



Northgate OCR GCSE Computer Science

Name _____

Teaching set _____

Knowledge Organiser

This booklet contains questions on all the topics found in unit 1 of the OCR GCSE Computer Science course. Use this resource throughout your GCSE revision.

- Every question and answer has been uploaded into Quizlet so you can test yourself.
- Use it to help learn the definitions of key terms.
- You can visit the BBC site using the links included on each page.
- You can use the Seneca site to complete reinforcement tasks.
- You can get family members to test your knowledge, make quizzes, games or flashcards.











Click to Select a Section





GCSE Topics Unit 1

Computer Systems

- 1.1  • Systems Architecture
- 1.2  • Memory
- 1.3  • Storage
- 1.4  • Wired and wireless networks
- 1.5  • Network topologies, protocols and layers
- 1.6  • System security
- 1.7  • System software
- 1.8  • Ethical, legal, cultural and environmental concerns





1.1 Systems Architecture



The Exam board say you need to be able to explain and apply:

- the purpose of the CPU
- Von Neumann architecture:
 - MAR (Memory Address Register)
 - MDR (Memory Data Register)
 - Program Counter
 - Accumulator
- common CPU components and their function:
 - 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:
 - clock speed
 - cache size
 - number of cores
- embedded systems:
 - purpose of embedded systems
 - examples of embedded systems.

OCR
Revision
Guide

Pages

1-3

KEY TERMS: • Glossary activity

- CPU
- Control unit
- Cache

- ALU
- MAR
- MDR
- Fetch
- Decode
- Execute

- PC
- Embedded
- Accumulator
- Clock
- Von Neumann
- Harvard

- Data Bus
- Instructions
- Address
- cores

Key Questions: [CGP Revision Guide Page]

- ▶ Explain the terms hardware and software. [1]
- ▶ What is an embedded system? [1]
- ▶ What advantages do embedded systems have over general purpose computers? [1]
- ▶ What does the program counter store? [1]
- ▶ What are the three main parts of a CPU? [2]
- ▶ What is the main job of the Control Unit? [2]
- ▶ What is the role of the ALU? [2]
- ▶ What is a register? [2]
- ▶ What is cache and what does it store? [2]
- ▶ Name the 4 main registers in the CPU... [2]
- ▶ What two things does the memory hold? [3]
- ▶ What is the difference between Von Neumann and the Harvard architecture? [3]
- ▶ Describe the processes involved in fetching an instruction? [3]
- ▶ Describe the processes involved in decoding an instruction? [3]
- ▶ Describe the processes involved in executing the instruction? [3]
- ▶ Which CPU register is the only one that has access to input devices? [3]



- 1.1.1 Architecture Introduction
- 1.1.2 Von Neumann Architecture
- 1.1.3 Factors Affecting CPU Performance





1.2 Memory

OCR
Revision
Guide
Pages
4-5

- KEY TERMS:**
- Virtual memory
 - RAM
 - ROM
 - Volatile
 - BIOS
 - Primary storage
 - Flash memory
 - Cores
 - Clock speed
 - GPU



The Exam board say you need to be able to explain and apply:

- 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.

Key Questions: [CGP]

- ▶ Explain the term “volatile memory”. [4]
- ▶ What are the key differences between RAM and ROM? [4]
- ▶ Which type of memory RAM or ROM is used for the main memory in a computer? [4]
- ▶ What is virtual memory? [4]
- ▶ Why does having more cores improve CPU performance? [4]
- ▶ What is the risk of overclocking a CPU? [4]
- ▶ When is virtual memory used? [4]
- ▶ As a user of a computer, how would you know you are using virtual memory? [4]
- ▶ What does the acronym BIOS mean. [4]
- ▶ What type of memory is the BIOS stored in? [4]
- ▶ What are the three factors that effects the CPU performance? [5]
- ▶ What do we really mean when we say a CPU with a higher clock speed runs faster? [5]
- ▶ It is important to have lots of RAM to avoid suing this type of memory. [5]
- ▶ How do good quality GPU’s help the CPU’s perform better? [5]
- ▶ Explain why doubling the number of cores doesn’t double the speed of the computer? [5]



- 1.2.1 Types of Memory
- 1.2.2 Flash Memory
- 1.2.3 Virtual Memory





1.3 Storage

OCR
Revision
Guide
Pages
6-7

- KEY TERMS:**
- Secondary storage
 - Capacity
 - Portability
 - Durability
 - Robustness
 - Reliability
 - Speed
 - Optical
 - Magnetic
 - Solid state
 - Kilo-Bytes kB
 - Mega-Bytes MB
 - Giga-Bytes GB
 - Terra-Bytes TB



- 1.3.1 Capacity
- 1.3.2 Solid State Storage
- 1.3.3 Magnetic Storage
- 1.3.4 Optical Storage

The Exam board say you need to be able to explain and apply:

- 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.

