

# Computing

Key Stage Three Curriculum

	Autumn A	Autumn B		Spring B	Spring B	Summer A		Summer B
<b>Year 7</b>	<p><b>Digital Literacy</b></p> <p>Pupils will learn about the Protocols for using a networked computer system.</p> <ul style="list-style-type: none"> <li>Logging on</li> <li>User names</li> <li>Passwords</li> <li>Internet security</li> <li>Data security</li> <li>School computing policies</li> <li>Directory Folder Structures</li> <li>School Email</li> </ul> <p>E- safety, how to stay safe online with key aspects:</p> <ul style="list-style-type: none"> <li>Social Media</li> <li>Cyber bullying Grooming</li> <li>Online Fraud</li> <li>Cat-phishing</li> <li>Hacking</li> <li>Digital Footprint/Tattoo</li> </ul>	<p><b>Computational Thinking</b></p> <p>Students will learn about Computational Thinking.</p> <p>The four cornerstones of Computational Thinking.</p> <ul style="list-style-type: none"> <li>Decomposition,</li> <li>Pattern Recognition</li> <li>Abstraction</li> <li>Algorithms</li> </ul> <p>How these cornerstones are used in computer science.</p> <ul style="list-style-type: none"> <li>Algorithms and modelling</li> <li>Sequencing</li> <li>Thinking Computationally</li> <li>What are patterns</li> <li>What is a Algorithm</li> <li>Flowchart and Pseudocode Algorithms</li> <li>Decisions and Outputs</li> <li>Selection</li> <li>Iteration</li> </ul>	<b>PROGRESS TEST ONE</b>	<p><b>Flowchart Algorithms</b></p> <p>Learning how flow charts are used to create sequenced programs.</p> <p>Students learn about:</p> <ul style="list-style-type: none"> <li>Processes,</li> <li>Decisions</li> <li>Inputs</li> <li>Outputs</li> </ul> <p>when designing their own flowcharts.</p> <p>Students will create flow charts for given real world scenarios.</p> <p>Students will use Computer based software to create working flowcharts to control real world mimics for:</p> <ul style="list-style-type: none"> <li>a pelican crossing</li> <li>a traffic light control</li> </ul> <p>To ensure pedestrians and traffic can safely use the road</p>	<p><b>Programming in Scratch</b></p> <p>Practical coding lessons using Scratch .</p> <p>Students learn how to code in a Block coding environment.</p> <p>The practical coding will be interleaved with programming theory to teach students coding techniques with engaging visual representations.</p> <p>Students will use the Scratch interface and learn how to use:</p> <ul style="list-style-type: none"> <li>The Block palette</li> <li>Code Area</li> <li>Start and stop buttons, Costumes</li> <li>Sounds</li> <li>Animating sprites</li> <li>Moving sprites using co-ordinates,</li> <li>Using sensing blocks, Adding a variable to count the players score</li> <li>Add their own functionality</li> </ul>	<p><b>Programming a Computer</b></p> <p>Students will learn how to code using Python. students will learn the syntax of the code, the structure of the program, functions, variables and casting.</p> <p>students will learn how to use Data Types:</p> <ul style="list-style-type: none"> <li>Boolean</li> <li>String</li> <li>Integer</li> <li>Float</li> </ul> <p>Selection Statements: Else, IF, Elseif,</p> <p>Iteration For and While loops,</p> <p>Students will write their programs and extend them with their own functionality leading to being able to write their own simple programs in Python.</p>	<b>PROGRESS TEST TWO</b>	<p><b>Creative Project</b></p> <p>Using a combination of Spreadsheets, Graphics Software using both Bitmap and Vector Graphics, students create an information poster on Global warming.</p> <p>This will combine artefacts from various sources and analyse data from the spreadsheet into graphs and charts to illustrate their findings</p> <p>Compression: Why we need to compress data, Lossy and lossless compression and what a Pixel is.</p>
<b>Assessment</b>	<p>Baseline Assessment</p> <p>Computer marked multiple choice quizzes</p>	<p>50 question quiz</p> <p>QWC Task</p> <p>End of term Progress test 1</p> <p>Computer marked multiple choice quizzes</p>		<p>50 question quiz</p> <p>Assessment on Flowchart Algorithm solutions evidenced during practical lessons.</p>	<p>50 question quiz</p> <p>Assessment of Scratch coding ability in lessons and final coded game.</p>	<p>50 question quiz</p> <p>Assessment of Python Coding ability.</p> <p>Computer marked multiple choice quizzes</p>		<p>50 question quiz</p> <p>QWC Task</p> <p>In class assessment of posters containing data bitmap / vector images and artefacts</p>

