content is available from the Isaac platform on networking:

- Network fundamentals
- The internet
- Network hardware

Teach Computing CPD materials extracted from the network face to face courses:

- Network Types
- Network Hardware
- Network Topologies
- Virtual Networks
- Packet Switching
- Network Models
- Protocols 1 Protocols 2
- Network Addresses (IP)
- DNS (Domain Name System)
- Network Addresses (MAC)
- Transmission media (Copper, Optical, WiFi)
- Network Threats

Other suggestions

BBC Bitesize introduces 3 main topics at GCSE level: Network Hardware, the Internet and Security. Each section is a mini site featuring topic overviews, videos and quizzes.

Programming

Description

You will learn that programs are created using common building blocks, known as programming constructs. These programming constructs form the basis for all programs and are also used in algorithms. You will need to understand how to create software to allow computers to solve problems. The GCSE curriculum covers the following areas:

- Creating programming projects using programming constructs
- Understand the programming concepts of sequence, selection, iteration, and variables
- Tracing & debugging code
- Modelling and simulation
- Evaluation and comparison of robustness, readability, and security
- Input and output data from a program
- Arithmetic logic

Self-assessment

Below are examples of the questions in the final test. Answers can be found on page 32.

1. What will be the result of the following code?

```
print ( 5 MOD 6 )
```

Possible responses:			
A	0.833’	**C**	1.2
B	1	**D**	5

2. The following pseudocode processes the number of items in a list. What is output?

```
LIST = [“Bob”, “tea”]
 n = zero
 m = zero
 for item in LIST
            n = n + 1
            if item =  “tea”:
                  m = m + 1
 print(m/n)
```

Possible responses:			
A	Output 1 if the first item in a longer list is “tea”	**C**	Output the number of times “tea” appears in the list
B	Output the number of items in the list	**D**	Output the proportion of the items in the list that are "tea"

3. If you run the following program, what would happen?

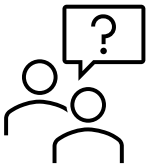
```
Def Dog(age):
        If age <=2:
                dog = age * 11
        else:
                dog = 22 + ((age-2)*4)
        return dog

print (Dog(“6”))
```

Possible responses:			
A	It would return 38.0	**C**	It would return “6”
B	It would produce a TypeError	**D**	It would return 66

Further support

CPD from the NCCE



You will find all our courses on the Teach Computing website, we're highlighted some useful courses below, focusing on programming.

Face to face and remote courses:

- **Foundation knowledge of Key Stage 3 and GCSE computer science**, this course will kick start your journey with computer science, you'll explore the fundamentals from data, programming to computer systems. Available face to face and remotely.
- **Python programming constructs - sequence, selection and iteration** covers how to write code to input, process and output data, and how to manipulate data stored in variables. Using the building blocks of sequence, selection and iteration you'll begin to understand how programs are constructed to perform a multitude of simple and more complex tasks. Available face to face and remote.
- **Python programming - working with data** covers data types, and how data structures are manipulated in Python programs. You'll create and edit files that can store data for later use, as you begin to develop simple software applications. Available remotely.

Online courses:

- Programming 101: An Introduction to Python for Educators (Online CPD) explores programming in Python. You'll discover basic programming concepts, learning how to understand the basics of Python syntax and interpret error messages.
- Programming 102: Think like a Computer Scientist (Online CPD) covers how to break down problems into smaller parts, and then design and apply algorithms to data. You'll also explore list structures and their various uses.
- Programming 103: Saving and Structuring Data (Online CPD) covers how to save text and binary files, and how to structure data so that programs can interpret it correctly. You will explore various common types of structured files, including CSV and JSON, and also find out how to connect to a SQL database to use it in your Python programs.

Resources from the NCCE

Isaac Computer Science: the following content is available from the Isaac platform on programming:

- Data types
- Logical operators
- Subprograms
- Variables and constants
- Iteration
- Reading and writing to text files

Teach Computing CPD materials extracted from different elements of the programming face to face courses:

- Python essentials support sheet
- Data types
- Variables
- Logical operators
- Count controlled iteration
- Condition controlled iteration
- Selection

Other suggestions

The BBC Bitesize website introduces programming techniques through topic overviews, videos and quizzes.

The W3Schools website provides online tutorials of how to program using several languages including Python.

- User input
- Selection
- WHILE Loops
- FOR Loops
- Variables

Safety and security

Description

As important data is stored on computers, measures such as passwords and anti-virus software are needed to keep those devices secure. You will need to understand what the risks are when using technology and how to protect individuals and systems. Areas covered by the GCSE curriculum are:

- Characteristics of threats to networks, digital systems and data
- Identifying vulnerabilities and protecting against threats
- Understand people are the weakest link

Self-assessment

Below are examples of the questions in the final test. Answers can be found on page 32.

3 Which of the following is **NOT** a Social Engineering technique?

Possible responses:			
A	Pharming	**C**	Adware
B	Phishing	**D**	Shouldering

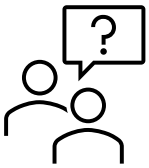
2. For which of the following is preventing a hacker from gaining access to a network one of its primary aims?

Possible responses:			
A	Anti malware	**C**	Encryption
B	Router	**D**	Firewall

3 Which of the following is **NOT** a Threat to your computer system.

Possible responses:			
A	Malware	**C**	Firmwire updates
B	Unpatched software	**D**	Misconfigured access rights

Further support



CPD from the NCCE

You will find all our courses on the Teach Computing website, we're highlighted some useful courses below, focusing on safety and security.

