Medium Term Plan

Year 6 Computing Overview

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Strands	Computing Systems and Networks	Programming	Data Handling 1	Creating Media	Data Handling 2	Skills Showcase
Topic	Bletchley Park	Introduction to Python	Big Data 1	History of Computers	Big Data 2	Inventing a Product

Key Stage 2 Pupils should be taught to;

- ✓ 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.

Computing Strand & Link to National Curriculum	Progression of Knowledge	Learning Objectives & Skills Progression	Hardware & Software	Cross Curricular Links	Key Vocabulary
Computing Systems and Networks - Bletchley Park	▪ 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.	▪ 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 poster 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		History – study an aspect or theme in British history. Maths – solve number and practical problems. Read, write, order and compare numbers up to 10 000 000. RSE – know the rules and principles for keeping safe online and how to report them. How to critically consider online friendships and an awareness of the risks associated with strangers online. English: Writing – Composition. Identifying the audience and purpose. Noting and developing initial ideas. Using further organisational and presentational devices to structure text.	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

		towards computer science. ▪ Present information about their historical figure in an interesting and engaging manner. ▪ 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. ▪			

Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 1	• To understand that there are lots of different types of secret codes • I can understand why codes might be valuable • I can identify some common secret codes • I am able to decipher some secret codes • I can write a message using a secret code	In the first lesson of this unit, explore a variety of different codes from simple Caesar ciphers to the Enigma code and discover how to decipher them	**Differentiation:** **Pupils needing extra support:** Should be directed towards the clues available for each code to help lead them towards solving them. **Pupils working at greater depth:** Should be encouraged to make connections between the codes they have looked at. **Key Questions:**	• Secret • Cipher • Pig Latin • Code • Scrambled • Date shift cipher • Caesar cipher • Pigpen cipher • Acrostic Code • Nth Letter Cipher
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 2	• To understand the	Children learn what brute force hacking is and the importance of secure passwords	**Differentiation:** **Pupils needing extra support:** If they are really struggling, hand them the	• Brute force hacking • Password

	importance of having a secure password • I know what is meant by brute force hacking • I understand why it is important to have a secure password • I understand why a longer password is more secure than a short one		answer sheet, but get them to explain each of the changes to the code. **Pupils working at greater depth:** Encourage independence in creativity in terms of the style of the hack. Can they change the code so that it only searches for digits less than five? How does that affect the ease with which the wizard can crack the code? **Key Questions:** • How can a computer find a solution more quickly than a person can? • How can you be sure you have tried every combination? • What do you think each line of the code means? • Are there common combinations that people might use, e.g. 123?	• Secure • Chip and pin system • Trial and error • Combination
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary

Lesson 3	• To understand the importance of Bletchley Park to the World War II war effort • I know that Bletchley Park was important during WWII • I know what the first computer was built for • I can create an information poster about Bletchley Park	Explore and find out about Bletchley Park during the WWII period and how the first computer cracked the supposed 'unbreakable' Enigma code	**Differentiation:** **Pupils needing extra support:** Work together to decide on the key facts for their information poster. Remind children they have to use the software chosen for the task. **Pupils working at greater depth:** Should be encouraged to add hyperlinks to further information and information about specific people who worked at Bletchley. **Key Questions:** • How do you know whether a website is telling the truth? • Is the website reputable? • Does more than one website say the same thing?	• Cipher code • Password • Secure • Brute Force Hacking • Combination • Trial and error • Chip and pin system
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 4	• To research historical figures that contributed to technological	Children learn about important historical figures in the field of computing including Alan Turing, Katharine Johnson and Steve Jobs	**Differentiation:** **Pupils needing extra support:** Provide fact file printouts of some figures to help support online research	• Discovery • Invention • Technological advancement

	advances in computing • I know some of the people who contributed to computing history • I can identify what some historical achieved • I am able to research one historical figure in detail		**Pupils working at greater depth:** Should be encouraged to embed videos into their presentations to show off their skills. They could also consider splitting 'paired' figures like Steve Jobs and Steve Wozniak and encourage children to think about how to persuade the audience that one was more important than the other. **Key Questions:** • How would life be different today if these historical figures hadn't invented made their various discoveries/ advancements to computer science?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 5	• To research and present information about historical figures in computing	Using their digital literacy skills, pupils research and present information about a historical computing figure, explaining the impact of their significance	**Differentiation:** **Pupils needing extra support:** Should be encouraged to discuss their presentation and prepare what they want to	• Contribute • Convince • Hero • Present