	Autumn A	Autumn B	PROGRESS TEST THREE	Spring A	Spring B	Summer A	PROGRESS TEST FOUR	Summer B
<b>Year 8</b>	<b>Programming 1</b>  Students will learn how to code using Python.  In this second coding module students focus on Algorithms that contain Iteration. <ul style="list-style-type: none"> <li>Iteration (repeating steps)</li> <li>For Loops (Count controlled)</li> <li>While Loops (Condition controlled)</li> <li>Representing Iteration in Flowchart algorithms</li> </ul>	<b>Programming 2</b>  In this second coding module students focus on Algorithms that contain logical reasoning (Boolean logic).  Students will go onto to learn about Arrays and Lists and develop their own programs. <ul style="list-style-type: none"> <li>Boolean conditions (True / False)</li> <li>Expressions =, &gt;, &lt;, &gt;=&lt; &lt;=, &lt;&gt;, AND, OR, NOT.</li> <li>Statements e.g. 5 &lt;10</li> <li>Boolean logic selection</li> <li>Variables</li> <li>Arrays</li> <li>Lists</li> </ul>		<b>Hardware and Software</b> Hardware and Software <ul style="list-style-type: none"> <li>Students will learn about:</li> <li>Digital Devices</li> <li>Input devices</li> <li>Output devices</li> <li>Storage Devices</li> <li>Logic Gates</li> <li>Software</li> <li>Systems software</li> <li>Applications software</li> <li>The CPU and the Fetch execute cycle.</li> <li>Clock speed</li> <li>Cores</li> <li>Cache</li> <li>Introduction to Networks</li> <li>WAN – Wide Area Networks</li> <li>LAN – Local Area Networks</li> <li>Internet Communication</li> <li>Internet and communication</li> <li>Search engines</li> </ul>	<b>Data Representation</b>  Students will learn about Alan Turing and his contribution to Computer Science.  To learn how computers see the world  To learn the denary system is 0-9  Binary is 0-1  Students learn about: <ul style="list-style-type: none"> <li>Number systems</li> <li>Denary</li> <li>Binary</li> </ul> They also learn how to convert: <ul style="list-style-type: none"> <li>Denary to Binary</li> <li>Binary to Denary</li> <li>Binary Addition</li> <li>Representing Sound, Images And Text</li> </ul>	<b>Searching and Sorting Algorithms</b>  Students will learn about sorting and searching algorithms. How to represent sorting algorithms in a flowchart  <b>Searches:</b> <ul style="list-style-type: none"> <li>Serial – Keyword search</li> <li>Linear</li> <li>Binary – Ordered list</li> <li>Comparison of searches</li> </ul> <b>Sorts:</b> <ul style="list-style-type: none"> <li>Bubble</li> <li>Merge</li> <li>Insertion</li> <li>Logical Reasoning</li> <li>Other types of sorting Algorithm – Merge sort, insertion sort, Shell sort, quick sort.</li> <li>Logical reasoning</li> <li>What is logical reasoning</li> <li>Logical reasoning in practice</li> </ul>		<b>Safety and Responsibility</b>  Students will learn about:  <b>Online safety</b> <ul style="list-style-type: none"> <li>Online dangers</li> <li>Malware</li> <li>Phishing</li> <li>Unsavory characters</li> <li>Trolling</li> <li>Anti virus software</li> <li>Firewall</li> <li>Cyber bullying</li> </ul> <b>Bias and reliability</b> <ul style="list-style-type: none"> <li>Sources of information</li> </ul> <b>Computers and the Law</b> <ul style="list-style-type: none"> <li>The Data Protection Act 1998</li> <li>Computer Misuse Act 1990</li> <li>Copyright Designs and Patents Act 1988</li> </ul>
<b>Assessment</b>	50 question quiz  In class assessment of Python Coding ability.  Computer marked multiple choice quizzes	50 question quiz  In class assessment of Python Coding ability.  Computer marked multiple choice quizzes		50 question quiz  Assessment of booklet class work.  Computer marked multiple choice quizzes	50 question quiz  Exercises on number conversions  Computer marked multiple choice quizzes	50 question quiz  Exercises on Searches and sorts Computer marked multiple choice quizzes		50 question quiz  Exercises on Safety and Responsibility

Year 9	Autumn A	Autumn B	PROGRESS TEST THREE	Spring A	Spring B	Summer A	PROGRESS TEST FOUR	Summer B
	<b>Programming 3</b>  <b>Procedures &amp; functions</b> <ul style="list-style-type: none"> <li>What is a procedure</li> <li>Why use a procedure</li> <li>Advantages of using a procedure</li> <li>Writing a procedure</li> <li>Running a procedure</li> <li>What is a function</li> <li>Writing a Function</li> <li>Functions in Python</li> <li>Writing a function in Python</li> <li>Running a Function in Python</li> </ul> <p>Programming theory will be interleaved with practical coding lessons where students will have the opportunity to develop their coding skills by creating and developing code students learnt in the theory lessons.</p> <p>(One lesson per fortnight)</p>	<b>Programming 3</b>  <b>Writing Error Free Code</b> <ul style="list-style-type: none"> <li>Errors and documenting code</li> <li>Syntax error and Logic error</li> </ul> <b>Types of syntax errors</b> - (variable, punctuation or statement errors)  <b>Types of logic errors</b> – (wrong sequence, wrong Boolean expression, wrong data type) <ul style="list-style-type: none"> <li>Logic errors in practice</li> <li>Boolean errors and missing steps</li> <li>Sequence errors</li> </ul> <b>Documenting code</b> <ul style="list-style-type: none"> <li>How to document code</li> <li>Using meaningful names</li> <li>Using comments</li> </ul> <p>(One lesson per fortnight)</p>		<b>Data Representation</b> <b>Text Images and Sound</b>  <b>Image</b> How an image is represented Metadata included in the file The effect of colour depth and resolution  <b>Sound</b> how sound can be sampled how sampling intervals affect the quality sample size bit rate sampling frequency  <b>Compression</b> Need for compression Types of compression: Lossy Lossless  <p>(One lesson per fortnight)</p>	<b>Memory and Storage</b> <ul style="list-style-type: none"> <li>The difference between RAM and ROM</li> <li>The purpose of ROM in a computer system</li> <li>The purpose of RAM in a computer system</li> <li>The need for virtual memory</li> <li>Flash memory</li> <li>Volatile Memory</li> <li>Non-Volatile Memory</li> <li>Cache Memory</li> </ul> The need for secondary storage: <ul style="list-style-type: none"> <li>Optical</li> <li>Magnetic</li> <li>Solid state</li> </ul> Suitable storage devices and storage media for a given application Advantages and disadvantages of these, using characteristics: <ul style="list-style-type: none"> <li>Capacity</li> <li>Speed</li> <li>Portability</li> <li>durability</li> <li>Reliability</li> <li>Cost..</li> </ul> <p>(One lesson per fortnight)</p>	<b>Spreadsheets 2</b>  Students will learn about: <b>How Spreadsheets work</b> <ul style="list-style-type: none"> <li>Workbooks and worksheets</li> <li>Columns, rows and cells</li> <li>Entering data into a cell</li> <li>Sorting cell data</li> <li>Duplicating cell content or filling a series</li> <li>Making a basic Spreadsheet</li> </ul> <b>Formatting</b> <ul style="list-style-type: none"> <li>Adjusting column width and row height</li> <li>Cell formatting</li> <li>Wrap text</li> <li>Merge cells</li> <li>Adding Formatting</li> <li>Formulas &amp; functions</li> <li>Symbols used</li> </ul> <b>Functions</b> – <ul style="list-style-type: none"> <li>Autosum</li> <li>Advanced Functions</li> <li>Adding formulas and functions</li> <li>Charts and Graphs</li> <li>Axis Labels</li> </ul> <p>(One lesson per fortnight)</p>		<b>Databases</b> <ul style="list-style-type: none"> <li>Database uses</li> <li>Databases vs Paper</li> <li>Advantages of using Databases</li> <li>The difference between data, information and knowledge</li> <li>Storing Data in Tables</li> <li>Creating a table</li> <li>Data Types</li> <li>Setting a Primary Key</li> <li>Validation rules</li> <li>Running Queries</li> <li>Query scenario</li> <li>Narrowing down the results</li> <li>Forms and Reports</li> </ul> <p>(One lesson per fortnight)</p>
<b>Assessment</b>	50 question quiz In class exercises	50 question quiz In class exercises		50 question quiz In class exercises	50 question quiz In class exercises	50 question quiz  Practical Spreadsheet assessment.		QWC Task  50 question quiz Practical Database assessment.

