

Grade 3 checklist

48 skills. Tick each one when you can do it. For grade 3 you need the skills for the grades below it too.

Computer systems (Paper 1)

- ☐ **State the purpose of the CPU** The CPU carries out the fetch–execute cycle: it fetches, decodes and executes instructions, over and over, to run programs. (Architecture of the CPU)
- ☐ **Name the three characteristics affecting performance** Clock speed, cache size and number of cores. (CPU performance)
- ☐ **Define an embedded system** A computer system inside a larger device that carries out a dedicated function. (Embedded systems)
- ☐ **Give examples of embedded systems** E.g. the controller in a washing machine or microwave, a smart thermostat, or a car's engine management system. (Embedded systems)
- ☐ **Define volatile and non-volatile memory** Volatile memory loses its contents when the power is turned off; non-volatile memory keeps them. (Primary storage (RAM, ROM, cache, virtual memory))
- ☐ **Explain why secondary storage is needed** It is non-volatile, so programs and files are kept when the power is off. (Secondary storage)
- ☐ **Give examples of each type of storage** Magnetic: HDD, tape; optical: CD, DVD, Blu-ray; solid state: SSD, USB flash drive, SD card. (Secondary storage)
- ☐ **Explain why data is stored in binary** Computers are made of switches (transistors) with two states, on and off, represented by 1 and 0. (Units and capacity)
- ☐ **Put the units in order** Bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte. (Units and capacity)
- ☐ **Convert 8-bit binary to denary** Add the place values (128, 64, 32, 16, 8, 4, 2, 1) of every column that holds a 1. (Binary, denary and hexadecimal)
- ☐ **Define a character set** The set of characters a computer can represent, each with its own unique binary code. (Characters: ASCII and Unicode)
- ☐ **Define pixel, colour depth and resolution** A pixel is a single dot of colour; colour depth is the number of bits per pixel; resolution is the number of pixels. (Images)
- ☐ **Describe how sound is sampled** The amplitude of the sound wave is measured at regular intervals and each measurement is stored in binary. (Sound)
- ☐ **State why files are compressed** To make files smaller, so they take up less storage space and are quicker to send. (Compression)
- ☐ **State what LAN and WAN stand for** Local Area Network and Wide Area Network. (LANs, WANs and network performance)
- ☐ **State the role of a server** A server provides services or resources, such as files, printing, email or web pages, to clients. (Client–server and peer-to-peer)
- ☐ **State the role of a client** A client requests services or resources from a server. (Client–server and peer-to-peer)

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- ☐ **Name the hardware needed for a LAN** NIC, switch, router, wireless access point and transmission media. (Network hardware)
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- ☐ **Define the Internet** The Internet is a worldwide collection of interconnected computer networks. (The Internet, DNS, hosting and the cloud)
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- ☐ **Identify a star or mesh network diagram** Star: all devices connected to one central device. Mesh: devices connected to several other devices. (Star and mesh topologies)
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- ☐ **Give examples of wired and wireless connections** Ethernet is wired; Wi-Fi and Bluetooth are wireless. (Ethernet, Wi-Fi and Bluetooth)
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- ☐ **Define encryption** Scrambling data using an algorithm and a key so it cannot be understood without the key. (Encryption)
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- ☐ **Recognise IPv4, IPv6 and MAC addresses** IPv4: four denary numbers with dots; IPv6: groups of hex digits with colons; MAC: six pairs of hex digits. (IP and MAC addressing)
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- ☐ **Define a protocol** A set of rules for how devices communicate and transfer data. (Standards and common protocols)
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- ☐ **Name the main threats to computer systems** Malware, social engineering, brute-force attacks, denial of service, data interception and theft, SQL injection. (Threats to computer systems and networks)
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- ☐ **Name methods to protect a network** Penetration testing, anti-malware, firewalls, user access levels, passwords, encryption and physical security. (Identifying and preventing vulnerabilities)
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- ☐ **State the purpose of an operating system** It manages the hardware and software, and provides a user interface and a platform for applications. (Operating systems)
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- ☐ **State the purpose of utility software** To maintain, protect or optimise the computer system. (Utility software)
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- ☐ **Give examples of each type of issue** E.g. job losses (ethical), social media (cultural), e-waste (environmental), location tracking (privacy). (Ethical, cultural, environmental and privacy issues)
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- ☐ **Name the three main computing laws** Data Protection Act 2018, Computer Misuse Act 1990, and Copyright, Designs and Patents Act 1988. (Legislation)
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- ☐ **Define open source and proprietary software** Open source: source code available to view, modify and share. Proprietary: source code closed; the licence restricts use. (Open source and proprietary software)
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Algorithms and programming (Paper 2)

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- ☐ **Define abstraction** Abstraction is removing unnecessary detail so you can focus on the parts of a problem that matter. (Computational thinking)
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- ☐ **Define decomposition** Decomposition is breaking a problem down into smaller sub-problems that are easier to solve. (Computational thinking)
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- ☐ **Identify the inputs and outputs of a problem** Pick out the data that goes in and the results that come out of a described program. (Inputs, processes, outputs and structure diagrams)
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- ☐ **Name the flowchart symbols** Terminal, input/output, process, decision and sub program symbols, joined by arrows. (Pseudocode and flowcharts)
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- ☐ **Define syntax error and logic error** A syntax error breaks the rules of the language; a logic error runs but gives the wrong result. (Trace tables and common errors)
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- ☐ **Describe how a linear search works** Check each item in turn from the start until the item is found or the end is reached. (Linear and binary search)
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- ☐ **State what a bubble sort does** It sorts a list by comparing adjacent items and swapping them if they are out of order. (Bubble sort)
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- ☐ **State what an insertion sort does** It takes each item in turn and inserts it into the correct place in a sorted part of the list. (Insertion sort)
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- ☐ **Define a variable and a constant** A variable's value can change while the program runs; a constant's value cannot. (Variables, constants, input, output and assignment)
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- ☐ **Name the three programming constructs** Sequence (in order), selection (decisions) and iteration (repetition). (Sequence, selection and iteration)
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- ☐ **Use the basic arithmetic operators** Add, subtract, multiply and divide with +, −, * and /. (Arithmetic, comparison and Boolean operators)
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- ☐ **Name the five data types** Integer, real, Boolean, character and string. (Data types and casting)
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- ☐ **Name types of validation check** Range, type, length, presence and format checks. (Defensive design)
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- ☐ **State the purpose of testing** To find and fix errors, and check the program meets its requirements. (Testing)
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- ☐ **Recall the truth tables for AND, OR, NOT** AND needs both inputs 1; OR needs at least one; NOT reverses the input. (Logic gates, diagrams and truth tables)
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- ☐ **Give examples of high-level and low-level languages** Python and Java are high level; machine code and assembly language are low level. (Languages and translators)
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- ☐ **State what an IDE is** Software with tools to help programmers write, run and debug programs. (The Integrated Development Environment)
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