	• I can identify why historical figures were influential in creating modern computers • I can present information using a presentation software • I can explain why a historical figure is important		say when they present it to the class. **Pupils working at greater depth:** Should be encouraged to talk about more than one historical figure in their Bletchley Park presentation. **Key Questions:** • Do you think your presentation went well? Why? Why not? • What would you change if you could do it again? • What did you like about the other presentations?	

Computing Strand & Link to National Curriculum	Progression of Knowledge	Learning Objectives & Skills Progression	Hardware & Software	Cross Curricular Links	Key Vocabulary

Programming - Introduction to Python	- 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. -	- 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		Maths – compare and classify geometric shapes based on their properties and sizes. Describe positions on the full coordinate grid. Art – improve their mastery of art and design techniques, including drawing, painting and sculpture and know about great artists, architects and designers in history	Algorithm Code Command Design Import Indentation Input Instructions Loop Output Patterns Random Remix Repeat Shape

		choose random numbers; decompose the program into an algorithm and modify a program to personalise it. - 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.			
Lesson	Success Criteria	Lesson Outline		Differentiation and Key Questions	Key Vocabulary
Lesson 1	• To tinker with a new piece of software • I can predict what I think something new will do • I can explore something independently • I can explain what I found	Children are introduced to text-based programming, exploring the capabilities and commands of the programme Logo and creating basic designs.		**<u>Differentiation:</u>** **Pupils needing extra support:** should explore simpler 2D shapes, sticking to squares, rectangles and triangles of different sizes. **Pupils working at greater depth:** After they have used one loop, discuss what they think would happen if they put another loop	• Loop • Code • Command • Patterns • Instructions

			between to 'do' and the 'end'. Have the children try this (tinker) and then reflect on what happened. **<u>Key Questions:</u>** • What do you think this will do? • What did it do? • Have you checked your code for typos? • What does the error say? • Where should the space be in your code? • Have you included a loop? (?) • Why did you decide to loop that section of code?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 2	• To understand nested loops • I can explain what a loop is	Still using Logo, pupils explore how having loops-within-loops changes the look of their designs.	**<u>Differentiation:</u>** **Pupils needing extra support:** Provide them with the following format: repeat 10 [repeat 4[fd 100 rt 90] rt 36]	• Loop • Code • Shape • Instructions • Command • Repeat

	• I know why we use loops • I can explain how a nested loop works		Explaining that they should only change the coloured numbers. The red number should be the number of sides the shape has, and the blue number should be the angle that's written underneath the shape on the command sheet. **Pupils working at greater depth:** Should be challenged to create a circle and then include that within a nested loop. Should be editing nested loops after creation, showing an awareness of which parts they can or can't change. **Key Questions:** • What is a loop for? • What instruction do we have to give to the computer for it to understand that it needs to loop? • What do you think this code does?	

			• How could we improve this? • Which instructions should be repeated? • Which order will the instructions be run in? • How can we make more than one square? • Why can't we see more than one shape? • Where are you telling the computer to turn before drawing another shape? • What does this line of code do?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 3	• To understand basic Python commands	Children develop their computational thinking skills of decomposition to help them to alter a picture using text-based programming language, Python.	**Differentiation:** **Pupils needing extra support:** May need to complete the same activity using Scratch, so that they can use the blocks rather than relying on typing.	• Code • Command • Instructions • Input • Import