# Year 7 Computing: Digital Literacy – Autumn 1

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

Digital Literacy	Core Knowledge And Cultural Knowledge (KNOW)	SHOW
<p>Pupils will learn about the Protocols for using a networked computer system.</p> <ul style="list-style-type: none"><li>• Standard Ways of Working.</li><li>• Logging on</li><li>• User names</li><li>• Passwords</li><li>• Internet security</li><li>• Data security</li><li>• School computing policies</li><li>• Directory Folder Structures</li><li>• School Email</li></ul> <p>E- safety, how to stay safe online with key aspects:</p> <ul style="list-style-type: none"><li>• Social Media</li><li>• Cyber bullying Grooming</li><li>• Online Fraud</li><li>• Cat-phishing</li><li>• Hacking</li><li>• Digital Footprint/Tattoo</li></ul> <p>How to identify these problems and how to report them if you experience them.</p>	<ul style="list-style-type: none"><li>• To know the impact Cyber Bullying can have on people.</li><li>• To know what Grooming is</li><li>• To know what Online Fraud is</li><li>• To know what cat-phishing is</li><li>• To now what Hacking means and why it is illegal</li><li>• To know what a Digital Tattoo or footprint is and the consequences this can have in later life</li><li>• To know how to stay safe online and what to do if there is a problem.</li><li>• How what is meant by E-Safety</li><li>• Know how to use a Directory Folder Structure</li><li>• Know how to create a secure password</li><li>• To know why we have Protocols on a Computer Network.</li></ul>	<ul style="list-style-type: none"><li>• To show students can Login and change the password</li><li>• To show students can create folders for each subject in their user area</li><li>• To show students can create a secure password for their own user area</li><li>• To show students can log into the Campion email system and send a message</li><li>• To show students can define a range of vocabulary about e-safety</li><li>• To show students can analyse ‘Joe’s Story’ and identify the key issues in relation to being a victim of cyber bullying.</li><li>• To show students can explain what Digital Footprint is and how this could affect you in years to come.</li><li>• To show students can explain what CEOP is and how to report online abuse.</li><li>• To show students can are able to use email</li><li>• To show students can use the Schools Social Media Policy</li></ul>

## Year 7 Computing: Computational Thinking. Autumn 2

### Core Knowledge And Cultural Knowledge (KNOW)

- Know the four cornerstones of Computational thinking
- To be able to explain what each of these Computational terms mean:
- Decomposition
- Pattern recognition
- Abstraction
- Algorithms and Algorithmic thinking

Students will learn about how these four cornerstones of computational thinking are used in computer science.

- Algorithms and modelling
- Sequencing
- Thinking Computationally
- What are patterns
- What is a Algorithm
- Flowchart and Pseudocode Algorithms
- Decisions and Outputs
- Selection
- Iteration

- To be able to choose the correct Computational thinking technique to use to solve a problem.
- To be able to use Computational Thinking to solve a problem.
- To understand the importance of sequencing when constructing an Algorithm.
- To know how computational thinking is used in a variety of everyday problems, for example making a delivery robot or Big Data.
- Understand and recognise what a pattern is and how this concept can be applied to computer science and algorithms
- To recognise that Algorithms can be represented graphically by using a Flowchart and also by Pseudocode.
- To understand how Algorithms often have to make use of Iteration (repeating or looping parts of a program) and selection where the algorithm has a variety of routes or options to select with the data input.

