

GCSE Computer Science



Revision Guide



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GCSE Computer Science Revision Guidance

The course outline

Component 01: Computer systems

Introduces students to the central processing unit (CPU), computer memory and storage, wired and wireless networks, network topologies, system security and system software. It also looks at ethical, legal, cultural and environmental concerns associated with computer science.

Component 02: Computational thinking, algorithms and programming

Students apply knowledge and understanding gained in component 01. They develop skills and understanding in computational thinking: algorithms, programming techniques, producing robust programs, computational logic, translators and data representation.

Assessment overview

Content Overview	Assessment Overview	
Computer systems <ul style="list-style-type: none">• Systems Architecture• Memory• Storage• Wired and wireless networks• Network topologies, protocols and layers• System security• System software• Ethical, legal, cultural and environmental concerns	Computer systems (01) 80 marks 1 hour and 30 minutes Written paper (no calculators allowed)	Worth 50% of total GCSE
Computational thinking, algorithms and programming <ul style="list-style-type: none">• Algorithms*• Programming techniques• Producing robust programs• Computational logic• Translators and facilities of languages• Data representation	Computational thinking, algorithms and programming (02) 80 marks 1 hour and 30 minutes Written paper (no calculators allowed)	Worth 50% of total GCSE

Exam dates

TBC Computer systems

AM 1h 30m

TBC Computational thinking, algorithms and programming PM 1h 30m

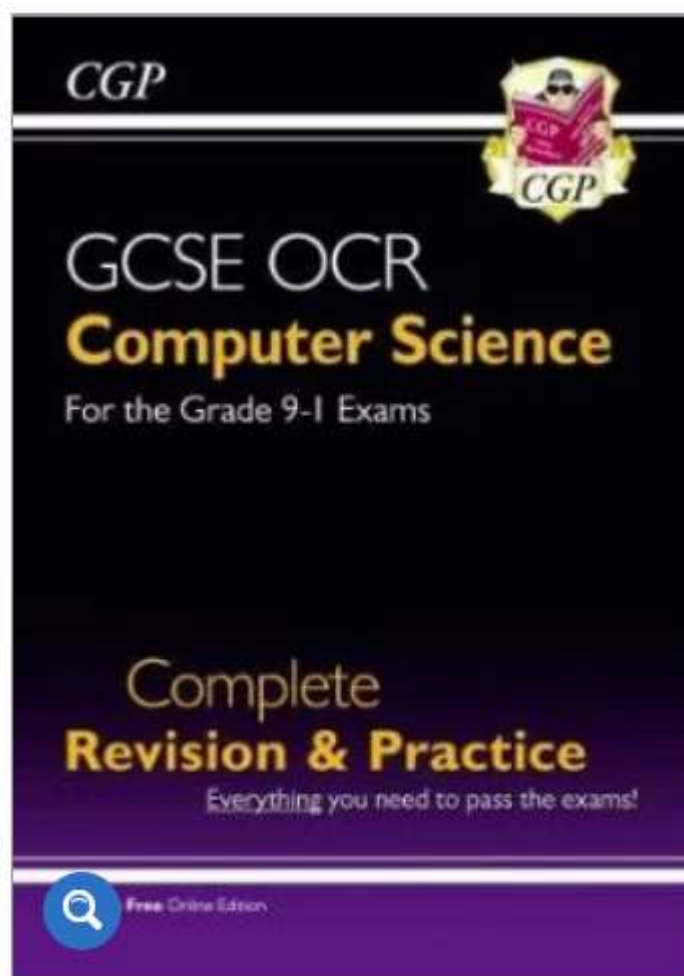
Useful Websites

<https://smartrevise.online/>

<http://ocr.org.uk/qualifications/gcse-computer-science-j276-from-2016/>

<https://www.cambridgegcsecomputing.org/>

Revision guides



New GCSE Computer Science OCR
Complete Revision & Practice - Grade 9-1
(with Online Edition)

What do I need to revise for Computer systems (01)

1.1 Systems architecture

Learners should have studied the following:
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|--|
| <ul style="list-style-type: none">• the purpose of the CPU• Von Neumann architecture:<ul style="list-style-type: none">○ MAR (Memory Address Register)○ MDR (Memory Data Register)○ Program Counter○ Accumulator• common CPU components and their function:<ul style="list-style-type: none">○ ALU (Arithmetic Logic Unit)○ CU (Control Unit)○ Cache• the function of the CPU as fetch and execute instructions stored in memory• how common characteristics of CPUs affect their performance:<ul style="list-style-type: none">○ clock speed○ cache size○ number of cores• embedded systems:<ul style="list-style-type: none">○ purpose of embedded systems○ examples of embedded systems. |
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1.2 Memory

Learners should have studied the following:
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- | |
|--|
| <ul style="list-style-type: none">• the difference between RAM and ROM• the purpose of ROM in a computer system• the purpose of RAM in a computer system• the need for virtual memory• flash memory. |
|--|

1.3 Storage

Learners should have studied the following:

- the need for secondary storage
- data capacity and calculation of data capacity requirements
- common types of storage:
 - optical
 - magnetic
 - solid state
- suitable storage devices and storage media for a given application, and the advantages and disadvantages of these, using characteristics:
 - capacity
 - speed
 - portability
 - durability
 - reliability
 - cost.