	• I can decompose a picture • I can 'remix' a project by tinkering • I can choose Python commands for a purpose		**Pupils working at greater depth:** Should be able to clearly and confidently explain where each section of their code is. **Key Questions:** • What do you need to do to draw this picture? • What similarities and differences do you notice between Logo and Python? • How do you make the turtle move? • What bit of your code draws the house? • How can you fill a shape?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 4	• To use loops when programming • I can explain what a loop is	Children use loops in Python to create their own pieces of Islamic art, tinkering with different values to create different shapes.	**Differentiation:** **Pupils needing extra support:** Give them this , encouraging them to experiment with it, changing the numbers	• Code • Loop • Shapes • Design • Indentation • Patterns

	• I can suggest an appropriate place to use a loop • I can use the syntax for a loop		to see what they can create. Or get them to use Scratch to build repeating patterns to support children who struggle managing written code, using the to help. **Pupils working at greater depth:** Encourage them to use embedded loops to create each of their rows. **Key Questions:** • What do you notice about the artwork? • Can you see any patterns? • How could a computer help us create these patterns?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 5	• To understand the use of random numbers	Pupils learn about the use of random numbers, decompose a program and write an algorithm to create original pieces of artwork.	**Differentiation:** **Pupils needing extra support:** Should be encouraged to explore and modify. Draw their attention to using	• Random • Input • Output • Remix • Algorithm

	• I can identify the need for random numbers • I can decompose a program • I can write an algorithm		undo/redo for any accidental deletes. **Pupils working at greater depth:** Should be challenged to apply previous knowledge in a new context; e.g. changing the 2D shape that's repeated. **<u>Key Questions:</u>** • What do you think of Piet Mondrian's artwork? • Can you see any similarities in Mondrian's artwork? • What does the program do? What do you notice? • What changes in the program each time you run it? • What instructions has Tina the turtle been given?	• Command • Instructions

			• When does the pen need to be up/down? • Why is a loop helpful in this program? • Where is the conditional used? What does it do? • How can last lesson help us with today's code?	

Computing Strand & Link to	Progression of Knowledge	Learning Objectives & Skills Progression	Hardware & Software	Cross Curricular Links	Key Vocabulary

National Curriculum					
Data Handling - Big Data 1	- 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.	- 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		Science – recognise that light appears to travel in straight lines RSE: Online Relationships – the rules and principles for keeping safe online and how to report. How information and data is shared and used online. Maths: interpret and construct pie charts and line graphs and use these to solve problems. Complete, read and interpret information in tables.	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

		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. - 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.			
Lesson	Success Criteria	Lesson Outline		Differentiation and Key Questions	Key Vocabulary
Lesson 1	• To identify how barcodes and QR codes work • I can identify and distinguish between barcodes and QR codes • I know some of the advantages and disadvantages	Understanding how barcodes and QR codes work and discovering some of their real-world applications.		**<u>Differentiation:</u>** **Pupils needing extra support:** Provide guided adult support where needed and ensure children are partnered with a more able peer. Emphasise the importance of teamwork so that each child contributes. **Pupils working at greater depth:** Could be challenged to create a QR code treasure hunt for their classmates, using an online QR code generator. **<u>Key Questions:</u>**	• Barcode • QR code • QR scanner

	of barcodes and QR codes • I understand how computers can use data from barcodes and QR codes •		• What do libraries use to keep track of books? (Barcodes.) • What is a barcode? (A series of black and white parallel lines that, when scanned, provide information about an item or product.) • Where have you seen one? (They are printed on almost all shop items and inside library books.) • How do you think they work? (The barcode scanner sends out a red beam of light and has a sensor to read how much light is bounced back. If the light is bounced back, it detects a white line and if the light does not bounce back, it detects a black line. The amount of light that bounces back determines how wide the line is, so the scanner can then identify which digit the line represents.)	

Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 2	• To explore how infrared waves transmit data • I know infrared light is part of the electromagnetic spectrum • I understand infrared light can be used for a variety of purposes • I understand infrared light can be easily blocked	Discovering how infrared waves transmit data and how this can be put to practical use by a range of devices.	**Differentiation:** **Pupils needing extra support:** Enable these children to use the most user-friendly cameras/devices, or to bring devices which they are familiar with. Encourage them to take a video rather than trying to capture a photo. **Pupils working at greater depth:** Children may recognise that each button on a remote will transmit a slightly different sequence of flashes. For their infrared invention, children will produce an annotated diagram and a detailed description of how it works. **Key Questions:** • What problem was the invention of the remote control designed to solve? (Changing channel on a TV without moving from your seat.) • What data would be sent along the cable from the remote to the TV? (Instructions to change the channel or volume of the TV.)	• Infrared • Data • Transmission • QR code • Signal • Proximity

			• How has the design of the remote control been improved in recent years? (They do not need a wire, instead use infrared technology.) • Where else have you seen infrared signals being sent? (Remote-controlled toys, drones, contactless thermometers, some wireless keyboards, proximity sensors, night vision goggles.)	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 3	• To recognise the uses of RFID • I understand how RFID can be used to transmit data • I know encoding keeps data safe • I can type formulas into cells using a spreadsheet	Children examine the uses of radio-frequency identification (RFID) and how encoding keeps RFID data safe.	**<u>Differentiation:</u>** **Pupils needing extra support:** could use a much shorter code (e.g. three-digits), use a one-step encoding system and work with a partner. **Pupils working at greater depth:** • Could use a three or four-stage encoding system by adding in two further columns which complete a new sum and then 'undo' it. They will need to think about which order the sums	• RFID • Wireless • Chips • Encrypted • Infrared • Radio waves • Barcodes • QR codes • Privacy

			need to be completed in to ensure that they are successfully decoded. • Could also try much longer numbers, e.g. 16-digit codes to mimic bank cards. Could try to break each other's codes – i.e. what did my learning partner multiply or add to the code to create the transfer code? **Key Questions:** • How can data be sent wirelessly? (Infrared and radio waves, barcodes, QR codes.) • How could data be stolen? (Data can be stolen by someone intercepting its transfer, by hacking into a computer or a computer network. Most data is encrypted (put into a coded form) so that even if it is stolen, it is not always useful to the person who has stolen it.) • What sort of information would you wish to keep private? (Bank account	

			details, home address, etc.)	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 4	• To input and analyse real-world data • I can recognise further uses of RFID • I can input and present data in a spreadsheet • I can make conclusions from a data source	With reference to theme parks, children learn to input, present and interpret data collected using RFID.	**Differentiation:** **Pupils needing extra support:** Allow these children to work with a learning partner or as part of a focus group. Create a spreadsheet template with column headers, so they know where to input the ride names and wait times. **Pupils working at greater depth:** Children can compare the 'live' wait time with the average wait time and colour code the cells in the spreadsheet to show if they are above or below average wait times. **Key Questions:** • What type of data might be stored on the wristbands? (Visit details, hotel booking information, credit to make purchases.) • How is the data being transferred? (RFID.)	• RFID • Chips • Data • MagicBand
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary

Lesson 5	• To analyse and evaluate data • I can recall how RFID is used in data transfer • I understand how RFID helps to solve real-world data challenges • I can sort and compare data within a spreadsheet •	Analysing transport data to solve commuter scenarios and considering how big data provides a useful service to consumers	**Differentiation:** **Pupils needing extra support:** Allow these children to work with a learning partner or as part of a focus group. They may need additional adult support to sort and analyse the spreadsheet data. **Pupils working at greater depth:** Children may even be able to notice other trends or patterns within the data, and could create another customer query for their peers to solve. **Key Questions:** • What is this data set about? (Passenger numbers on the London Underground network.) • What type of information has been included? (Tube station names and 'passenger counts' – the number of people entering and exiting London Underground stations, based on gate data.) • How is this data useful? (It identifies the busiest days and times for individual stations so that passengers can	• Algorithms • Systems/data analyst • Commuter • Contactless • Brand

			plan their journey to avoid the most congested stations or times)	