### SHOW

- To show students can a sequence a set of random instructions in the correct order for given scenarios.
- To show students can construct a written algorithm for an everyday task.
- To show students can decompose a given problem into its individual aspects
- To show students can look for and recognise patterns in everyday situations where certain steps could be used to solve problems in different situations.
- To show students can look at problems and extract the relevant and non relevant aspects required to solve a problem.
- To show students can produce independent Algorithms both flow chart and pseudocode for a given problem or situation.
- To show students can sequence events logically to produce efficient solutions to a given problem or scenario.
- To show students can demonstrate creativity when designing Algorithmic solutions to problems utilising the four corner stones of Computational thinking: Decomposition, Pattern recognition, Abstraction, Algorithms and Algorithmic thinking
- To show students can identify where selection of iteration may need to be deployed to solve a computational problem to produce an efficient working Algorithm.

# Year 7 Computing: Algorithms Spring 1

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

### Flowchart Algorithms

- Students learn how flow charts are used to create sequenced programs, this will include:
  - Processes
  - Decisions
  - Input and outputs
  - Start and Stop Terminators
  - Design their own flowcharts
  - Use Flowal to design computer modelled Flow Charts
  - Using Computer based software to create working flowcharts to control mimics
  - Creating a flowchart Algorithm
  - Ensure Flowcharts use symbols to construct the flowcharts and show the step-by-step solution to the problem
  - Use sequencing and know why it is important for a computer program to have events happening in the correct order

- Learn how and when to use the standard symbols to represent the different types of instructions.
- Be able to create their own flowchart algorithms
- Work independently to create their own solutions
- Be able to provide critical and evaluative commentary of the success of their flowcharts
- Provide well explained solutions to overcome any problems with the Algorithm.
- Change or adapt algorithms to ensure efficient programs

Students will demonstrate their knowledge of Algorithms by:

To show students can use the correct flowchart symbols when creating Algorithms

- Process
- Input
- Output
- Decisions
- Terminators

To show students can create working and efficient computer based Flow chart Algorithms

- To show students can test their own algorithms.
- To show students can identify errors in sequencing
- To show students can run a computer based algorithm flowchart
- To show students can identify and evaluate the success of real world algorithms
- To show students can understand how problems have occurred in the creation of the algorithm
- To show students can fix problems as and when students

## Year 7 Computing: Programming in Scratch - Spring 2

### Core Knowledge And Cultural Knowledge (KNOW)

Students learn how to code in a Block based visual coding environment. Creating a Game making use of the programming functions listed below.

Practical coding lessons using Scratch.

The practical coding will be interleaved with programming theory to teach students coding techniques with engaging visual representations. Students will use:

- The Scratch interface
- The Block palette
- Code Area
- Use the Forever block
- Start and stop buttons
- Costumes
- Sounds
- Events
- Control
- Looks
- Motion
- Sensing
- Operators
- Variables
- Animating sprites
- Moving sprites using x and y co-ordinates
- Using variables to move the Sprite
- Using motion blocks
- Using sensing blocks
- Adding a variable to count the players score
- Adding their own extensions.

- Students understand that all computer programs have well designed algorithms to ensure students function correctly.
- Students know what a variable is and how these contribute to the functioning of a computer program.
- Recognise that maths play a fundamental part in constructing computer programs and are critical for setting parameters and motion controls in scratch.
- Realise that blocks of code have to interact with each other in order to get the program to work and that these blocks have to be logical and sequenced in the correct order.
- Understand that any scoring system will involve mathematical algorithms in the game students are producing.
- To know the difference between x and y co-ordinates when programming movement of the sprite.
- To understand that the program students have to create will include the combination of many controls including: Sounds, Events, Control Looks, Motion, Sensing, Operators, and Variables.

### SHOW

- To show students can animate their Scratch Sprite by changing it's costumes
- To show students can move the Sprite with code
- To show students can make the sprite look like its running
- To show students can use the Forever block of code to change the costume
- To show students can use the Stop button to make the script stop
- To show students can position the sprite on the stage
- To show students can use the Blue Motion blocks to make the Sprite move
- To show students can change the direction of the movement of the sprite
- To show students can make the Sprite jump in the game
- To show students can use the sensing blocks to check for Game Over
- To show students can use the Green block as a Boolean operator
- To show students can add a variable to count the players score
- To show students can define variables
- To show students can add a score counter to the game
- To show students can be able to explain what each block of code does
- To show students can make changes to the code a predict what should happen



# Year 7 Computing: Programming 1 - Summer 1

## Core Knowledge And Cultural Knowledge (KNOW)

- Know how open the Python Integrated Development Environment.
- To be able to write a simple 'Hello World' program and run this in Python.
- Be able to use Print and input functions correctly and independently.
- To know what a Selection statement is.
- To know when to use the following different types Selection Statements and why students are needed for particular coding problems.
- Else
- Elseif
- Else
- To know there are four different types of variables: Boolean, String, Integer, Float. Students will be learn the difference between these different types.

Students will learn the difference between a Constant and a Variable.

Students will learn about the four key Operators + - / \*

students will learn and use of the three basic programming constructs used to control the flow of a program: sequence, selection and iteration

- To know what Syntax is
- To know how to debug code.
- To know what a variable is and how to declare one.
- To know what the these Data types are and be able to give the correct explanation for each one:
- Boolean, String, Integer and Float
- To be able to give examples of where a constant would need to be used and a variable in coding context.
- To know and be able to explain the difference between iteration and selection.

