





This book will be used to make notes, describe keywords and predict (and answers) questions for each topic with your GCSE Computer Science studies. This will detail all of the unit criteria that you will need to be confident of before undertaking the Summer examinations.

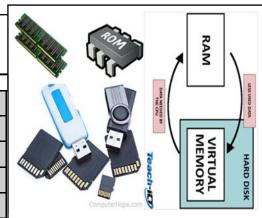
Every effort must be taken to ensure that this booklet is completed to the best of your ability during revisions sessions and independent learning.

SYSTEM ARCHITECTURE: Central Processing Unit CPU AND FETCH EXECUTE CYCLE Control Unit NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: Arithmetic / Logic Unit Output Device I know the purpose of the CPU PC CIR AC MAR MDR I know the Von Neumann architecture (MAR, MDR, PC & Accumulator) I know common CPU components and their function (ALU, CU, Cache) **Memory Unit** I know the function of the CPU as fetch and execute instructions stored in memory **STUDENT NOTES KEYWORDS** Von Neumann Architecture Registers ALU (Arithmetic & Logic Unit) Control Unit MDR (Memory Data Register) MAR (Memory Address Register) PC (program Counter) Accumulator **CPU (Central Processing Unit)**

SYSTEM ARCHITECTURE: CPU AND FETCH EXECUTE CYCLE NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: **Embedded** I know how common CPU characteristics affect their performance including: Systems Clock Speed, Cache Size, Number of cores. I know what is meant by the term embedded systems including: I know the purpose of embedded systems I can give suitable examples of embedded systems **STUDENT NOTES KEYWORDS** CACHE memory **Clock Speed** Cores **Embedded System**

MEMORY: RAM, ROM, FLASH & VIRTUAL NEED TO BE CONFIDENT OF BEFORE THE EXAMINA I know the difference between RAM and ROM

| NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: | | | |
|--|--|--|--|
| I know the difference between RAM and ROM | | | |
| I know the purpose of ROM in a computer system | | | |
| I know the purpose of RAM in a computer system | | | |
| I understand virtual memory and know why a computer system may need it | | | |
| I know the purpose of flash memory | | | |
| STUDENT NOTES | | | |



| I know the purpose of flash memory | ComputerHope.com |
|------------------------------------|--------------------------------------|
| STUDENT NOTES | <u>KEYWORDS</u> |
| | RAM (Random Access Memory) |
| | To an (name of the costs well of the |
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| | |
| | ROM (Read Only Memory) |
| | |
| | |
| | |
| | CACHE Memory |
| | |
| | |
| | |
| | VIRTUAL Memory |
| | |
| | |
| | |
| | Flash Memory |
| | |
| | |
| | |
| | DRAM |
| | |
| | |
| | SRAM |
| | |
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| | |

SECONDARY STORAGE:

TYPES & CHARACTERISTICS

| NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: | |
|---|-------------------|
| I understand the need for secondary storage | |
| I understand data capacity and can calculate data capacity requirements | 16 cs |
| I know the common types of storage: optical, magnetic and solid state | |
| I know the characteristics: capacity, speed, portability, durability, reliability, cost | |
| can select and justify the most appropriate storage media for given scenarios | |
| STUDENT NOTES | <u>KEYWORDS</u> |
| | Lucia Baria |
| | Input Device |
| | - |
| | Output Device |
| | - Cutput Sevice |
| | |
| | Magnetic |
| | Wagnetic |
| | |
| | |
| | Optical |
| | |
| | |
| | Solid State |
| | - |
| | |
| | Secondary Storage |
| | |
| | - |
| | |
| | Durability |
| | |
| | |
| | Portability |
| | |
| | |

Capacity

Reliability

WIRED & WIRELESS NETWORKS(1):

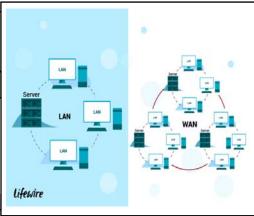
TYPES & FACTORS AFFECTING PERFORMANCE

NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION:

I know the different types of networks: LAN & WAN

I can describe the factors that affect the performance networks

I understand the different roles of computers in a client-server and a peer-to-peer network



| STUDENT NOTES | <u>KEYWORDS</u> |
|---------------|---------------------------------|
| | LAN (Local Area Network) |
| | |
| | |
| | WAN (Wide Area Network) |
| | |
| | |
| | Client-Server Network |
| | |
| | |
| | Peer-to-Peer Network |
| | |
| | |
| | Latency |
| | |
| | |
| | Bandwidth |
| | |
| | |
| | ISP (Internet Service Provider) |
| | isi (internet service Provider) |
| | |
| | |