Computing Strand & Link to National Curriculum	Progression of Knowledge	Learning Objectives & Skills Progression	Hardware & Software	Cross Curricular Links	Key Vocabulary
Creating Media - History of Computers	- 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.	- 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		English: Reading – comprehension. How authors use language; pupils understanding of what they have read; careful research; and how to correctly cite and record sources for information found on the internet. English: Writing – composition. Selecting appropriate grammar and vocabulary: describing settings, characters and atmosphere; and assessing the effectiveness of their own and others' writing. History – a study of an aspect or theme in British history that	Background noise Byte Computer Devices File FX Gigabyte Graphics Hard drive Hardware Kilobytes Megabyte Memory storage Mouse Operating system Overlay Play Processor Radio play RAM

		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. - Learning about the history of computers and		extends pupils' chronological knowledge. Design and Technology – use research and develop design criteria to inform the design of innovative, functional, appealing products.	Raspberry Pi Record Reverb ROM Script Smartphone Sound Sound effects Terrabytes Touch screen Track Trackpad Trailer

		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. -			
Lesson	Success Criteria	Lesson Outline		Differentiation and Key Questions	Key Vocabulary
Lesson 1	• To tinker with sound • I can identify the key features of a radio play	Discover and learn about the key features of a radio play before then creating and editing a radio play set at Bletchley Park during World War II		**<u>Differentiation:</u>** **Pupils needing extra support:** Should work with a more confident partner to explore Soundtrap/Audacity. **Pupils working at greater depth:** Should take note of	• Radio play • Sound effect • Sound clip • Track • File • Reverb

	• I can record sounds to sound recording software • I can add tracks in order to include sound effects into my recording •		what different controls do and explain them to the class at the end of the lesson. **Key Questions:** • What is a sound effect? • How have sound effects been made?	• Overlay • Sound • Record • Play
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 2	• To record, edit and add sound effects to a radio play • I can plan and record a radio play • I can edit my radio play to remove any mistakes • I can add sound effects to my radio play to make it more interesting •	Once children have written their radio play, they record and edit it to include sound effects and music	**Differentiation:** **Pupils needing extra support:** Should work as a group with the *Activity: Example script* resource. **Pupils working at greater depth:** Encourage children to think about general background noise; for example, in some radio plays, it may say that the room is echoey, how could they alter their recording to give the impression of echoey? (By adding reverb*)* **Key Questions:** • How is a radio play different to a film? • What are the important features of a radio play?	• FX • Script • Radio play • Trailer • Sound effects • Background noise

Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 3	• To understand how computers have changed and the impact this has had on the modern world • I can identify how computers have evolved over time • I understand that computers are everywhere in modern life • I can recognise some of the earliest computers and how they impacted the modern world	Children will learn about the ways that computers have changed and the impact this has had on the modern world	**Differentiation:** **For pupils needing extra support:** Suggest a Google Doc and select only a handful of the computers from the list written in date order with one fact about each. **Pupils working at greater depth:** Encourage them to express their findings using whatever medium they prefer. Make sure they include a picture and some information about why each computer type was built. **Key Questions:** • How and where do you play computer games now? • What are the main features that have changed in computers over the years?	• Computer • Bytes • Kilobytes • Megabytes • Terrabytes • Gigabytes • Graphics
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 4	• To research one of the computers that changed the world and present	After learning about the evolution of computers in the previous lesson, this lesson will involve children selecting one historical computer to	**Differentiation:** **Pupils needing extra support:** Should be helped to understand the key features of a presentation: keep it simple, try to have	• Hardware • Devices • Memory storage • Smartphone

