Knowledge Progression

Year 6 Computing

	Computational Thinking	Computers & Hardware	Digital Literacy & eSafety
Key Vocabulary	Algorithm, Computer code, Computer command, Decompose, Import (software), Indentation (programming), Loop, Nested loop, Random numbers, Remix, Script libraries, Variable, Acrostic code, Repetition, Selection, Sequence, Caesar cipher, Cipher, Data shift cipher, Nth letter cipher, Pigeon cipher, Scrambled, Repeat.	Chip and pin system, Byte, Computer, CPU, Device, Gigabyte, Kilobyte, Megabyte, Memory storage, Mouse, Operating system (OS), Radio play, ROM, Sound effects, Terabyte, Touch screen, Trackpad, Electronic components, Graphics, overlay	Barcode, Boolean, Brand, Contactless, Data, Data privacy, Encrypt, Infrared waves, NFC (near field communication), QR (quick response) code, Radio waves, RFID (radio frequency identification), Signal systems, Data analyst, Transmission, Big data, Bluetooth, Corrupt data, Digital revolution, GPS (global positioning system), IoT (internet of things), RFID, SIM, Smart city, Smart school, Password, CAD, Image rights, Screenshot, Structure, Brute force hacking, Secure, Licence. Public domain, Commercial use, Credit required, Data transmitters, Data receivers, Data corruptors, WiFi, Infrared, Proximity, Binary.
Previous knowledge/ Learning	**In Year 5, our pupils learnt to:** *C1* - Decompose an animation into a series of images. *C2* - Decompose information to plan a code for a program. *C3* - Use a range of programming commands to amend code within a live scenario through Sonic Pi utilising live loops. *C4* - Use repetition within a program, writing more complex algorithms for a purpose, beginning to use nested loops (loops within loops) through Sonic Pi. *C5* - Recognise that computers transfer data in binary (ASC II) and understand simple binary addition.	**In Year 5, our pupils learnt to:** *C6* - Learn that external devices can be programmed by a separate computer (Micro:bit). *C7* - Understand the difference between RAM and ROM.	**In Year 5, our pupils learn to:** *C8* - Understand how the data for digital images can be compressed (scaling, cropping, JPEG) and how bit patterns represent images as pixels. Binary is essential for this. *C9* - Use video editing software to create stop-motion animation films of 24 frames/second. They know how to upload photos, keep a camera in focus and can use: repetition, duplications, title pages, effects and frame removals. *C10* - Understand how data is collected and what a search engine is, and about copyright infringement. Furthermore, they understand page ranking and indexing. *C11* - Understand how to use 3D design software package TinkerCAD including dragging, dropping, zooming, resizing and highlighting multiple shapes.
N.C. Objectives	➢ Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts. ➢ Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ➢ Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.	➢ Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration.	➢ Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content ➢ Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information ➢ Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
Resources / Websites	A range of infrared devices (toys, games or remote-controlled devices, including IWB and television remotes) Batteries Video recording devices Computers, laptops or tablets Laptops/desktops	Headphones Metre ruler Smartphone A micro SD card of around 8GB Tennis rackets Three-digit padlocks Access to internal microphones or USB microphones	Laptops/desktops Tennis rackets Three-digit padlocks Access to internal microphones or USB microphones

Cycle 1:	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Kapow:	Bletchley Park 1	Bletchley Park 2	Introduction to Python	Big Data 1	Big Data 2	Skills Showcase

Powerful Knowledge

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Key Knowledge – what do we want our children to know before they leave our phase? How will we get them there? How is that personalised to Tranmere?	***POWERFUL KNOWLEDGE*** Our children will: *C1* - Understand how ciphers work and what brute force hacking is, and the significance of Bletchley Park. *C2* - Write in a text-based programming language (Python – fd, rt, fp etc) *C3* - Use and adapt nested loops to create art. *C4* - Write and adapt/improve increasingly complex algorithms and decompose a program into an algorithm written in python whilst creating art. ***HOW DOES THIS LOOK AT TRANMERE?*** 1. Remix the code for a brute force hacking algorithm. 2. Children explore a variety of different codes, from simple Caesar ciphers and pigeon ciphers to the Enigma code and crack coded messages. 3. Children are introduced to the text-based programming language Python, learning to write code to create their own pieces of Islamic inspired art utilising loops. 4. Using the programme Logo, children explore nested loops and how they alter their shape designs, before progressing to use randomisation in code to create or remix a Mondrian inspired piece of art.	***POWERFUL KNOWLEDGE*** Our children will: *C5* - Learn about the history of computers. *C6* - Learn how computers have evolved over time. *C7* - Predict how technology will continue to develop and influence our lives. *C8* - Identify and understand the history / everyday use of barcodes, QR codes, infrared and RFID. All within real world contexts: proximity tests, barriers/alarms, heat detectors, and RFID encryption. *C9* - Understand Bluetooth and how data can be corrupted. ***HOW DOES THIS LOOK AT TRANMERE?*** 1. Children learn how the first computer cracked the Enigma code. 2. Children explore all types of computers, from the very first to the most contemporary. They learn about the earliest designs and how they have developed, including mobile phones and consoles. 3. Children design a computer of the future. 4. Children will use QR codes to complete a treasure hunt and then embed them in a storyboard to send text to the reader. 5. Children will investigate the infrared light of a remote and which materials can block signals. 6. Children learn about 'Big Data' and how it is analysed to make improvements to daily life. 7. Whilst studying RFID, the children will create a two-stage encoding process to understand encryption. To understand encryption, they will use RFID data to survey rollercoaster queue times and will spreadsheet the findings. They will use these to advise visitors to the park. 8. Children, in the hall, will transmit data in packets by writing it, depicting it and scrunching it up to throw. However, in the centre of the 'transmitters' and 'receivers' will be the 'data corruptors' who will attempt to corrupt the messages using tennis rackets.	***POWERFUL KNOWLEDGE*** Our children will: *C10* - Understand the importance of secure passwords and how to create them. *C11* - Use search and word processing skills to create a presentation (PowerPoint, Google Slides or Prezi). *C12* - Plan, record and edit using video and audio software, including music, voiceover, sound, transitions and text. *C13* - Learn about the 'Internet of Things' and how it has led to big data which will lead to Smart Cities that promote more efficient, productive lives. *C14* – Sort data within an Excel spreadsheet by inserting a table and compare using Freeze Panes. *C15* - Use TinkerCAD to design a product that utilises a micro:bit to solve a real world problem and create a website with embedded links and multiple pages to sell this product. *C16* - Create a video advertisement, edit it using WeVideo and embed it in a web page. ***HOW DOES THIS LOOK AT TRANMERE?*** 1. Children create a web page on Google Sites about Bletchley Park and its significance. 2. Children learn about the importance of passwords through 'brute force hacking' whilst remixing a hacking algorithm. 3. Children create a presentation on historical figures in computing including: Alan Turing, Margaret Hamilton and Steve Jobs, Linus Torvalds and Charles Babbage. 4. Children learn the key features of a radio play (scripts, sound recordings, narration, background noise, Audacity) before creating and editing a play set at Bletchley Park during the war. 5. Children learn how infrared waves transmit data and the uses of RFID through real world (the Smart City application plans for Glasgow) application such as chip and pin devices. 6. Children design a Smart School based on their knowledge of Big Data and the Internet of Things, tinkering with how to improve school life, before itching the idea to the SLT using presentation software. 7. Children design an electronic product and adapt existing code to achieve the desired result, using TinkerCAD to design a housing for this product, thinking specifically about the difference between solid/hole and brick/block. 8. Children create a website for their product that contains an edited video advert.