## SHOW

- To show that students can create and run a program successfully in Python
- To show that students understand the importance of correct syntax by coding programs correctly without syntax errors in their exercise books.
- To show students can code in Python with minimal syntax and logic errors.
- To show students can identify and fix any syntax errors that may appear in the programs with minimal assistance.
- To show students can create a program using input and print functions and successfully code and run this independently.
- To show students can create a program using selection
- To show students can create a more complex program that correctly makes use of multiple selection statements : IF, ELSEIF, ELSE without syntax or logic errors.
- To show students can change the default data type in Python by using casting from STR to INT.
- To show students can identify suitable variable names
- To show students can code a program using Python that performs calculations.

# Year 7 Computing: Creative Project - Summer 2

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

Students will learn about Spreadsheets and Graphics Software using both Bitmap and Vector Graphics to create an information poster on Global warming combining artefacts from various sources. Data will be analysed from the spreadsheet into graphs and charts to illustrate their findings

### Spreadsheets

- Formulas
- Operators +, -, \*, / (Addition, subtraction, multiplication and division).
- Cells
- Formatting – Borders, shading, text size, font type.
- Graphs
- Charts
- Cell referencing
- Worksheets
- Data types
- SUM Function

### Graphics Software

- Vector Graphics
- Bitmap Graphics
- Lossy compression
- Lossless compression
- File types

- To know what a Spreadsheet is used for
- To know the four basic operators used in spreadsheet calculations +, -, \*, / (Addition, subtraction, multiplication and division).
- To know what the difference is between a graph and a chart
- To know what is meant by cell referencing and be able to correctly identify a cell on a spreadsheet.
- To know what the SUM function does and when it should be used
- To know the advantages of using a spreadsheet and how powerful the software is for data analysis.
- To know what a Vector graphic is used for
- To know what a Bitmap graphic is and when students are used.
- To know the difference between lossy and lossless compression
- To know four different file types

- To show that students can enter data into a Spreadsheet
- To show that students can use formulas to add rows of data
- To show that students can use the correct operators when creating spreadsheet formulas
- To show that students can create a Chart or a graph
- To show that students can use correct cell referencing when creating formulas
- To show that students can rename worksheets
- To show that students can use the SUM function to add a row or column of numbers
- To show that students can use correct data types on their spreadsheet
- To show that students can use several formatting features, bold, text align, shading etc
- To show that students know the difference between Bitmap and Vector Graphics
- To show that students know the difference between lossy and lossless compression.
- To show that students can save images using the correct files types
- To show that students can create a poster using artefacts for several sources
- To show that the poster students have created meets the requirements of the design brief and is suitable for the audience.

# Year 8 Computing: Programming 2 - Autumn 1

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

Students will learn how to code using Python.

In this second coding module students focus on Algorithms that contain Iteration and logical reasoning (Boolean logic) to learn how to code and develop their own programs.

- Iteration (repeating steps)
- For Loops (Count controlled)
- While Loops (Condition controlled)
- Boolean conditions (True / False)
- Representing Iteration in Flowchart algorithms

students will also know what is meant by Casting and to know what these Python codes mean

- STR
- INT
- REAL
- BOOL

Programming theory will be interleaved with practical coding lessons where students will have the opportunity to develop their coding skills by creating and developing code students learnt in the theory lessons.

Students will be encouraged to be independent learners attempting to fix their own logic and syntax errors to improve their understanding of how the code works. students will also be given the opportunity to extend the functionality of their programs and develop their own code.

- To know why Iteration is used and the advantages of doing so.
- To know the difference between a for loop and a while loop
- To know the difference between condition controlled loops and count controlled loops
- To know what a Boolean condition is
- To know how to represent iteration in a flowchart algorithm
- To know what casting is in programming
- To know when and to be able to give examples of how these data types are used in coding – STR, INT, REAL, BOOL.

- To show students can create a program that uses a simple for loop
- To show students can create a program that uses a simple while loop
- To show students can create a program that uses a complex condition controlled loop
- To show students can create a program that uses a complex Count controlled loop
- To show students can create a Python program using Boolean conditions
- To show students can use casting and implement these data types into their programs STR, INT, REAL, BOOL.
- To show students can develop code independently
- To show students can identify and fix logic and syntax errors
- To show students can write their own programs using count controlled and condition controlled loops.

## Year 8 Computing: Programming 1 – Autumn 2

### Core Knowledge And Cultural Knowledge (KNOW)

In this second coding module students focus on Algorithms that contain logical reasoning (Boolean logic).

Students will go onto to learn about Arrays and Lists and develop their own programs.

Learning in this module:

- Boolean conditions (True / False)
- Expressions =, >, <, >=< <=, <>, AND, OR, NOT.
- Statements e.g. 5 < 10, 15 > 60
- Boolean logic selection
- Variables
- Arrays
- Lists
- Why lists are useful, how students make the code more efficient by doing the same job with a lot less code and why Python doesn't use Arrays
- Creating lists in Python e.g. score [0] = 2500
- Programming theory will be interleaved with practical coding lessons where students will have the opportunity to develop their coding skills by creating and developing code students learnt in the theory lessons.

- To know what and Array is
- To know the advantages of using an Array
- To know that Python uses Lists rather than arrays and that students do a similar job
- To know what a Boolean condition is
- To know the Expressions to use with Boolean conditions =, >, <, >=< <=, <>, AND, OR, NOT.
- To know what is meant by a statement in programming
- To know how to make the correct selection of a Boolean Logic expression.
- To know what a variable is
- To know the process the program goes through when coding an array of a list
- To know the correct syntax of a list in Python.