WIRED & WIRELESS NETWORKS(2):

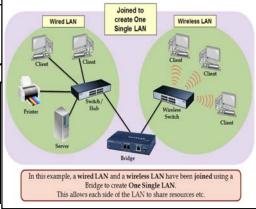
HARDWARE REQUIREMENTS & THE INTERNET

NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION:

I know the hardware needed to connect a standalone pc to a local area network: wireless access point; router/switch; Network Interface Card; transmission media

I can describe the internet as a worldwide collection of computer networks: Domain Name Servers; Hosting; and the Cloud

I understand the concept of virtual networks



| STUDENT NOTES | <u>KEYWORDS</u> |
|---------------|------------------------------|
| | WAP (Wireless Access Point) |
| | |
| | Bouter |
| | Router |
| | |
| | Switch |
| | |
| | NIC (Network Interface Card) |
| | |
| | Turning No. 1 |
| | Transmission Media |
| | |
| | DNS (Domain Name Server) |
| | |
| | |
| | Hosting |
| | |
| | The Cloud |
| | |
| | Virtual Network |
| | |
| | |

NETWORK TOPOLOGIES, PROTOCOLS & LAYERS:

HARDWARE REQUIREMENTS & THE INTERNET

| NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: | | |
|--|--|--|
| I can describe star and mesh networks | | |
| I can describe wifi frequency, channels and encryption | | |
| I can clearly describe the concept of packet switching | | |
| I can describe the purpose of a range of available protocols | | |
| I understand the difference between MAC Address and IP Address | | |
| CTUDENT NOTES | | |

| THE DESCRIPTION OF TWO BEAUTIONS OF THE SECTION |
|---|
| DHCP, DNS, FTP, HTTP, HTTPS, POP, SMTP, SSH, etc |
| Segment |
| TCP UDP |
| Datagram |
| IP Address: IPv4, IPv6 |
| MAC Address Frame |
| Ethernet cable, fibre, wireless, |

| STUDENT NOTES | <u>KEYWORDS</u> |
|---------------|---|
| | Star Network |
| | |
| | Mesh Network |
| | |
| | Wifi Frequency |
| | |
| | Wifi Channels |
| | |
| | Encryption |
| | |
| | Ethernet |
| | |
| | Network Layers |
| | |
| | Packet Switching (Header, Payload, Trailer) |
| | |
| | |
| | Standalone |
| | |
| | MAC Address |
| | |

SYSTEM SECURITY:

NETWORK THREATS & PREVENTION

NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION:

I can describe a range of potential attacks on a network: malware; phishing; ; DDOS; social engineering; brute force attack; Data Interception & theft; SQL Injection; poor network policy.

I can describe the threats that the above attacks pose to networks

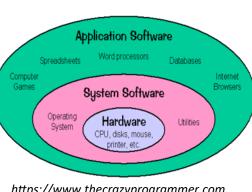
I can describe measures of identifying and preventing vulnerabilities: penetration testing; network forensics; network policies; anti-malware software; firewalls; user access levels; passwords; and encryption



| STUDENT NOTES | <u>KEYWORDS</u> |
|---------------|-----------------------|
| | Social engineering |
| | |
| | Network Policies |
| | |
| | Malware |
| | |
| | Anti-malware software |
| | |
| | Firewall |
| | |
| | Network Vulnerability |
| | Network vullerability |
| | |
| | Encryption |
| | |
| | Phishing |
| | |
| | Data Interception |
| | |
| | SQL Injection |
| | |
| | |

CVCTERA COETIA/A DE

| SYSTEM SOFTWARE: | | | |
|--|--|--|--|
| PURPOSE, OPERATING SYSTEMS & UTILITIES | | | |
| NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: | | | |
| I can describe the purpose and functions of system software | | | |
| I can describe the purpose of the operating system and explain key functions: user interface; memory management/multitasking; peripheral management & drivers; user management; file management. | | | |
| I can describe the purpose of a range of utility software: encryption; defragmentation; data compression; and methods of backup (full & incremental) | | | |



https://www.thecrazyprogrammer.com STUDENT NOTES **KEYWORDS** User Interface Multitasking/Memory Management Peripheral Management/Driver Incremental Back-up User management File management **Encryption Software** Defragmentation **Data Compression** Full Backup

