

Grade 4 checklist

60 skills. Tick each one when you can do it. For grade 4 you need the skills for the grades below it too.

Computer systems (Paper 1)

- ☐ **Describe what the ALU and CU do** The ALU carries out arithmetic and logical operations; the CU decodes instructions and sends control signals to coordinate the other components. (Architecture of the CPU)
- ☐ **Name the four Von Neumann registers** Program Counter (PC), Memory Address Register (MAR), Memory Data Register (MDR) and Accumulator (ACC). (Architecture of the CPU)
- ☐ **State what clock speed measures** The number of fetch–execute cycles carried out per second, e.g. 3.5 GHz means 3.5 billion cycles per second. (CPU performance)
- ☐ **State the characteristics of embedded systems** Dedicated function, small, low power, low cost, reliable, with the program usually stored in ROM. (Embedded systems)
- ☐ **State the purpose of RAM and ROM** RAM holds the programs and data currently in use; ROM holds the start-up (boot) instructions. (Primary storage (RAM, ROM, cache, virtual memory))
- ☐ **Explain why computers need primary storage** The CPU can only access instructions and data directly from primary storage, which is much faster than secondary storage. (Primary storage (RAM, ROM, cache, virtual memory))
- ☐ **Define the six storage characteristics** Capacity, speed, portability, durability, reliability and cost, and what each one means. (Secondary storage)
- ☐ **Convert between units of data** Multiply by 1000 to change to a smaller unit and divide by 1000 to change to a larger one (use 8 between bits and bytes). (Units and capacity)
- ☐ **Convert denary to 8-bit binary** Work from 128 downwards, putting a 1 in each column whose value you can subtract. (Binary, denary and hexadecimal)
- ☐ **Identify the most and least significant bits** The most significant bit is the left-most bit (worth 128 in 8 bits); the least significant bit is the right-most (worth 1). (Binary, denary and hexadecimal)
- ☐ **Apply the four binary addition rules** $0 + 0 = 0$, $0 + 1 = 1$, $1 + 1 = 10$ (write 0, carry 1), $1 + 1 + 1 = 11$ (write 1, carry 1). (Binary addition, overflow and shifts)
- ☐ **State how many characters ASCII represents** ASCII uses 7 bits (128 characters); extended ASCII uses 8 bits (256 characters). (Characters: ASCII and Unicode)
- ☐ **Represent a simple image in binary** With 1 bit per pixel, e.g. 1 = black and 0 = white, each row of pixels becomes a row of bits. (Images)
- ☐ **Define sample rate and bit depth** Sample rate is the number of samples taken per second (Hz); bit depth is the number of bits used for each sample. (Sound)
- ☐ **Define lossy and lossless compression** Lossy permanently removes some data; lossless reduces the file size without losing any data. (Compression)
- ☐ **Describe the differences between a LAN and WAN** A LAN covers a small area such as one site and uses hardware the organisation owns; a WAN covers a large area and uses infrastructure owned by other organisations. (LANs, WANs and network performance)

-
- ☐ **Name factors that affect network performance** Bandwidth, number of users, transmission media, error rate, latency and interference. (LANs, WANs and network performance)
-
- ☐ **Describe a peer-to-peer network** All computers have equal status and share resources directly with each other, with no central server. (Client-server and peer-to-peer)
-
- ☐ **State the purpose of each device** E.g. a WAP lets wireless devices join a wired network; a router connects the LAN to the Internet. (Network hardware)
-
- ☐ **Explain why DNS is needed** People remember domain names easily, but computers need IP addresses to send data to the right server. (The Internet, DNS, hosting and the cloud)
-
- ☐ **Explain what web hosting is** Storing a website's files on a server connected to the Internet so that users can access the website. (The Internet, DNS, hosting and the cloud)
-
- ☐ **Draw a star or mesh topology** Draw each device linked to a labelled central switch, or linked to several other devices. (Star and mesh topologies)
-
- ☐ **State benefits of wired and wireless connections** Wired: faster, more reliable and more secure. Wireless: mobility, no cables, easy to add devices. (Ethernet, Wi-Fi and Bluetooth)
-
- ☐ **Use plaintext, ciphertext and key correctly** Plaintext is the original data, ciphertext is the encrypted data, and the key is used to encrypt and decrypt. (Encryption)
-
- ☐ **State who assigns IP and MAC addresses** The network assigns the IP address; the manufacturer assigns the MAC address to the NIC. (IP and MAC addressing)
-
- ☐ **State the purpose of each common protocol** HTTP/HTTPS: web pages; FTP: files; SMTP: sending email; POP/IMAP: retrieving email; TCP/IP: packets and routing. (Standards and common protocols)
-
- ☐ **Explain why standards are needed** Agreed rules let hardware and software from different manufacturers work together. (Standards and common protocols)
-
- ☐ **Describe what a layer is** A division of network communication with a specific job, which uses the layer below and serves the layer above. (The concept of layers)
-
- ☐ **Identify an attack from a description** E.g. flooding a server with requests so users cannot reach it is a denial of service attack. (Threats to computer systems and networks)
-
- ☐ **Describe features of a strong password** Long, a mix of upper and lower case letters, numbers and symbols, and not a word or a personal detail. (Identifying and preventing vulnerabilities)
-
- ☐ **Identify the functions of an operating system** User interface, memory management and multitasking, peripheral management, user management, file management. (Operating systems)
-
- ☐ **Name three types of utility software** Encryption software, defragmentation software and data compression software. (Utility software)
-
- ☐ **Define the digital divide and its causes** The gap between people with and without access to technology, caused by cost, location, age, skills or disability. (Ethical, cultural, environmental and privacy issues)
-
- ☐ **State what each law protects** Personal data (DPA), computer systems and data from unauthorised access (CMA), original work (CDPA). (Legislation)
-
- ☐ **Give examples of each type** E.g. Linux and LibreOffice (open source); Microsoft Windows and Adobe Photoshop (proprietary). (Open source and proprietary software)
-