1.4 Wired and wireless networks

Learners should have studied the following:

- types of networks:
 - LAN (Local Area Network)
 - WAN (Wide Area Network)
- factors that affect the performance of networks
- the different roles of computers in a client-server and a peer-to-peer network
- the hardware needed to connect stand-alone computers into a Local Area Network:
 - wireless access points
 - routers/switches
 - NIC (Network Interface Controller/Card)
 - transmission media
- the internet as a worldwide collection of computer networks:
 - DNS (Domain Name Server)
 - hosting
 - the cloud
- the concept of virtual networks.

1.5 Network topologies, protocols and layers

Learners should have studied the following:

- star and mesh network topologies
- Wifi:
 - frequency and channels
 - encryption
- ethernet
- the uses of IP addressing, MAC addressing, and protocols including:
 - TCP/IP (Transmission Control Protocol/Internet Protocol)
 - HTTP (Hyper Text Transfer Protocol)
 - HTTPS (Hyper Text Transfer Protocol Secure)
 - FTP (File Transfer Protocol)
 - POP (Post Office Protocol)
 - IMAP (Internet Message Access Protocol)
 - SMTP (Simple Mail Transfer Protocol)
- the concept of layers
- packet switching.

1.6 System security

Learners should have studied the following:

- forms of attack
- threats posed to networks:
 - malware
 - phishing
 - people as the 'weak point' in secure systems (social engineering)
 - brute force attacks
 - denial of service attacks
 - data interception and theft
 - the concept of SQL injection
 - poor network policy
- Identifying and preventing vulnerabilities:
 - penetration testing
 - network forensics
 - network policies
 - anti-malware software
 - firewalls
 - user access levels
 - passwords
 - encryption.

1.7 Systems software

Learners should have studied the following:

- the purpose and functionality of systems software
- operating systems:
 - user interface
 - memory management/ multitasking
 - peripheral management and drivers
 - user management
 - file management
- utility system software:
 - encryption software
 - defragmentation
 - data compression
 - the role and methods of backup:
 - full
 - incremental.

1.8 Ethical, legal, cultural and environmental concerns

Learners should have studied the following:

- how to investigate and discuss Computer Science technologies while considering:
 - ethical issues
 - legal issues
 - cultural issues
 - environmental issues
 - privacy issues.
- how key stakeholders are affected by technologies
- environmental impact of Computer Science
- cultural implications of Computer Science
- open source vs proprietary software
- legislation relevant to Computer Science:
 - The Data Protection Act 1998
 - Computer Misuse Act 1990
 - Copyright Designs and Patents Act 1988
 - Creative Commons Licensing
 - Freedom of Information Act 2000.

What do I need to revise for Computational thinking, algorithms and programming (02)

2.1 Algorithms

Learners should have studied the following:

- computational thinking:
 - abstraction
 - decomposition
 - algorithmic thinking
- standard searching algorithms:
 - binary search
 - linear search
- standard sorting algorithms:
 - bubble sort
 - merge sort
 - insertion sort
- how to produce algorithms using:
 - pseudocode
 - using flow diagrams
- interpret, correct or complete algorithms.

2.2 Programming techniques

Learners should have studied the following:

- the use of variables, constants, operators, inputs, outputs and assignments
- the use of the three basic programming constructs used to control the flow of a program:
 - sequence
 - selection
 - iteration (count and condition controlled loops)
- the use of basic string manipulation
- the use of basic file handling operations:
 - open
 - read
 - write
 - close
- the use of records to store data
- the use of SQL to search for data
- the use of arrays (or equivalent) when solving problems, including both one and two dimensional arrays
- how to use sub programs (functions and procedures) to produce structured code
- the use of data types:
 - integer
 - real
 - Boolean
 - character and string
 - casting
- the common arithmetic operators
- the common Boolean operators.

2.3 Producing robust programs

Learners should have studied the following:

- defensive design considerations:
 - input sanitisation/validation
 - planning for contingencies
 - anticipating misuse
 - authentication
- maintainability:
 - comments
 - indentation
- the purpose of testing
- types of testing:
 - iterative
 - final/terminal
- how to identify syntax and logic errors
- selecting and using suitable test data.