	information about it to the class • I can present information about one device that changed the world • I can research information carefully and recognise whether information is reliable • I know how to correctly cite and record sources for information found on the Internet •	research and present information about.	between three to five bullet points per page, not to write everything on the slide, but to put detailed information into presenter's notes instead. **Pupils working at greater depth:** Should explore information in more depth, including persuasive writing techniques, to convince others that the machine in their presentation was the most important and valuable. **Key Questions:** • What are some of the main differences between the first computers and those we use today? • What does the word 'copyright' mean? • How do we credit the original author/creator's piece of work?	• Raspberry Pi • Hard disk drive • Byte • Gigabyte • Megabyte • Computer
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 5	• To design a computer of the future	Following on from Lessons 3 and 4 which focused on computers past and present, the class are required to design a computer for the future,	**Differentiation:** **Pupils needing extra support:** Should use the *Resource: Computer parts* to help base their ideas on and	• RAM • ROM • Hard drive • Processor

	• I understand how computers work • I can recognise components of a computer and why they are important • I know how computers evolved over time • I can use my understanding of historic computers in order to design a computer of the future	taking into account all that they have learnt about computers so far	to consider the components of their computer design. **Pupils working at greater depth:** Should justify why their computer will have certain features and reference their research of modern computers and possibly the evolution of computing over time. **Key Questions:** • How old are our computers at school? • If you were to update them today, what hardware would've changed? (E.g. faster processor, larger hard drive.)	• Touch screen • Trackpad • Mouse • Operating system

Computing Strand & Link to	Progression of Knowledge	Learning Objectives & Skills Progression	Hardware & Software	Cross Curricular Links	Key Vocabulary

National Curriculum					
Data Handling 2 - Big Data 2	- 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	- 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		Physical Education – take part in outdoor and adventurous activity challenges. Maths – complete, read and interpret information in tables, including timetables. Geography – human geography, including: types of settlement and land use, economic activity and the distribution of natural resources. Design & Technology – use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose. Apply their understanding of computing to program, monitor and control their products. English: Spoken Language – participate in discussions, presentations, performances, role play, improvisations and debates.	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

	difference between mobile data and WiFi. -	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. - 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.			

Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 1	• To explain how data can be safely transferred • I can recognise that data can become corrupted within a network • I can explain how data sent in 'packets' is more robust • I can identify the need to update devices and software •	Pupils learn how data can be safely transferred	**Differentiation:** **For pupils needing extra support:** Ask to go last as this will enable them to observe their peers and learn from their examples. **Pupils working at greater depth:** Should be challenged to consider a way to encode the data so that it is robust enough to cope with packets getting lost, but any packet interception would not be decodable. **Key Questions:** • Can you remember the three methods of wireless data transfer we have already looked at in this topic? (QR codes, infrared and RFID) • Would your message still get through if you lost one, two or three of your packets in the transfer?	• Corrupted • Wireless • QR codes • RFID • Infrared • Data • Stop motion • Bluetooth
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary

Lesson 2	• To investigate the data usage of online activities • I can compare methods of wireless data transfer • I can recognise differences between WiFi and mobile data • I can use a spreadsheet to compare the data-usage of various online activities	Pupils will investigate the data usage of online activities	**Differentiation:** **Pupils needing extra support:** Should be given time to recap the spreadsheet skills from previous topics. **Pupils working at greater depth:** Should either compare four different data allowances or four activities, and complete the extension act **Key Questions:** • Who has a mobile phone? • How much data do you have available each month? • What is the difference between mobile data and WiFi? • Do any of them know how much they have to pay if they exceed their monthly data plan?	• WiFi • Data • SIM
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 3	• To identify how data analysis can improve city life	Children will learn to identify how data analysis can improve city life	**Differentiation:** **Pupils needing extra support:** May need help with reading the text on screen or with knowledge of the	- Internet of Things - Simulation - Data - WiFi