Key Questions: [CGP]

- ▶ What are the names of the three tiers of storage? [6]
- ▶ Name some examples of secondary storage. [6]
- ▶ How does the speed of primary storage compare to secondary? [6]
- ▶ Name four main parts of a hard disc drive [6]
- ▶ What physical properties does the traditional hard drive use to store 1's and 0's [6]
- ▶ What are the advantages and disadvantages of Magnetic hard drives? [6]
- ▶ What are the advantages and disadvantages of SSD hard drives? [6]
- ▶ What type of memory does an SSD use? [6]
- ▶ Name some examples of optical drives [7]
- ▶ Explain the basic working of a CD use the terms laser,data pits and reflection [7]
- ▶ What are the advantages of using optical discs? [7]
- ▶ What are the disadvantages of using optical discs? [7]
- ▶ What is the capacity of a CD-ROM, DVD and Blu-Ray disc? [7]





1.4 Wired and Wireless Networks

The Exam board say you need to be able to explain and apply:

- 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 point
 - routers/switches
 - NIC (Network Interface Card)
 - transmission media
- the internet as a worldwide collection of computer networks:
 - DNS (Domain Name Server)
 - hosting
 - the cloud
- • the concept of virtual networks.

OCR CGP
Revision
Guide
Pages
13,14,15,20

KEY TERMS:

- topology
- fibre-optics
- internet
- LAN
- mesh
- WAP
- world wide web
- WAN
- star
- Bluetooth
- cloud
- Standalone
- DNS
- client-server
- virtual networks
- Networked
- bandwidth routers
- peer-to-peer
- VPN
- NIC
- MAC address
- WIFI

Key Questions: [CGP]

- ▶ Why should we use a network or LAN? [13]
- ▶ What does WAN stand for and describe its main features. [13]
- ▶ What does LAN stand for and describe its main features. [13]
- ▶ What is the biggest WAN of all? [13]
- ▶ What factors affect the performance of a network? [13]
- ▶ What are the advantages and disadvantages of wired versus wireless networks? [13]
- ▶ List some hardware needed to create a LAN? [14]
- ▶ What does a router do? [14]
- ▶ What does NIC stand for and why is it needed? [14]
- ▶ What hardware do you need to connect to a wireless network? [14]
- ▶ What do we call the bands within bands used in Wi-Fi? [14]
- ▶ What is the key difference in hardware between peer-to-peer and client-server? [15]
- ▶ Describe the client-server network [15]
- ▶ What are the pros and cons of a peer-to-peer network [15]
- ▶ Describe the characteristics of the peer-to-peer network [15]
- ▶ What are the pros and cons of a peer-to-peer network [15]
- ▶ Describe the main characteristics of a VPN. [20]
- ▶ Explain all the parts of this address... <https://www.bbc.co.uk/bitesize/revision.html> [20]
- ▶ What are the advantages of storing data in the cloud? [20]
- ▶ What are the disadvantages of storing data in the cloud? [20]



- 2.1.1 Networks Introduction
- 2.1.2 Types of Networks
- 2.1.3 Client-Server Model
- 2.1.4 Peer-to-Peer Model
- 2.1.5 Network Hardware
- 2.1.6 The Internet
- 2.1.7 The Cloud
- 2.1.8 Pros & Cons of the Cloud
- 2.1.9 Virtual Networks





1.5 Network topologies, protocols and layers

The Exam board say you need to be able to explain and apply:

- ✓ 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.

OCR CGP
Revision
Guide

Pages
16-19

KEY TERMS:

- Wireless
- frequency
- channels
- Encryption
- Keys
- protocols
- TCP/IP
- layers
- application
- transport
- Network-internet
- Link-physical
- IP addresses
- MAC addresses
- packets
- ports
- Headers
- Payload
- packet switching

Key Questions: [CGP]

- ▶ What are the advantages of a star network? [16]
- ▶ What are the disadvantages of a using a star network? [16]
- ▶ What is the role of the switch in a star network? [16]
- ▶ What is the main advantage of the mesh topology? [16]
- ▶ What is the definition of a protocol? [17]
- ▶ What is an IP address? [17]
- ▶ What is the difference between a static and dynamic IP address? [17]
- ▶ What is a MAC address? [17]
- ▶ Why is packet switching so effective at routing messages? [18]
- ▶ List the things a packet contains [18]
- ▶ How does a receiving computer know there was an error in the message? [18]
- ▶ What is the TCP/IP? [19]
- ▶ List the four layers of the TCP/IP protocol [19]
- ▶ Which layer, turns data into a useful form for the user eg HTTP into websites? [19]
- ▶ Which layer breaks the message into packets? [19]
- ▶ Which layer directs the data by adding the IP addresses to the packets? [19]
- ▶ Which layer contains all the physical devices and wires/cables etc? [19]
- ▶ What are the advantages of using layers? [19]



SENeca

- 2.2.1 Topology
- 2.2.2 WIFI
- 2.2.3 Addressing
- 2.2.4 Network Protocols
- 2.2.5 Application Protocols
- 2.2.6 Layers
- 2.2.7 Packet Switching





1.6 System security

The Exam board say you need to be able to explain and apply:

- ✓ 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.