2.4 Computational logic

Learners should have studied the following:

- why data is represented in computer systems in binary form
- simple logic diagrams using the operations AND, OR and NOT
- truth tables
- combining Boolean operators using AND, OR and NOT to two levels.
- applying logical operators in appropriate truth tables to solve problems
- applying computing-related mathematics:
 - +
 - -
 - /
 - *
 - Exponentiation (^)
 - MOD
 - DIV

2.5 Translators and facilities of languages

Learners should have studied the following:

- characteristics and purpose of different levels of programming language, including low-level languages
- the purpose of translators
- the characteristics of an assembler, a compiler and an interpreter
- common tools and facilities available in an integrated development environment (IDE):
 - editors
 - error diagnostics
 - run-time environment
 - translators.

2.6 Data representation

Learners should have studied the following:

Units

- bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte
- how data needs to be converted into a binary format to be processed by a computer.

Numbers

- how to convert positive denary whole numbers (0-255) into 8 bit binary numbers and vice versa
- how to add two 8 bit binary integers and explain overflow errors which may occur
- binary shifts
- how to convert positive denary whole numbers (0-255) into 2 digit hexadecimal numbers and vice versa
- how to convert from binary to hexadecimal equivalents and vice versa
- check digits.

Characters

- the use of binary codes to represent characters
- the term 'character-set'
- the relationship between the number of bits per character in a character set and the number of characters which can be represented (for example ASCII, extended ASCII and Unicode).

Images

- how an image is represented as a series of pixels represented in binary
- metadata included in the file
- the effect of colour depth and resolution on the size of an image file.

Sound

- how sound can be sampled and stored in digital form
- how sampling intervals and other factors affect the size of a sound file and the quality of its playback:
 - sample size
 - bit rate
 - sampling frequency.

Compression

- need for compression
- types of compression:
 - lossy
 - lossless.

Command Words for the exams

Command words	Meaning
Add	Join something to something else so as to increase the size, number, or amount.
Annotate	Add brief notes to a diagram or graph.
Calculate	Obtain a numerical answer showing the relevant stages in the working.
Complete	Provide all the necessary or appropriate parts.
Convert	Change the form, character, or function of something.
Define	Give the precise meaning of a word, phrase, concept or physical quantity.
Design	Produce a plan, simulation or model.
Draw	Produce (a picture or diagram) by making lines and marks on paper with a pencil, pen, etc.
Give	Present information which determines the importance of an event or issue. Quite often used to show causation.
Outline	Give a brief account or summary.
How	In what way or manner; by what means.
Identify	Provide an answer from a number of possibilities. Recognise and state briefly a distinguishing factor or feature.
Label	Add title, labels or brief explanation(s) to a diagram or graph.
List	Give a sequence of brief answers with no explanation.
Order	Put the responses into a logical sequence.
Outline	Give a brief account or summary.
Show	Give steps in a derivation or calculation.
Solve	Obtain the answer(s) using algebraic and/or numerical and/or graphical methods.
State	Give a specific name, value or other brief answer without explanation or calculation.
Tick	Mark (an item) with a tick or select (a box) on a form, questionnaire etc. to indicate that something has been chosen.
What	Asking for information specifying something.

Tackling Essay Questions

It is important when revising for essay-style examinations that you are familiar with the wording that may be used for the question.

Command words	Meaning
Analyse	Break down in order to bring out the essential elements or structure. To identify parts and relationships, and to interpret information to reach conclusions.
Compare	Give an account of the similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.
Describe	Give a detailed account or picture of a situation, event, pattern or process
Differentiate	Explore and explain the differences.
Discuss	Offer a considered and balanced review that includes a range of arguments, factors or hypotheses. Opinions or conclusions should be presented clearly and supported by appropriate evidence.
Evaluate	Assess the implications and limitations; to make judgements about the ideas, works, solutions or methods in relation to selected criteria.
Explain	Give a detailed account including reasons or causes.
Justify	Give valid reasons or evidence to support an answer or conclusion.

Try to use the following writing frame as a 'recipe' to construct your answer so that you are presenting a balanced view point that meets mark band 3.




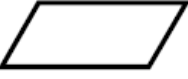


The Recipe – for essay type exam questions

Introduction			
+ Impact	Consequence	- Impact	Consequence
+ Impact	Consequence	- Impact	Consequence
+ Impact	Consequence	- Impact	Consequence
Conclusion			

Flowchart symbols

Flow charts

Flow charts like pseudocode are informal but the most common flow chart shapes are:

	Line	An arrow represents control passing between the connected shapes.
	Process	This shape represents something being performed or done.
	Sub Routine	This shape represents a subroutine call that will relate to a separate, non-linked flow chart
	Input/Output	This shape represents the input or output of something into or out of the flow chart.
	Decision	This shape represents a decision (Yes/No or True/False) that results in two lines representing the different possible outcomes.
	Terminal	This shape represents the "Start" and "End" of the process.