Algorithms and programming (Paper 2)

- ☐ **Define algorithmic thinking** Algorithmic thinking is working out the steps needed to solve a problem and the order they must happen in. (Computational thinking)
- ☐ **Identify the processes in a problem** Name what the program does with the data, such as calculating, checking or sorting. (Inputs, processes, outputs and structure diagrams)
- ☐ **Describe what a structure diagram shows** It shows a problem broken down into smaller sub-problems as a hierarchy of boxes. (Inputs, processes, outputs and structure diagrams)
- ☐ **Follow a flowchart or pseudocode to find outputs** Work through each step with given inputs, following the correct branch at each decision. (Pseudocode and flowcharts)
- ☐ **Spot a syntax error in code** Find missing brackets, missing quotation marks or misspelt keywords, and correct them. (Trace tables and common errors)
- ☐ **State the condition needed for binary search** The data must already be sorted, in ascending or alphabetical order. (Linear and binary search)
- ☐ **Show the list after one pass** Compare each adjacent pair from left to right, swapping where needed. (Bubble sort)
- ☐ **Describe the splitting stage of merge sort** The list is repeatedly divided in half until every sub-list contains one item. (Merge sort)
- ☐ **Identify variables, constants and assignments in code** Point to the lines that declare a constant, assign a value, take input or give output. (Variables, constants, input, output and assignment)
- ☐ **Explain why a constant is used** It cannot be changed by mistake, and it only needs updating in one place in the code. (Variables, constants, input, output and assignment)
- ☐ **Identify each construct in given code** Point to the lines that use if or switch, and the lines that use a loop. (Sequence, selection and iteration)
- ☐ **Use the comparison operators correctly** Use ==, !=, <, <=, > and >= to compare values and give True or False. (Arithmetic, comparison and Boolean operators)
- ☐ **Choose a suitable data type for data** For example a price is real, a count is integer and a yes/no value is Boolean. (Data types and casting)
- ☐ **Join strings together (concatenation)** Use + to join strings, casting numbers with str() first. (String manipulation)
- ☐ **Explain why programs store data in files** Data in variables is lost when the program ends; a file keeps it for next time. (File handling)
- ☐ **Access an array element by its index** Remember the first element is at index 0, so names[2] is the third item. (Arrays and records)
- ☐ **Identify records and fields in a table** Each row is a record; each column is a field. (SQL)
- ☐ **Describe what a sub program is** A named block of code that does a specific task and can be called when needed. (Functions and procedures)
- ☐ **State the range of values random() can give** random(1, 6) gives a whole number from 1 to 6 inclusive. (Random number generation)

-
- ☐ **Choose a suitable validation check** Match the check to the data, such as a range check for an age.
(Defensive design)
-
- ☐ **Give examples of each type of test data** Normal, boundary, invalid and erroneous data for a given rule.
(Testing)
-
- ☐ **Recognise the symbols for the three gates** AND is D-shaped, OR has a curved back and a point, NOT is a triangle with a circle. (Logic gates, diagrams and truth tables)
-
- ☐ **Explain why translators are needed** The CPU can only execute machine code, so source code must be translated. (Languages and translators)
-
- ☐ **Name the main tools in an IDE** Editor, error diagnostics, run-time environment and translator. (The Integrated Development Environment)
-
- ☐ **Identify inputs, processes and outputs for a scenario** Pick out the data in, what is done with it and what comes out. (Paper 2 Section B practice: design, write, test and refine)
-

Free notes, worksheets, practice papers and mock exams at chhetriacademy.com. Written for this site; not taken from past papers.
Stuck? 1-to-1 tutoring with a free 30-minute trial lesson.