### SHOW

- To show students can create a list in Python
- To show students can create a program using a Boolean condition
- To show students can create a Python program
- To show students can use statements
- To show students can create a program making use of variables.
- To show students can create programs containing both Boolean logic and a list
- To show students can develop code independently
- To show students can identify and fix logic and syntax errors
- To show students can write their own programs using lists .

# Year 8 Computing: Hardware and Software / Internet Communication Spring 1

## Core Knowledge And Cultural Knowledge (KNOW)

Hardware and Software and Internet Communication  
In this unit students will learn about:

### Hardware and Software

- Digital Devices
- Input devices
- Output devices
- Storage Devices
- Logic Gates

### Software

- Systems software
- Applications software

### The CPU and the Fetch execute cycle.

- Clock speed
- Cores
- Cache

### Introduction to Networks

- WAN – Wide Area Networks
- LAN – Local Area Networks
- Internet Communication
- The different roles of computers in a client-server and a peer-to-peer network .

### Internet Communication

- Internet and communication
- Search engines

- To know the different types of Digital Devices
- To be able to identify output and input devices and be able to explain the difference between the two.
- To know the different types of storage devices
- To know what a logic gate is and be able to identify the difference between AND, OR and NOT Logic gates
- To know the difference between applications software and systems software.
- To know what a CPU is
- To know the principle of the fetch, decode, execute cycle.
- To know what the clock speed is
- To know that more cores in a processor equate to faster processing power
- To know what the cache memory is and the advantages of using cache
- To know the advantages of using Networks and the difference between a LAN and a WAN
- To know what a search engine is and that the internet is the biggest WAN

## SHOW

- To show students can correctly identify input and output devices from a selection of images.
- To show students can correctly identify between magnetic optical and flash types of memory.
- To show students can correctly identify the output at Q from three different scenarios on a NOT Gate
- To show students can correctly identify the output at Q from three different scenarios on a AND Gate
- To show students can correctly identify the output at Q from three different scenarios on a OR Gate
- To show students can correctly identify different types of software as applications or systems software.
- To show students can show the fetch, decode and execute cycle in diagrammatic form.
- To show students understand what cores do on a processor
- To show that students understand that cache memory is fast built in memory.
- To be able to explain the difference between a LAN and a WAN and be able to identify where each is used.

# Year 8 Computing: Data Representation Spring 2

## Core Knowledge And Cultural Knowledge (KNOW)

- Students will learn about Alan Turing and his contribution to Computer Science.

Students learn about:

### Alan Turing:

- Brilliant Mathematician
- Founder of modern computing - 1936
- Breaking the Enigma code - 1939
- Enigma Machine the 'Bombe' at Bletchley Park
- Designs for the First Modern Computer – 1946, Automatic Computing Engine (ACE.)
- Can a Machine Think – 1950 - (The Turing Test)
- How Turing saved thousands of lives in WWII

### Number systems:

To learn about the place values in a Binary system

128 – 64 – 32 – 16 – 8 – 4 – 2 - 1

- Denary
- Binary

### They also learn how to convert:

- Denary to Binary
- Binary to Denary
- Binary Addition
- Representing Sound, Images And Text

### Turing:

- To know how important Alan Turing was to the development of Modern Computing.
- To know why Turing is regarded as the founder of Modern Computing
- How the bombe machine broke the Enigma code at Bletchley Park.
- To know what the Automatic Computing Engine is

### Number Systems:

- To know how the Denary Number system works
- To know how the Binary system works
- To know how to convert a Denary number into a Binary number.
- To know how to convert a Binary Number into a Denary Number
- To know how to add Binary numbers together
- To know how sound, images and text are represented in Binary.

## SHOW

- To show students can articulate who Alan Turing was.
- To show they can explain how Turing's invention saved lives in the War
- To show students can explain how his designs for the ACE were similar to a modern computer.
- To explain what the Turing test is
- To show students can create a binary number grid
- To be able to convert a binary number to a denary number
- To be able to convert a denary number into a binary number
- To be able to perform binary addition
- To be able to understand how sound, images and text are represented in binary

# Year 8 Computing: Searching and Sorting Algorithms - Summer 1

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
<p>Students will learn about sorting and searching algorithms.</p> <p>Why we need sorting and searching algorithms</p> <p>How to represent sorting algorithms in a flowchart</p> <p><b>Searches:</b></p> <ul style="list-style-type: none"><li>• Serial – Keyword search</li><li>• Linear</li><li>• Binary – Ordered list</li><li>• Comparison of searches</li></ul> <p><b>Sorts:</b></p> <ul style="list-style-type: none"><li>• Bubble</li><li>• Merge</li><li>• Insertion</li><li>• Logical Reasoning</li><li>• Shell sort, quick sort.</li></ul> <ul style="list-style-type: none"><li>• Logical reasoning</li><li>• What is logical reasoning</li><li>• Why logical reasoning is used</li><li>• Logical reasoning in practice</li><li>• Comparing Algorithms</li></ul>	<ul style="list-style-type: none"><li>• To know the difference between sorting and searching Algorithms</li><li>• To know why we need sorting and searching algorithms</li><li>• To know how a serial Algorithm search works</li><li>• To know how a Linear search Algorithm operates</li><li>• To know what Binary search Algorithm is and how it works</li><li>• To know what sort of search is best in certain circumstances</li></ul> <ul style="list-style-type: none"><li>• To know how a Bubble sort Algorithm operates</li><li>• To know how a Merge sort Algorithm operates</li><li>• To know how an Insertion sort Algorithm operates</li><li>• To know what Logical reasoning is and why it is useful</li><li>• To be able to compare the performance of different types of Algorithms</li></ul>	<ul style="list-style-type: none"><li>• To show that the student can identify the advantages and disadvantages of a Serial search</li><li>• To show that the student can identify the advantages and disadvantages of a Linear search</li><li>• To show that the student can identify the advantages and disadvantages of a Binary search</li><li>• To show that the student can identify the advantages and disadvantages of a Bubble sort</li><li>• To show that the student can identify the advantages and disadvantages of a Merge sort</li><li>• To show that the student can identify the advantages and disadvantages of an Insertion sort</li><li>• To show that the student can identify the advantages and disadvantages of using logical reasoning in sorting and searching algorithms</li></ul>

