The **BIG** Picture

Discovering the history of Bletchley Park, historical figures, and computer science. Children learn about code-breaking and password hacking as well as decoding messages. Children present information about historical figures.

NC Objectives- Key Stage 2
Pupils should be taught:

- 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

Unit Outcome

Pupils who are **secure** will be able to:

- Explain that codes can be used for a number of different reasons and decode messages.

- Explain how to ensure a password is secure and how this works.

- Create a simple website with information about Bletchley Park including the need to build electronic thinking machines to solve cipher codes.

- Explain the importance of historical figures and their contribution towards computer science.

- Present information about their historical figure in an interesting and engaging manner.

Key vocabulary

Acrostic Code	Brute force hacking
Caesar cipher	Chip and pin system
Cipher	Code
Combination	Contribute
Convince	Date shift cipher
Discovery	Hero
Invention	Nth Letter Cipher
Password	Pig Latin
Pigpen cipher	Present
Scrambled	Secret
Secure	Technological advancement
	Trial and error

Key Skills

- Learning about the history of computers and how they have evolved over time.
- Using past experiences to help solve new problems.
- Writing increasingly complex algorithms for a purpose.
- Debugging quickly and effectively to make a program more efficient.
- Remixing existing code to explore a problem.
- Changing a program to personalise it.
- Evaluating code to understand its purpose.
- Predicting code and adapting it to a chosen purpose.
- Using search and word processing skills to create a presentation.
- Understanding how search engines work.
- Understanding the importance of secure passwords and how to create them.
- Using search engines safely and effectively.

Key Knowledge

- To understand the importance of having a secure password and what "brute force hacking" is.

- To know that the first computers were created at Bletchley Park to crack the Enigma code to help the war effort in World War 2.

- To know about some of the historical figures that contributed to technological advances in computing.

- To understand what techniques are required to create a presentation using appropriate software.

The **BIG** Picture

Learning the fundamentals of the programming language of Python, they will test, change and explain what their program does. Children use loops and explain what repeats do and what the parts of the loop do while recognising that computers choose random numbers and decompose the program into an algorithm.

NC Objectives- Key Stage 2
Pupils should be taught:

- 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
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Unit Outcome

Pupils who are **secure** will be able to:

- Iterate ideas, testing and changing throughout the lesson and explain what their program does.

- Use nested loops in their designs, explaining why they need two repeats.

- Alter the house drawing using Python commands; use comments to show a level of understanding around what their code does.

- Use loops in Python and explain what the parts of a loop do.

- Recognise that computers can choose random numbers; decompose the program into an algorithm and modify a program to personalise it.

Key vocabulary

Algorithm	Code
Command	Design
Import	Indentation
Input	Instructions
Loop	Output
Patterns	Random
Remix	Repeat
	Shape

Key Skills

- Decomposing a program into an algorithm.

- Writing increasingly complex algorithms for a purpose.

- Debugging quickly and effectively to make a program more efficient.

- Remixing existing code to explore a problem.

- Using and adapting nested loops.

- Programming using the language Python.

- Changing a program to personalise it.

- Evaluating code to understand its purpose.

- Using logical thinking to explore software independently, iterating ideas and testing continuously.

Key Knowledge

- To know that there are text-based programming languages such as Logo and Python.

- To know that nested loops are loops inside of loops.

- To understand the use of random numbers and remix Python code.

The **BIG** Picture

Understanding about the use of big data including barcodes, QR codes, infrared, and RFID technologies. Children will create and scan their own QR codes, manipulate real-time data in spreadsheets, and present their findings. They also analyse transport data to understand its usefulness to commuters.

NC Objectives- Key Stage 2
Pupils should be taught:

- 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
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Unit Outcome

Pupils who are **secure** will be able to:

• Understand why barcodes and QR codes were created.

• Create (and scan) their own QR code using a QR code generator website.

• Explain how infrared can be used to transmit a Boolean type signal.

• Explain how RFID works, recall a use of RFID chips, and type formulas into spreadsheets.

• Take real-time data and enter it effectively into a spreadsheet.

• Presenting the data collected as an answer to a question.

• Recognising the value of analysing real-time data.

• Analyse and evaluate transport data and consider how this provides a useful service to commuters.