ETHICAL, LEGAL, CULTURAL & ENVIRONMENTAL CONCERNS:

| NEED TO | DE CON | ICIDENT | OE DEEODE | THE EV | MINATION |
|------------|--------|--------------------|-------------|--------|------------------|
| 14661) 11) | DE LLI | 4 6 1176141 | LIE DEFLIKE | | AIVIIIVA IIU JIV |

I can discuss computer science technologies whilst considering: *ethical issues; legal issues; cultural issues; environmental issues; privacy issues*

I can describe how stakeholders are affected by technologies

I can discuss the legislation relevant to Computer science: Data Protection Act (1998); Computer Misuse Act (1990); Copyright, Designs & Patent Act (1988); Creative Commons Licencing; Freedom of Information Act (2000)



| STUDENT NOTES | <u>KEYWORDS</u> |
|---------------|--|
| | Ethical |
| | |
| | Cultural |
| | |
| | Legal |
| | |
| | Computer Misuse Act (1990) |
| | |
| | Data Protection Act (1998) |
| | |
| | Privacy |
| | |
| | Code of Conduct |
| | |
| | Creative commons Licensing |
| | |
| | Freedom of Information Act (2000) |
| | |
| | Copyright, Designs & Patent Act (1988) |
| | |
| | |

Bubble Sorting ALGORITHMS—Computational Thinking, Search and Sort Algorithms NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: 5 1 4 2 8 1 4 2 5 8 1 2 4 5 8 I can define abstraction, decomposition and algorithmic thinking & discuss their uses in CS 1 4 2 5 8 1 2 4 5 8 I understand the difference between standard search algorithms (binary & linear) 1 2 4 5 8 1 2 4 5 8 I understand the difference between sort algorithms (bubble, merge and insertion) 1 4 2 5 8 1 2 4 5 8 I can discuss the advantages and disadvantages of different search & sort algorithms 1 4 2 5 8 1 2 4 5 8 1 2 4 5 8 **STUDENT NOTES KEYWORDS** Abstraction Decomposition Algorithmic Thinking Search algorithm **Binary Search** Linear Search Sort Algorithm **Bubble Sort** Merge Sort **Insertion Sort**

| | Find the sum of 5 numbers Flowchart |
|---|---|
| ALGORITHMS (contd) Computational Thinking, | Algorithm in simple English Start Start |
| Search and Sort Algorithms | Initialize sum = 0 and count = 0 (PROCESS) Sum = 0 |
| NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: | 2. Enter n (I/O) 3. Find sum + n and assign it to sum and then increment count Output Description: |
| | by 1 (PROCESS) 4. Is count < 5 (DECISION) |
| I can confidently create my own algorithms (pseudocode & flow diagrams) | if YES go to step 2 else sum = sum + n |
| I can interpret, correct or complete algorithms | Print sum (I/O) count=count+1 |
| | Print sum Is count < 5 YES |
| | Stop |
| STUDENT NOTES | KEYWORDS |
| | <u>KETWORDS</u> |
| | Algorithm |
| | |
| | |
| | Pseudocode |
| | |
| | |
| | Flow Diagram |
| | Tiew Blog.um |
| | |
| | Laterage |
| | Interpret |
| | |
| | |
| | Debug |
| | |
| | |
| | Logic Error |
| | Logic Error |
| | |
| | |
| | Syntax Error |
| | |
| | |
| | Sequence (code) |
| | |
| | |
| | |
| | Selection (code) |
| | |
| | Iteration (code) |
| | Iteration (code) |
| | |
| | |

PROGRAMMING TECHNIQUES

NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION:

I can programming using variables, constants, operators, inputs, outputs and assignments (and can show this knowledge when creating/editing pseudocode)

