Computing: Progression of Knowledge

Birchwood Junior School

By computing role · Years 3 to 6

Our computing roles

Data handler | Programmer | Problem solver | Engineer | Publisher | Risk assessor

What children know in each computing role, by year group. Each statement completes the sentence 'I know that …'.

	Year 3	Year 4	Year 5	Year 6
Data handler	**Branching databases** • questions can have yes/no answers • you can ask yes/no questions about different attributes • to separate objects into two similarly sized groups you need to select an attribute • a branching database is an identification tool • a data set can be structured using yes/no questions • a well-structured branching database will enable you to identify objects using fewer questions • there are real-world applications for branching databases	**Data logging** • questions can be answered using a table of data • data can be logged over time • sensors are input devices • a sensor can be used as an input device for data collection • a data logger captures 'data points' from sensors over time	**Mars Rover** • Mars Rover is a motor vehicle that collects data from space by taking photos and examining samples of rock • numbers in binary code are written using only 0s and 1s • messages can be sent in binary format • RAM is Random Access Memory and acts as the computer's working memory • simple operations can be used to calculate bit patterns **Flat-file databases** • a computer program can be used to organise data • ordering data allows us to answer some questions • tools can be used to select data to answer questions • operands can be used to filter data • AND and OR can be used to refine data selection • computer programs can be used to compare data visually • we present information to communicate a message	**Big data** • data contained within barcodes and QR codes can be used by computers • infrared waves are a way of transmitting data • Radio Frequency Identification (RFID) is a more private way of transmitting data • data is often encrypted so that even if it is stolen it is not useful to the thief **Spreadsheets** • questions can be answered using spreadsheet data • there are different software tools to work with data • the data type determines how a spreadsheet can process the data • formulas can be used to produce calculated data • cells can be linked • data should be organised in a spreadsheet • a cell's value automatically updates when the value in a linked cell is changed
Programmer	**Programming (Scratch)** • programs start because of an input • sequence is a series of events that must be performed in order to achieve a task • a program includes sequences of commands • the sequence of a program is a process • the order of commands can affect a program's output • different sequences can achieve the same output • different sequences can achieve different outputs	**Programming (Scratch)** • 'repeat' means to continue an action • there are everyday tasks that include repetition as part of a sequence e.g. brushing teeth, dance moves • we can use a command in a program to repeat instructions • there are loops within a program • there are patterns in a sequence • in programming there are indefinite loops and count-controlled loops • an indefinite loop will run until the program is stopped • you can program a loop to stop after a specific number of times • the instruction order in a loop is important • not all tools enable more than one process to run at once	**Programming (Scratch and Crumble)** • a condition can only be true or false • a count-controlled loop contains a condition • a condition-controlled loop will stop when a condition is met • when a condition is met, a loop will complete a cycle before it stops • a loop can be used to repeatedly check whether a condition has been met • the instruction order in 'if … then … else …' statements is important and affects the loop	**HTML** • HTML tags can be used to alter the appearance of a website • changing the HTML and CSS alters the appearance of an object on the web • copyright means that images are protected • we should do a 'Creative Commons' image search if we wish to use images from the internet • there are ways to spot websites that carry misinformation ('fake news') • the 'inspect element' tool can be used to explore and alter text and images **Python** • there are text-based programming languages such as Logo and Python • nested loops are loops inside of loops

	Year 3	Year 4	Year 5	Year 6
Risk assessor	• there is a difference between online and offline • I should not post personal information online • there are techniques for creating a strong password • you should ask permission from others before sharing about them online and that they have the right to say 'no.' • not everything I see or read online is true	• not everything on the internet is true: people share facts, beliefs and opinions online • the internet can affect your moods and feelings • privacy settings limit who can access your important personal information, such as your name, age, gender etc • different age restrictions apply to different social media sites	• there are different methods used to encourage people to buy things online • technology can be designed to act like or impersonate living things • technology can be a distraction, and someone might need to limit the amount of time spent using technology • there are appropriate behaviours in order to stay safe and be respectful online	• a digital footprint means the information that exists on the internet as a result of a person's online activity • there are steps required to capture bullying content as evidence • it is important to manage personal passwords effectively • having a positive online reputation has benefits • there are some common online scams
Problem solver	• A task can be broken down into smaller steps through decomposition • using decomposition helps to find separate steps • a set of small steps is called an algorithm • some algorithms may have patterns • some algorithms may have repeated steps	• abstraction is the removal of any unnecessary information • abstraction allows us to identify the important information • any instruction needs to be accurate for it to work correctly • logical reasoning is used to identify errors	• problems can be decomposed into smaller parts • abstraction allows the removal of information to identify key information • errors occur when algorithms are not accurate • when checking, there may be patterns in the algorithm • when checking, there may be repetition in the algorithm • logical reasoning allows us to identify and debug errors	• problems can be decomposed into smaller parts • abstraction allows the removal of information to identify key information • errors occur when algorithms are not accurate • when checking, there may be patterns in the algorithm • when checking, there may be repetition in the algorithm • logical reasoning allows us to identify and debug errors • end products need to be critically evaluated and improvements suggested
Engineer	**Desktop computing** • text and images can be used together to convey information • landscape and portrait are two different page orientations • different layouts can suit different purposes • DTP pages can be structured with placeholders • different font styles and effects are used for particular purposes • there are benefits of using a DTP application	**PowerPoint** • text and images can be used together to convey information • landscape and portrait are two different page orientations • different layouts can suit different purposes • PowerPoint pages can be structured with placeholders • different font styles and effects can be used for particular purposes • there are benefits of using a PowerPoint application	**Sharing information** • a system is a set of interconnected parts which work together • computers can be connected together to form IT systems • data can be transferred between IT systems • inputs, processes and outputs are used in large IT systems • search engines are examples of large IT systems • search engines create indices and that they are different for each search engine • web crawlers automatically browse web pages and store information, creating an index • search results are selected using algorithms • ranking orders search results to make them more useful • ranking is determined by rules and that different search engines use different rules	**Computing systems: communication** • data is transferred across networks using agreed protocols (methods) • connections between computers allow access to shared stored files • data is transferred in packets • computers connected to the internet allow people in different places to work together • technology offers opportunities for communication and collaboration • different types of media can be shared through the internet • communication and collaboration using the internet can be public or private
Publisher	**Creating media** • different types of camera shots can make photos or videos look more effective • photos and videos can be edited using film editing software • transitions and text can be added to video	**Photo editing** • images can be digitally manipulated • digital images can be changed for different purposes • changes made on an image can affect the quality of the image	**Vectors** • a vector drawing comprises separate objects • each object in a drawing is in its own layer • vector images can be scaled without any loss of quality • objects can be modified in groups • alignment and size guides can help create a more consistent drawing	**3D modelling** • 3D models can be created on a computer • a 3D environment can be viewed from different perspectives • digital tools can be used to manipulate 3D objects • placeholders can create holes in 3D objects • artefacts can be broken down into a collection of 3D objects