Key vocabulary

Algorithms	Barcode
Binary	Boolean
Brand	Chips
Commuter	Contactless
Data	Encrypted
Infrared	MagicBand
Privacy	Proximity
QR code	QR scanner
Radio waves	RFID
Signal	Systems/data analyst
Transmission	Wireless

Key Skills

Understanding and identifying barcodes, QR codes and RFID.

Identifying devices and applications that can scan or read barcodes, QR codes and RFID.

Understanding how barcodes, QR codes and RFID work.

Gathering and analysing data in real time.

Creating formulas and sorting data within spreadsheets.

Learning how 'big data' can be used to solve a problem or improve efficiency.

Key Knowledge

• To know that data contained within barcodes and QR codes can be used by computers.

• To know that infrared waves are a way of transmitting data.

• To know that Radio Frequency Identification (RFID) is a more private way of transmitting data.

• To know that data is often encrypted so that even if it is stolen it is not useful to the thief.

The **BIG** Picture

Writing, recording and editing radio plays set during WWII, looking back in time at how computers have evolved and designing a computer of the future.

NC Objectives- Key Stage 2
Pupils should be taught:

- 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
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Unit Outcome

Pupils who are secure will be able to:

•Explain how to record sounds and add in sound effects over the top.

•Produce a simple radio play with some special effects and simple edits which demonstrate an understanding of how to use the software.

•Create a document that includes correct date information and facts about the computers and how they made a difference.

•Demonstrate a clear understanding of their device and how it affected modern computers, including well-researched information with an understanding of the reliability of their sources.

•Describe all of the features that we'd expect a computer to have including RAM, ROM, hard drive and processor, but of a higher specification than currently available.

Key vocabulary

Background noise	Byte	Radio play	RAM
Computer	Devices	Raspberry Pi	Record
File	FX	Reverb	ROM
Gigabyte	Graphics	Script	Smartphone
Hard drive	Hardware	Sound	Sound effects
Kilobytes	Megabyte	Terrabytes	Touch screen
Memory storage	Mouse	Track	Trackpad
Operating system	Overlay	Trailer	
Play	Processor		

Key Skills
Learning about the history of computers and how they have evolved over time.
•Using the understanding of historic computers to design a computer of the future.
•Using search and word processing skills to create a presentation.
•Planning, recording and editing a radio play.
•Creating and editing sound recordings for a specific purpose.

Key Knowledge

•To know that radio plays are plays where the audience can only hear the action so sound effects are important.

•To know that sound clips can be recorded using sound recording software.

•To know that sound clips can be edited and trimmed.

The **BIG** Picture

Understanding data usage through the use of mobile data vs WiFi, the Internet of Things, and big data. Identifying high/low data activities and preparing presentations on using Big Data/IoT to improve school efficiency while respecting privacy.

NC Objectives- Key Stage 2
Pupils should be taught:

- 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
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Unit Outcome
Pupils who are **secure** will be able to:
- Recognise that data can become corrupted within a network and that data sent in packets is more robust, as well as identify the need to update devices and software.
- Recognise differences between mobile data and WiFi and use a spreadsheet to compare and identify high-use data activities and low-use data activities.
- Make links between the Internet of Things and Big Data and give a basic example of how data analysis/analytics can lead to improvement in town planning.
- Explain ways that Big Data or IoT principles could be used to solve a problem or improve efficiency within the school and prepare a presentation about their idea, considering the privacy of some data.
- Present their ideas about how Big Data/IoT can improve the school and provide feedback to others on their presentations.

Key vocabulary

Big Data	Bluetooth
Corrupted	Data
Energy	GPS
Improve	Infrared
Internet of Things	Personal
Privacy	QR codes
Revolution	RFID
SIM	Simulation
Smart city	Smart school
Stop motion	Threat
WiFi	Wireless

Key Skills
Understanding how corruption can happen within data during transfer (for example when downloading, installing, copying and updating files).
- Understanding that computer networks provide multiple services.
- Using search and word processing skills to create a presentation.
- Creating formulas and sorting data within spreadsheets.
- Learning about the Internet of Things and how it has led to 'big data'.
- Learning how 'big data' can be used to solve a problem or improve efficiency.