## Year 8 Computing: Safety and Responsibility - Summer 2

### Core Knowledge And Cultural Knowledge (KNOW)

### SHOW

In this module students will learn about:

#### Online safety

- Online dangers
- Malware
- Phishing
- Unsavoury characters
- Trolling
- Anti virus software
- Firewall
- Cyber bullying

#### Bias and reliability

- Sources of information

#### Computers and the Law

- The Data Protection Act 1998 – the eight principles of the legislation.
- Computer Misuse Act 1990 – How it is designed to protect against hacking
- Copyright Designs and Patents Act 1988 – How this relates to software and protection of source code.

Students will know what the dangers of using the internet are in regard to personal safety

- Know the different types of Malware, worms, Trojans, viruses.
- Know the dangers of Phishing and how you have to be careful online
- Know what an unsavoury character is
- Know what Trolling is
- Know what anti – virus software does
- Know what a Firewall does
- Know what Cyberbullying is
- To know what bias is and how this can affect the reliability of data.
- To know the eight principles of the Data Protection Act
- To know what the Computer Misuse Act was designed to prevent
- To know how the Copyright Designs and Patents Act 1988 affects the ownership of software and source code.

To show that a students can identify the three types of Malware

To show that students can explain what Phishing is and how to identify a phishing email

To show they can explain what is meant by an unsavoury character

To show they can explain with examples what Trolling is

To show they know what particular things antivirus software protects against.

To show they can explain the difference between anti virus software and a firewall

To show students understand how bias can affect the reliability of data and that only trusting information from reliable sources is important for the accuracy of information.

To show they know at least four principles of the data protection act

To show they understand what the Computer Misuse Act was designed to prevent.

To show students understand Copyright law.



# Year 9 Computing: Programming 3 – Autumn 1

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

### Procedures & functions

Students will learn about:

- What is a procedure
- Why use a procedure
- Advantages of using a procedure
- Writing a procedure
- Running a procedure
- What is a function
- Writing a Function
- Functions in Python
- Writing a function in Python
- Running a Function in Python

Programming theory will be interleaved with practical coding lessons where students will have the opportunity to develop their coding skills by creating and developing code students learnt in the theory lessons.

(One lesson per fortnight)

- To know the difference between a procedure and a function
- To know why procedures are used
- To know the advantages of using procedures
- To know how to write a procedure in Python
- To know what is meant by running a procedure
- To know what a function is
- To know what the code for a function looks like in Python
- To know how to run a procedure in Python

- To show that students know the advantages of using procedures, that they are easier to write and easier to debug.
- To be able to code a procedure in Python and understand how the code works
- Be able to dissect the code of a procedure line by line to understand what the code actually does
- To show that they can call a procedure in Python when coding the program.
- To show they can explain the difference between a procedure and a function in Python
- To show they understand that using functions and procedures in Python can make the code shorter, simpler and easier to write.
- To show that the student can code a working function in Python and understand how the code works.

# Year 9 Computing: Programming – Writing error free code - Autumn 2

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

### Writing Error Free Code

- Students will learn about:
- Errors and documenting code
- Syntax error and Logic error

**Types of syntax errors** - (variable, punctuation or statement errors)

**Types of logic errors** – (wrong sequence, wrong Boolean expression, wrong data type)

- Logic errors in practice
- Boolean errors and missing steps
- Sequence errors

### Documenting code

- How to document code
- Using meaningful names
- Using comments

Programming theory will be interleaved with practical coding lessons where students will have the opportunity to develop their coding skills by creating and developing code students learnt in the theory lessons.

(One lesson per fortnight)

- To know the difference between a logic error and a syntax error
- To know that variable, punctuation or statement errors are all types of syntax error.
- To know that wrong sequence, wrong Boolean expression, wrong data types are all types of logic errors
- To be able to identify incorrect syntax in sample code and know how to correct the code.
- To know how to read code and identify logic errors which will prevent the program from working.
- To know how to document code
- To know the importance of using meaningful names and variable names
- To know why it is important to put comment lines in your code to explain what is happening.

To show students can identify and correct errors in syntax on sample code

To show students can explain the difference between and logic error and a syntax error.

To be able to correct data type and Boolean errors

To show a student can use comment lines in their code to help another programmer know what the code is doing and how it is designed.

To show they can use meaningful variable names when writing and coding their programs.

To show they know the importance of documenting code correctly to ensure coding is error free.