Year 11 'At Home' Strategy

Methods of Revision:

O – Online – this could be Quizlet, SmartRevise or any number of revision websites. Good for repetition of keywords and base knowledge. Won't help as much with understanding or linking knowledge.

LCWC – Look Cover Write Check – good for embedding complex understanding such as more difficult concepts which have multiple steps. Also good for testing key vocabulary.

PPQ – Past Paper Questions – good for testing yourself against the exam boards criteria. Focus on using key terminology and ensuring you take the time to understand how they want the question answered. Look at the number of marks for each question.

FC – Flash Cards – good for quickly testing key concepts or vocabulary. Easy to repeat concepts to embed learning. Combine with LCWC or PPQ to show learning.

PRAC – Practice – repeat knowledge/skills until it is embedded.

CODE – Practice coding skills which force you to use programming concepts and put them into use. Applicable to writing pseudocode and understanding how coding concepts work.

READ – Read and stay up to date with how computers are affecting our daily lives. Think more deeply and consider how what you're reading affects all stakeholders, the law, culture and the environment.

DRAW – Draw diagrams of concepts or make links or to practice completing tasks which require you to draw and link symbols

Other information:

- **Please use:**
 - **Revision guides**
 - **Past papers**
 - **CS Revision Pack**
 - **Personal Mock Exam Feedback (pink sheets)**
 - **Electronic Files**

w/c	Suggested areas of syllabus to be covered	Suggested methods of revision	Revision Style
04.01.20	2.1 Algorithms	<ul style="list-style-type: none"> • Revision Booklet – check topic specific methods of revision • Craig and Dave Videos (YouTube) • Homework – 2.4 Logic • Algorithm Practice Problems • PPQ's 	<ul style="list-style-type: none"> • Practice
18.01.20	2.2/2.3 Programming	<ul style="list-style-type: none"> • Revision Booklet – check topic specific methods of revision • Craig and Dave Videos (YouTube) • CODE!! 	<ul style="list-style-type: none"> • Practice
01.02.20	2.4 Computational Logic	<ul style="list-style-type: none"> • Revision Booklet – check topic specific methods of revision • Craig and Dave Videos (YouTube) • Homework – 2.5 Translators • Draw logic gates • PPQ's 	<ul style="list-style-type: none"> • Practice • Rote
22.02.20	2.5 Translators	<ul style="list-style-type: none"> • Revision Booklet – check topic specific methods of revision • Craig and Dave Videos (YouTube) • SmartRevise • PPQ's 	<ul style="list-style-type: none"> • Rote • Understanding
08.03.20	2.6 Data Representation	<ul style="list-style-type: none"> • Revision Booklet – check topic specific methods of revision • Craig and Dave Videos (YouTube) • SmartRevise • PPQ's 	<ul style="list-style-type: none"> • Practice • Rote
22.03.20	1.1 System Architecture	<ul style="list-style-type: none"> • Revision Booklet – check topic specific methods of revision • Craig and Dave Videos (YouTube) • Homework – 2.6 Data Rep • SmartRevise • PPQ's 	<ul style="list-style-type: none"> • Rote • Understanding
05.04.20	1.2/1.3	<ul style="list-style-type: none"> • Revision Booklet – check 	<ul style="list-style-type: none"> • Rote

Easter Break	Memory/Storage	<ul style="list-style-type: none"> topic specific methods of revision Craig and Dave Videos (YouTube) SmartRevise PPQ's 	<ul style="list-style-type: none"> Understanding
05.04.20 Easter Break	1.4/1.5 Networks and Topologies	<ul style="list-style-type: none"> Revision Booklet – check topic specific methods of revision Craig and Dave Videos (YouTube) SmartRevise PPQ's 	<ul style="list-style-type: none"> Rote Understanding
19.04.20	1.6 System Security	<ul style="list-style-type: none"> Revision Booklet – check topic specific methods of revision Craig and Dave Videos (YouTube) SmartRevise PPQ's 	<ul style="list-style-type: none"> Rote Understanding
03.05.20	1.7 Systems Software	<ul style="list-style-type: none"> Revision Booklet – check topic specific methods of revision Craig and Dave Videos (YouTube) SmartRevise PPQ's 	<ul style="list-style-type: none"> Rote Understanding
03.05.20	1.8 Ethics	<ul style="list-style-type: none"> Revision Booklet – check topic specific methods of revision Craig and Dave Videos (YouTube) SmartRevise Read current affairs news PPQ's 	<ul style="list-style-type: none"> Rote Understanding Written SPAG Technical Keywords

Exam dates

TBC Computer systems

AM 1h 30m

TBC Computational thinking, algorithms and programming PM 1h 30m