Key Knowledge

- To know that data can become corrupted within a network but this is less likely to happen if it is sent in 'packets'.

- To know that devices or that are not updated are most vulnerable to hackers.

- To know the difference between mobile data and WiFi.

The **BIG** Picture

Designing a new electronic product and using CAD software to design appropriate housing for it. Developing skills in website design, video editing, and persuasive language to promote their product. Evaluating and adapting existing code, debugging programs, and searching for accurate information online.

NC Objectives- Key Stage 2
Pupils should be taught:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems;
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- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
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Unit Outcome

Pupils who are **secure** will be able to:

•Evaluate code, understanding what it does and adapt existing to code for a specific purpose.

•Debug programs and make them more efficient using sequence, selection, repetition or variables.

•Design appropriate housing for their product using CAD software, including any input or output devices needed to make it work.

•Create an appealing website for their product, aimed at their target audience which explains what their product is and what it does, using persuasive language.

•Create an edited video of their project, articulating the key benefits.

•Describe and show how to search for information online and be aware of the accuracy of the results presented.

Key vocabulary

Adapt	Advert	Opinions	Output
Algorithm	Bugs	Photos	Product
Coding	Debugging	Program	Repetition
Design	Edit	Screenshot	Search engine
Electronic	Evaluate	Selection	Sequence
Facts	Image rights	Snippets	Software
Images	Influence	Structures	Variables
Information	Inputs	Video	Website
Loops	Manipulation		

Key Skills
Using past experiences to help solve new problems.
• Writing increasingly complex algorithms for a purpose.
• Debugging quickly and effectively to make a program more efficient.
• Remixing existing code to explore a problem.
• Changing a program to personalise it.
• Evaluating code to understand its purpose.
• Predicting code and adapting it to a chosen purpose.
• Using logical thinking to explore software independently, iterating ideas and testing continuously.
• Creating and editing videos, adding multiple elements: music, voiceover, sound, text and transitions.
• Using design software TinkerCAD to design a product.
• Creating a website with embedded links and multiple pages.
• Understanding how search engines work.
• Using search engines safely and effectively.

Key Knowledge

•To know what designing an electronic product involves.

•To know which programming software/language is best to achieve a purpose.

•To know the building blocks of computational thinking e.g. sequence, selection, repetition, variables and inputs and outputs.

The **BIG** Picture

Learning how to navigate the internet in an informed, safe and respectful way.

NC Objectives- Key Stage 2
Pupils should be taught:

- 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
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Unit Outcome
Pupils who are **secure** will be able to:
- Discuss a range of issues online that can leave pupils feeling sad, frightened, worried or uncomfortable and can describe numerous ways to get help.
- Explain how sharing online can have both positive and negative impacts.
- Be aware of how to seek consent from others before sharing material online and can describe how content can still be shared online even if it is set to private.
- Explain what a 'digital reputation' is and what it can consist of.
- Understand the importance of capturing evidence of online bullying and can demonstrate some of these methods on the devices used at school.
- Describe ways to manage passwords and strategies to add extra security such as two-factor authentication.
- Explain what to do if passwords are shared, lost, or stolen.
- Describe strategies to identify scams.
- Explain ways to increase their privacy settings and understand why it is important to keep their software updated.

Key vocabulary

Anonymity	Antivirus	Phishing	Privacy settings
Biometrics	Block and report	Private	Reliable source
Consent	Copy	Report	Reputation
Digital footprint	Digital personality	Respect	Scammers
Financial information	Hacking	Screengrab	Secure
Inappropriate	Malware	Settings	Software updates
Online bullying	Online reputation	Two factor authenication	URL
Password	Paste	Username	
Personal information	Personality		

Key Skills
Learning about the positive and negative impacts of sharing online.
- Learning strategies to create a positive online reputation.
- Understanding the importance of secure passwords and how to create them.
- Learning strategies to capture evidence of online bullying in order to seek help.
- Recognising that updated software can help to prevent data corruption and hacking.

Key Knowledge
- To know that a digital footprint means the information that exists on the internet as a result of a person's online activity.
- To know what steps are required to capture bullying content as evidence.
- To understand that it is important to manage personal passwords effectively.
- To understand what it means to have a positive online reputation.
- To know some common online scams.