Face to face and remote courses:

- **Introduction to computer systems, networking and security in GCSE computer science** introduces the different components of computer hardware, including devices not instantly recognisable as computers. Available face to face and remote.
- **The Internet and Cyber-Security** explains how the internet works, the protocols that are needed to transfer data and the importance of staying safe when using the internet. You'll explore various addressing systems including IP and MAC, what DNS is and how it's used, the four-layer TCP/IP model and how protocols are used. Available remotely.

Online courses:

- **Introduction to cybersecurity for teachers** introduces you to the core ideas of cybersecurity, including threats and how to prevent against them.

Resources from the NCCE

Isaac Computer Science: the following content is available from the Isaac platform on safety and security:

- Social engineering
- Malicious software
- Network security

Teach Computing CPD materials:

- Network threats - definitions of a variety of cybersecurity threads listed.
- Case studies of security breaches from the Information Commissioner's Office.

- Explanations of key terms relating to threats and their prevention.
- Further detail on security measures such as penetration testing and encryption.

Other suggestions

BBC Bitesize KS3 introduces the topic of Safety & Responsibility. These overviews of online safety, bias & reliability and the law & ethics are ideal introductions to the topic as it is presented at KS3.

BBC Bitesize KS4 provides greater depth into the topic of System Security, covering core knowledge including forms of attack, threats to networks, and identifying & preventing vulnerabilities.

What support is available?

NCCE Computing Hubs

Computing Hubs provide local, responsive, and tailored support to teachers across England. They are led by schools and colleges across England with an exceptional track record in teaching computing and computer science. They deliver face-to-face and remote courses, provide local support for teachers in primary and secondary schools in their area.

Find your local hub.

Communities of Practice

Communities of Practice - run by Computing at School (CAS) - are local networks of computing teachers that share expertise, resources and best practice to encourage strong and effective teaching.

How can I practice for the test?

Preparing for the assessment

Once you have completed your CPD, you will be able to try the practice summative test, which will give you a good indication of the kind of questions you will get in the final test. Your results

will be emailed to you showing your results for each area of the curriculum. This will help you decide if you are ready to take the final test, or if you should consider some further CPD first.

If you have a disability, impairment or sensory loss, we may be able to give you extra time to take the test. Please email us in confidence at certificationqueries@bcs.uk. We look at each request for extra time on a case by case basis.

There are also plenty of resources available for you to use for revision before you take the final assessment.

Online subject knowledge assessments

The National Centre for Computing Education has created free online subject knowledge assessments. Although these are designed for you to use to evaluate your students' knowledge, you can also take these assessments to practice the style of questions which are included in the final test.

Your own notes

Don't discount your own notes as a vital revision resource! Hopefully these notes will focus on the areas that you had to spend more time on during the course, as well as being formatted in the most useful way for you.

Other resources

This handbook contains links to free resources provided by external providers. While we hope that our courses are sufficient on their own, we know that people learn differently and so seeing a concept explained in another way can help embed the learning.

Following the assessment

As soon as you've completed the assessment, you'll be informed as to whether you've passed or not.

Following a successful pass

Congratulations! You've completed the KS3 and GCSE computer science subject knowledge certificate, however, your journey with the National Centre for Computing Education shouldn't stop there.

Your next certificate…

Now you've completed the subject knowledge certificate, why not start the Teach Computing Secondary certificate? This certificate explores the wider aspects of teaching computing, including pedagogy, assessment, and leadership. You can continue to access free face-to-face, remote, and online CPD.
Explore the Teach Computing Secondary Certificate.

You can take advantage of the Teach Computing Curriculum, which contains everything you need to teach computing at key stages 1 to 4, including lesson plans (for 500 hours' worth of lessons!), slides, worksheets, homework and assessment. All this content is completely free to use and has been created by expert teachers, based on the latest pedagogical research and it provides an innovative progression framework where computing content (concepts, knowledge, skills, and objectives) has been organised into interconnected networks we call learning graphs.

If you need to try again

Don't worry if you fail the assessment - you will be able to take it again and still achieve certification. The most important thing is not to see this as a failure, but just another stage in your journey to certification. If you were close to achieving the required standard for certification, you may want to take the test again immediately. You should be able to take the assessment a second time immediately, although you will have to leave a 48-hour gap between subsequent attempts.

If you missed the target mark by a larger margin, take some time to plan how you can improve your knowledge before your next attempt. You should have received some feedback containing your scores for the questions from each topic area. As well as reviewing your notes from the courses that you've taken that covered that area, you could also sign up for further courses to deepen your understanding - check the Handbook for course suggestions by topic area.

Good luck - with perseverance you should soon be able to achieve the required standard and obtain the *National Centre for Computing Education Certificate in KS3 and GCSE computer science subject knowledge*.

Self-assessment answers

Algorithms 1. B 2. C 3. A

Computer Systems 1. D 2. C 3. A

Data and Information 1. A 2. B 3. B

Design & Development 1. C 2. A 3. B

Impact of Technology 1. A 2. B 3. C

Computer Networks 1. D 2. B 3. A

Programming 1. D 2. D 3. B

Safety & Security 1. C 2. D 3. C