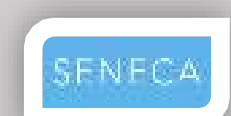
OCR CGP
Revision
Guide
Pages
21-23

KEY TERMS:

- Malware
- phishing
- Passwords
- virus
- brute force
- Trojan
- worms
- denial of service
- Spyware
- SQL injection
- firewalls
- Captcha
- encryption
- Shoulder surfing
- Authentication
- Penetration testing

Key Questions: [CGP]

- ▶ Name 5 ways which a network can be attacked? [21]
- ▶ Explain a DoS attack [21]
- ▶ Describe a passive attack. [21]
- ▶ List six malicious ways malicious software may carry-out [21]
- ▶ Provide 3 ways that malicious software can get access to a network [21]
- ▶ What is the key difference between a worm and a virus? [21]
- ▶ What is a trojan? [21]
- ▶ Provide 3 ways in which social engineering is used to defraud. [22]
- ▶ Explain how SQL injection works [22]
- ▶ What main features will a good network policy have? [23]
- ▶ Explain what penetration testing is. [23]
- ▶ What considerations should you take into account with regards to your password. [23]
- ▶ What is firewall and what is its job? [23]
- ▶ What type of attacks do user access rights stop [23]
- ▶ What is encrypted text called? [23]
- ▶ What is an encryption key? [23]
- ▶ Why is encryption used? [23]



- 2.3.1 Forms of Attack
- 2.3.2 Malware
- 2.3.3 Social Engineering
- 2.3.4 Common Active Attacks
- 2.3.5 Information Security
- 2.3.6 Network Administration
- 2.3.7 Protecting Against Malware
- 2.3.8 Authentication & Encryption





1.7 System Software

The Exam board say you need to be able to explain and apply:

- ✓ 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.

OCR CGP
Revision
Guide
Pages
8-11

KEY TERMS:

- Operating system
- GUI
- Memory management

- Open source
- Closed source
- Proprietary
- Fragmentation
- Defragmentation
- Compression

- Encryption
- utilities
- Back-ups
- Full
- Incremental



Key Questions: [CGP]



- ▶ What are the 5 main functions of an operating system? [8]
- ▶ What is the role of a device driver? [8]
- ▶ Why might device manufacturers release updates to their device drivers? [8]
- ▶ What are the advantages of using a GUI? [8]
- ▶ What are the advantages for command line interfaces with the operating system? [8]
- ▶ Explain how an OS can carry out multi-tasking [9]
- ▶ Describe the main features of file and disk management [9]
- ▶ Describe a full back-up [10]
- ▶ Describe an incremental back-up [10]
- ▶ List 3 examples of utility software [10]
- ▶ Why does a disc over time need defragmenting? [10]
- ▶ Explain the process of defragmentation, and why it is useful? [10]
- ▶ What are the names of the two main types of application software [11]
- ▶ What are the advantages of open source software? [11]
- ▶ What are the disadvantages of open source software? [11]
- ▶ What are the advantages of closed source or proprietary software? [11]
- ▶ What are the disadvantages of closed source or proprietary software? [11]



- 3.1.1 Types of System Software
- 3.1.2 Operating Systems
- 3.1.3 Operating System Managers
- 3.1.4 Operating System Manager 2
- 3.1.5 Utility Software
- 3.2.1 Open Source vs Proprietary Software





1.8 Ethical, legal, cultural and environmental concerns

The Exam board say you need to be able to explain and apply:

- ✓ 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.

OCR CGP
Revision
Guide
Pages
25-31

KEY TERMS:

- DPA
- legislation
- Copyright
- Creative commons license
- Freedom of information
- Stakeholders
- Ethical
- Cultural
- Moral
- Privacy issues



Key Questions: [CGP]

- ▶ What issues can the use of technology raise? [25]
- ▶ What is a stakeholder? [25]
- ▶ What are examples that reflect why it is difficult to keep private information safe on the internet. [26]
- ▶ What do some governments do to ensure we are protected against terrorism. [26]
- ▶ What is internet sensorship? [26]
- ▶ In what ways does technology impact on our social well being? [27]
- ▶ What form does cyberbullying take? [27]
- ▶ Provide examples of how technology can impact on our health. [27]
- ▶ What causes the digital divide? [28]
- ▶ Provide some examples of how technology has changed our lives. [28]
- ▶ In what ways does making devices impact on the environment? [29]
- ▶ Why does using your devices have such an impact on electricity production [29]
- ▶ What can we do to reduce the amount of electricity consumed in devices. [29]
- ▶ What is WEEE? [29]
- ▶ State the main aspects of the Data protection Act 1998 [30]
- ▶ What does the freedom of information act allow? [30]
- ▶ What are the main features of the Computer misuse act [30]
- ▶ How does the copyright, designs and patent act protect innovation [31]
- ▶ Explain the creative commons license [31]



1.2 Ethical, Legal, Cultural & Environmental Concern

- 3.2.1 Open Source vs Proprietary Software
- 3.2.2 Ethical Issues
- 3.2.3 Ethical Issues 2
- 3.2.4 Legal Issues
- 3.2.5 Legal Issues 2
- 3.2.6 Cultural Issues
- 3.2.7 Environmental Issues
- 3.2.8 Privacy Issues
- 3.2.9 Stakeholders
- 3.2.10 End of Topic Test - Software & Issues