# Year 9 Computing: Data Representation – Text Images and Sound – Spring 1

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

Students will learn about :

### Image

- How an image is represented as a series of pixels represented in binary
- How text is represented
- What ASCII code is
- What Unicode is
- What Metadata is
- The effect of colour depth and resolution on the size of an image file.
- How images are represented in binary
- What a pixel is

### Sound

- How analogue sound can be sampled and stored in digital form
- how sampling intervals and other factors affect the size of a sound file and the quality of its playback:
- sample size
- bit rate

### Compression

- Need for compression
- Types of compression:
- Lossy and Lossless
- Sampling frequency

- To know that images, text and sound all have to be represented in binary for a computer to be able to process the information.
- To know what Unicode and ASCII code is and how they are used to represent text when a computer processes information.
- To know what sort and type of data meta data is and how this is stored in the image file.
- To know what colour depth is
- To know how resolution affects file size.
- To know how the colour used in a pixel is represented in binary.
- To know the difference between analogue and digital sound and how digital sound is stored in a computer.
- To know what the sample size is
- To know what the bit rate is

- To show that students can understand how images, text and sound all are represented in binary on computer system.
- To show students can explain the difference between Unicode and ASCII code
- To show they can list different types of metadata that are stored on image files.
- To show they can explain what effect colour depth and resolution have on file sizes.
- To show they can explain how the colour used in a pixel is represented in binary.
- To show they can draw and analogue wave form and overlay this with a digital sound wave form.
- To show students can explain how sample size and bit rates are used in sound sampling.

## Year 9 Computing: – Memory and Storage - Spring 2

### Core Knowledge And Cultural Knowledge (KNOW)

Students will learn about:

- RAM and ROM
- The purpose of ROM in a computer system
- The purpose of RAM in a computer system
- The need for virtual memory
- Flash memory
- Volatile Memory
- Non-Volatile Memory
- Cache Memory

Common types of storage:

- Optical
- Magnetic
- Solid state

Suitable storage devices and storage media for a given application

Advantages and disadvantages of these, using characteristics:

- Capacity
- Speed
- Portability
- durability
- Reliability
- Cost..

- To know the difference between RAM and ROM.
- To know why computer needs both RAM and ROM to be able to operate.
- To know what virtual memory is, how it works and when it is used
- To know the advantages of using Flash memory
- To know the difference between volatile and non-volatile memory
- To know what cache memory is and when it is used in processing data.
- To know the three types of storage media
- Optical
- Magnetic
- Solid State
- To know the most suitable storage types for different situations
- To know the main criteria to be mindful of when selecting types of storage – Capacity, Speed, Portability, Durability, Reliability and Cost.

### SHOW

- To show a students can explain the difference between RAM and ROM.
- To show, through questioning how and why computer needs both RAM and ROM to be able to operate.
- To show through explanation what virtual memory is, how it works and when it is used
- To be able to lists advantages of using Flash memory
- To be able to explain the difference between volatile and non-volatile memory
- To show they understand what cache memory is and when it is used in processing data.
- To show students can explain the differences between the three types of storage media: Optical, Magnetic, Solid State
- To show they can explain how and why storage types are suitable for different situations
- To show they understand the main criteria to be mindful of when selecting types of storage – Capacity, Speed, Portability, Durability, Reliability and Cost.

# Year 9 Computing: Spreadsheets - Summer 1

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

Students will learn about:

### How Spreadsheets work

- Workbooks and worksheets
- Columns, rows and cells
- Entering data into a cell
- Sorting cell data
- Duplicating cell content or filling a series
- Making a basic Spreadsheet

### Formatting

- Adjusting column width and row height
- Cell formatting
- Wrap text
- Merge cells
- Adding Formatting
- Formulas and functions
- Symbols used

### Functions

- Autosum
- Advanced Functions
- Adding formulas and functions
- Charts and Graphs
- Axis Labels

- Know what a Spreadsheet is and what they are used for in the real world
- To know the difference between a workbook and worksheet
- To know that spreadsheets contain columns, rows and cells.
- To know how to sort cell data
- To know what duplicating a cell means
- To know how to make a basic Spreadsheet
- To know what column width and row height is
- To know what is meant by cell formatting
- To know what wrap text does
- To know the difference between a formula and a function
- To know what Autosum does
- To know what an advanced function is
- To know the difference between a graph and a chart
- To know that graphs need axis labels

- To show that they can create a Spreadsheet in Excel
- To show they can rename worksheets
- To show they can sort data using the spreadsheet
- To show they can duplicate data in a Spreadsheet
- To show they know how to adjust column width and row height
- To show they can use cell formatting
- To show they can use wrap text
- To show they can create a formula and a functions.
- To show they know what Autosum does
- To show they can use an advanced function
- To show they know the difference between a graph and a chart
- To show they can label that graphs with axis labels

# Year 9 Computing: Databases – Summer 2

## Core Knowledge And Cultural Knowledge (KNOW)

## SHOW

### Databases

Students will learn about:

- Database uses
- Databases vs Paper
- Advantages of using Databases
- The difference between data, information and knowledge
- Storing Data in Tables
- Creating a table
- Data Types
- Setting a Primary Key
- Validation rules
- Running Queries
- Query scenario
- Narrowing down the results
- Forms and Reports

- To know what a Database is and what it's used for
- To know the advantages of using a Database
- To know that a paper-based filing system is similar in function to a database.
- To know what the difference is between data, information and knowledge
- To know that data is stored in tables in a database
- To know how to create a table
- To know the main data types used in a Database
- To know what a Primary key is
- To know why validation rules are needed
- To know how to build a query
- To know what a form is
- To know what a report is

- To show that they can create Database
- To show students can explain the advantages of using a Database
- To show that the student can explain the similarities between a paper-based filing system and a database.
- To show that they know what the difference is between data, information and knowledge
- To show they understand that data is stored in tables in a database
- To show they can create a database table
- To show they can change the data types used in a Database
- To show they can set a Primary key
- To show they can explain what a validation rule is and why they are needed.
- To show they can build a simple query
- To show they can create a form
- To show they can generate a report from a query.