	• I can identify the meaning of the term 'Internet of Things' • I can recall how devices can be connected to the 'Internet of Things' – via WiFi or mobile data • I can recognise how the IoT has led to Big Data • I can link data analytics to improvement in town planning •		methods of electricity generation. **Pupils working at greater depth:** Should be encouraged to look at the available data (market data, land stats, electrical supply vs demand, population happiness, tax rates, etc) and consider whether they are getting the best use from the land. **Key Questions:** - Why do you think they have made this data free to access online? (Because people may want to develop apps to help people around the city, or citizens may be able to use the data to help them plan their day better)	- Smart city
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 4	• To design a system for turning a school into a smart school	Using their knowledge of Big Data and the Internet of Things, children design a system for a smart school Free	**Differentiation:** **Pupils needing extra support:** May need access to the video about smart buildings to help them to	- Big Data - Smart school - Data - Improve

	• I can recall methods of data transfer • I can evaluate the methods of data transfer • I can apply Big Data/IoT principles to solve a problem • I can research the technology associated with solving the problem • I can prepare a presentation		come up with ideas. They may also benefit from working with a more confident partner so that they can share their ideas on how to improve the school. **Pupils working at greater depth:** Should be encouraged to carry out their own research, e.g. collect data (non-private), scout the school for locations of sensors, research devices, methods of data transfer, or conduct interviews. **Key Questions:** - Which methods do you think could improve the school?	- Energy
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 5	• To present ideas for turning a school into a smart school • I can present my ideas for improving	Children present their ideas for a turning a school into a smart school and consider whether using this data could create any privacy issues	**Differentiation:** **Pupils needing extra support:** Might need more time to discuss their feedback with a partner before filling in their *Activity: Feedback form.* **Pupils working at greater depth:** Should be encouraged	• Big Data • Privacy • QR Code • GPS • Personal • Threat • Revolution

	school through the application of Big Data and the Internet of Things • I can listen to the ideas of my peers and provide effective feedback on their presentation • I can ask and answer effective questions that deepen my understanding		to ask questions about the other children's ideas. **Key Questions:** • How can this idea improve the school? • What technology will be needed to make this idea work? • What data will be created? • Can you think of any privacy issues?	

Computing Strand & Link to National Curriculum	Progression of Knowledge	Learning Objectives & Skills Progression	Hardware & Software	Cross Curricular Links	Key Vocabulary

Skills Showcase - Inventing a Product	• 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.	- 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		Design and Technology – use research and develop design criteria to inform the design of innovative, functional, appealing products.; apply understanding of computing to program, monitor and control products; and generate, develop, model and communicate their ideas. English: Writing – Composition. Identifying audience and purpose and selecting appropriate grammar and vocabulary.	Adapt Advert Algorithm Bugs Coding Debugging Design Edit Electronic Evaluate Facts Image rights Images Influence Information Inputs Loops Manipulation Opinions Output Photos Product Program Repetition Screenshot Search engine Selection Sequence Snippets Software Structures Variables Video

		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. - Using past experiences to help solve new problems. - Writing increasingly complex algorithms for a purpose. - Debugging quickly and effectively to make a			Website

		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.			
Lesson	Success Criteria	Lesson Outline		Differentiation and Key Questions	Key Vocabulary
Lesson 1	• To design an electronic product • I can evaluate code and understand what it does • I know that programs are designed for a specific purpose • I can use and adapt existing to	Pupils choose an electronic product to design and then use and adapt existing code to achieve a desired result		**<u>Differentiation:</u>** **Pupils needing extra support:** should be encouraged to use the existing code of a simple project and spend time finding out how it works and why and how they could make simple changes to it. **Pupils working at greater depth:** should be encouraged to predict the code behind different	• Electronic • Product • Code • Evaluate • Design • Adapt

	code to design a product		projects before seeing how they work. You could also ask them how they would adapt the code to make changes to the product. **Key Questions:** • How do you think a light switch works? • What objects around your house may need to use a programming element to make it work?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 2	• To code and debug a program • I can debug programs and make them more efficient • I can use sequence, selection, repetition, variables or inputs and outputs within my program	Following on from the previous lesson, pupils continue coding their programs, making them more efficient and incorporating structures such as sequencing, selection, repetition, variables, inputs and outputs	**Differentiation:** **Pupils needing extra support:** should use existing code to adapt. Encourage them to explain how it works and experiment with different values. **Pupils working at greater depth:** should be encouraged to incorporate selection, repetition and variables in their programs. **Key Questions:**	• Coding • Debugging • Sequence • Selection • Repetition • Variables • Inputs • Outputs • Program • Algorithm • Design • Structures • Loops • Bugs