I understand the concept of sequence, selection & iteration in code/pseudocode

I can code/design in pseudocode basic string manipulation

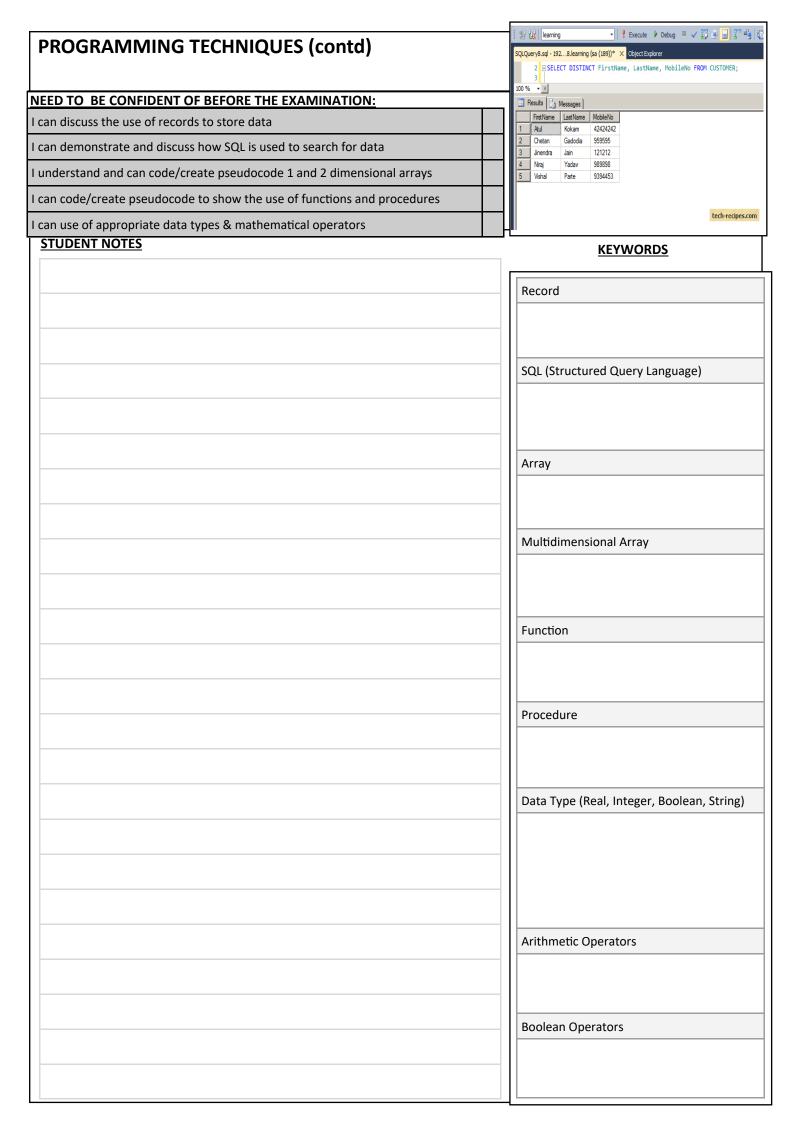
STUDENT NOTES

I can code/design in pseudocode file handling operations(read, open, write, close)

| 31 | self, file = man |
|--|--|
| 32 33 | self, fingerprints |
| 34 | self.logdupes = transcript self.debug = debug |
| 35 | self.logger loggin |
| 36 37 | osth: |
| 38 | self.file self() |
| 39 | self.fingerprints |
| 48 41 | |
| 42 | eclassmethod def from_settings(cls, settings)) |
| 43 | debug = settings.gettings), dead |
| 45 | debug = settings; return cls(job_dir(setting)) |
| 46 | def request seen(self, request) |
| 47 | def request_seement fine prints fp = self.request_finerprints if fp in self.fingerprints |
| 49 | onturn True |
| 50 | self.fingerprints.mdd(fp) |
| 51 | if self.file: self.file.write(fp = et.li |
| 62 | SELLALIZATION CONTROL CONTROL OF THE PARTY O |
| 43 44 45 46 47 48 48 59 51 52 53 53 | def request_fingerprint(self, request) |
| 55 | Legura Lednest Trans. |
| | al. |

KEYWORDS

| Variable |
|---------------------------------|
| |
| |
| Constant |
| |
| |
| Operators |
| |
| Input (in programming) |
| |
| Output (in programming) |
| |
| |
| Sequence |
| |
| Selection |
| |
| |
| Iteration |
| |
| String manipulation |
| |
| File Handling (in programming) |
| The ridinaling (in programming) |
| |
| |



PRODUCING ROBUST PROGRAM NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: I can discuss defensive design considerations I understand the importance of code maintainability I understand the importance and different types of testing for programs I can efficiently identify and correct syntax and logic errors in code I can create an effective test plan including suitable test data STUDENT NOTES **KEYWORDS** Input Sanitisation/validation Planning for contingencies Anticipating misuse Authentication Maintainability Commenting code Indentation (in code) Iterative Testing (programs) Final/Terminal Testing (programs) **Test Data**

Logic Gates **COMPUTATIONAL LOGIC** the truth table for each of the following Logic Gates: **NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION:** 1 0 I can explain why data is represented in binary form in computer systems I can create/interpret simple logic diagrams using the operations AND, OR & NOT Name the Logic Gate: I can create/interpret truth table for logic diagrams Complete the truth table for the circuit on the right: I can combine Boolean operators AND, OR & NOT to 2 level (in a logic diagram) **STUDENT NOTES KEYWORDS** Binary Logic Diagram **Truth Table** AND (Logic Gate) OR (Logic Gate) NOT (Logic Gate)

TRANSLATORS & FACILITIES OF LANGAUGES Al Files • Sort import org.junit.runmer.RunWith; import org.junit.runmers.Suite; import junit.framework.JUnit4TestAdapter; **NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION:** I can discuss the purpose of translators public class AllTests (public static void main (String[] args) { junit.textui.TestRunner.run (suite()); I can describe the characteristics of high and low level languages I cab describe the characteristics of an assembler, compiler & interpreter I can describe the use of common tools & facilities available Line:30 Cot1 Code:0 Top:4 EVS.EL **STUDENT NOTES KEYWORDS Translators** High Level Languages Low Level Languages Assembler Compiler Interpreter IDE (Integrated Development Environment) Editor Facility (IDE) Error Diagnostics Facilities (IDE) Run-Time Environment (IDE)

| DATA REPRESENTATION | ASCII Hex Symbol | ASCII Hex Symbol | ASCII Hex Symbol | ASCII Hex Symbol |
|---|-------------------------------|-------------------------------------|-------------------------------------|-------------------------------|
| Units, Numbers, Characters, Images, Sound and Compression | 0 0 NUL 1 1 SOH 2 2 STX | 16 10 DLE 17 11 DC1 18 12 DC2 | 32 20 (space) 33 21 ! 34 22 " | 48 30 0 49 31 1 50 32 2 |
| NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: | 3 3 ETX 4 4 EOT 5 5 ENQ | 19 13 DC3 20 14 DC4 21 15 NAK | 35 23 # 36 24 \$ 37 25 % | 51 33 3 52 34 4 53 35 5 |
| I understand different units of data in computer systems | 6 6 ACK 7 7 BEL | 22 16 SYN 23 17 ETB | 38 26 & 39 27 ' | 54 36 6 55 37 7 |
| I understand how numbers are represented in binary and can convert between | 8 8 BS 9 9 TAB 10 A LF | 24 18 CAN 25 19 EM 26 1A SUB | 40 28 (41 29) 42 2A * | 56 38 8 57 39 9 58 3A : |
| I understand how characters are represented in binary and can convert between | 11 B VT 12 C FF 13 D CR | 27 1B ESC 28 1C FS 29 1D GS | 43 2B + 44 2C , 45 2D - | 59 3B ; 60 3C < 61 3D = |
| | 14 E SO 15 F SI | 30 1E RS 31 1F US | 46 2E . 47 2F / | 62 3E > 63 3F ? |
| STUDENT NOTES | | KEYW | ORDS | 1 |
| | Bit | | | |
| | DIL | | | |
| | | | | |
| | Nibble | | | |
| | | | | |
| | Kilobyte | | | |
| | Kilobyte | | | |
| | | | | |
| | Megabyte | | | |
| | | | | |
| | Gigabyte | | | |
| | Gigabyte | | | |
| | | | | |
| | Terabyte | | | |
| | | | | |
| | Dotah: ± | | | |
| | Petabyte | | | |
| | | | | |
| | Denary (ba | ase 10) | | |
| | | | | |
| | | | | |
| | | | | |
| | Binary (Ba | se 2) | | |
| | | | | |
| | | | | |
| | Overflow I | Error | | |
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Sound Recording **DATA REPRESENTATION (contd)** Units, Numbers, Characters, Images, Sound and Compression NEED TO BE CONFIDENT OF BEFORE THE EXAMINATION: I understand how images are represented in binary and can convert between I understand how sounds are represented in binary and can convert between I understand compression techniques and why compression is needed in **STUDENT NOTES KEYWORDS** Pixel Metadata **Colour Depth** Resolution

Sample (Sound)

Sample Interval

Bit Rate

Sampling Frequency