			• Can you guess what it does? • Why have you made that prediction? • What changes would you make to the code to improve it or make it your own?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 3	• To use CAD to design a product • I understand the inputs and outputs needed for my product • I can design appropriate housing for this • I can use CAD software to create shapes	Pupils use the software TinkerCAD to design the housing of their product, giving consideration to the inputs and outputs their product requires	**Differentiation:** **Pupils needing extra support:** should be encouraged to stick to basic shapes to create their design. **Pupils working at greater depth:** should be encouraged to use a variety of shapes and holes to create their design and articulate the purpose of each component. **Key Questions:** • What forms of input will be needed?	• Design • Product • Input • Output • Software • Algorithm

			• Does the micro:bit display need to be visible? • If so, how will this look?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 4	• To create a website • I can create an appealing website for my product • I can describe clearly what my product is and what it does • I can use persuasive language	Pupils create a website for their product aimed at their target audience, using persuasive language to describe what their product is and does	**<u>Differentiation:</u>** **Pupils needing extra support:** should work together to plan the key headers for their website, such as 'What is the product?', 'Why do I need this product?'. Once the layout has been created, the pupils can add their content to make it specific to their product. **Pupils working at greater depth:** should be encouraged to search for other websites that would appeal to their target audience to incorporate similar language and images. They should also try to include embedded links to other sites and a stack to showcase their product. **<u>Key Questions:</u>**	• Product • Website • Images • Screenshot • Information • Image rights

			• What makes a successful product website? • What does your product do? • Why would someone want to have your product? • Who is your product designed for? • What type of website would your audience like to see?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 5	• To create and edit a video • I can record a video or take photos of my product • I can identify and articulate the key benefits of my product • I can edit a video	Pupils create video adverts for their products which can be linked into their websites	**<u>Differentiation:</u>** **Pupils needing extra support:** may need support in transferring files if not using a tablet. The Teacher videos from the ' unit could be used to support their use of WeVideo. **Pupils working at greater depth:** should be challenged to add multiple elements to their edited video and to embed their video in their website.	• Video • Advert • Edit • Photos • Product

			<u>Key Questions:</u> • What are the key features of an advert? • What does abstraction mean?	
Lesson	Success Criteria	Lesson Outline	Differentiation and Key Questions	Key Vocabulary
Lesson 6	• To understand the techniques used in advertising a product • I can understand how to use search technologies effectively • I can define the terms 'opinions', 'facts', influence', 'manipulation' and 'persuasion' and how they are used in advertisements • I can use opinions and facts in an advertisement for my product	Exploring how search engines are used and how search results are ranked. Pupils will learn about the persuasive techniques that many companies use in advertisements to sell their products including facts and opinions as well as influence and manipulation.	**<u>Differentiation:</u>** **Pupils needing extra support: Ensure pupils work together as a group under the guidance of an adult to look at various relevant products and companies using an online search engine to explore adverts that they can then reproduce in a format option of the adult's discretion. For example, on A3 card/paper or on drawing software or application such as Sketchpad.** **Pupils working at greater depth:** Can work on more than one advertisement that focuses intently on	• Search engine • Advertisement • Snippets • Search results • Influence • Manipulation • Opinions • Facts

			different persuasive techniques, such as: • influence • manipulation persuasion **Key Questions:** • What is this a picture of? • Are these advert slogans facts or opinions? • What does the word ‘fact’ mean? • What does the word ‘opinion’ mean? • What does the word ‘influence’ mean? • What does the word ‘manipulation’ mean? • What does the word ‘persuasion’ mean? • Have you ever come across ‘influence’, ‘manipulation’ and/or ‘persuasion’ in adverts you have seen online?	