**Highfield Hall Primary School**

**Knowledge & Skills Progression: Science**

**Purpose of study:** A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.

**Aims:** The national curriculum for computing aims to ensure that all pupils can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation; can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems; can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems; are responsible, competent, confident and creative users of information and communication technology.

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|  | **3 & 4-year-olds will be learning to:** | **Children in Reception will be learning to:** | **ELG** |
| **Expressive arts and design** |  | * Explore, use and refine a variety of artistic effects to express their ideas and feelings. | **Creating with materials**   * Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. |
| **Physical development** | * Match their developing physical skills to tasks and activities in the setting. | * Develop their small motor skills so that they can use a range of tools competently, safely and confidently. |  |
| **PSED** | * Remember rules without needing an adult to remind them. | * Show resilience and perseverance in the face of a challenge. * Know and talk about the different factors that support their overall health and wellbeing:-sensible amounts of ‘screen time’. | **Managing self**   * Be confident to try new activities and show independence, resilience and perseverance in the face of challenge.   • Explain the reasons for rules, know right from wrong and try to behave accordingly. |
| **Understanding the World** | * Explore how things work. |  |  |

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| **Year 1** | | | | |
|  | **Breadth of Study** | **Skills** | **Core and British Values** | **Additional Cultural Capital Experiences** |
| **Computer science** | Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.  Create and debug simple programs.  Use logical reasoning to predict the behaviour of simple programs. | Explain that an algorithm is a set of instructions used to solve a problem or achieve an objective.  Work out what is wrong with a simple algorithm when the steps are out of order (e.g. PM - The Wrong Sandwich)  Write a simple algorithm (set of instructions)  Make logical attempts to fix a code (e.g. PM - Bubbles activity)  Read a code to predict what might happen (e.g. PM – 2Go Turtle) | Resilience  Creativity  Curiosity  Critical thinking |  |
| **Information Technology** | Use technology purposefully to create, organise, store, manipulate and retrieve digital content. | Name, save and retrieve their work.  Follow simple instructions to access online resources.    Sort and collate information (e.g. PM – 2Quiz sorting shapes, 2Count pictograms) | Creativity  Critical thinking |  |
| **Digital Literacy** | Recognise common uses of information technology behind school.  Use technology safely and respectively, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies. | Explain what ‘technology’ means and name uses of technology, in and out of school.  Explain the importance of keeping information (usernames and passwords) private. | Respect  Compassion  Responsibility  Mental well-being | Visit from a blogger/police officer to talk about online safety. |
| **Year 2** | | | | |
|  | **Breadth of Study** | **Skills** | **Core and British Values** | **Additional Cultural Capital Experiences** |
| **Computer science** | Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.  Create and debug simple programs.  Use logical reasoning to predict the behaviour of simple programs. | Understand that instructions need to be precise so they can be successfully converted into code.  Create a simple program.  Identify and correct some errors (e.g. PM – Debug Challenges: Chimp)  Identify parts of a program that respond to specific events and initiate specific actions (e.g. write a cause and effect sentence of what will happen in a program) | Resilience  Creativity  Curiosity  Critical thinking |  |
| **Information Technology** | Use technology purposefully to create, organise, store, manipulate and retrieve digital content. | Organise data using a database (e.g.PM 2Investigate)  Edit more complex digital data (e.g. PM – 2Sequence music compositions)  Use a range of media in their digital content including photos, text and sound. | Creativity  Critical thinking | Take a photo to display in the Highfield Hall gallery. |
| **Digital Literacy** | Recognise common uses of information technology behind school.  Use technology safely and respectively, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies. | Use a search engine to find relevant content.  Make links between technology they see around them and work they do in school.  Discuss the consequences of inappropriate online searches and name ways of reporting inappropriate behaviours.  Use email safely. | Respect  Compassion  Responsibility  Mental well-being | Visit from a blogger/police officer to talk about online safety. |

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| **Year 3** | | | | |
|  | **Breadth of Study** | **Skills** | **Core and British Values** | **Additional Cultural Capital Experiences** |
| **Computer science** | Design, write and debug programs that accomplish specific goals, including controlling or stimulating 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. | Write an algorithm for a real-life situation, identifying any errors and taking steps to fix it.  Design and code a program that follows a simple sequence.  Use repetition effects in their programs; exploring the difference using a repeat command and a timer command.  Use logical, achievable steps when designing a program.  Identify and correct errors in algorithms (e.g. 2Code traffic light)  Read programs with several steps and predict the outcome accurately.  Identify ways the internet is used to communicate.  Open, respond to and attach files to emails (e.g. 2Email) | Resilience  Creativity  Curiosity  Critical thinking | Use TinkerCad to design (link to DT) |
| **Information Technology** | Use search engines 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 and presenting data and information. | Use a search engine to retrieve relevant digital content.  Collect, analyse, evaluate and present data and information using a selection of software (e.g. 2Question branching database, 2Graph), choosing which software is most appropriate.  Create content to attach to an email. | Creativity  Critical thinking |  |
| **Digital Literacy** | Use technology safely, respectively and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concern about content or contact. | Create a secure password and explain implications of not keeping it safe.  Use the internet safely and describe ways of keeping themselves safe online.  Name at least two ways of reporting unacceptable content and contact. | Respect  Compassion  Responsibility  Mental well-being | Visit from a blogger/police officer to talk about online safety. |

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| **Year 4** | | | | |
|  | **Breadth of Study** | **Skills** | **Core and British Values** | **Additional Cultural Capital Experiences** |
| **Computer science** | Design, write and debug programs that accomplish specific goals, including controlling or stimulating 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 coding structures for selection and repetition.  Attempt to debug their own programs.  Use timers to achieve repetition.  Use ‘if statements’ for selection.  Use and manipulate the value of variables.  Use user inputs and outputs (e.g. 2Code)  Use ‘if statements’, repetition and variables in their program design.  Use step-through methods to identify errors in code and make logical attempts to correct it (e.g. 2Code traffic light)  Read programs with several steps and predict the outcome accurately.  Name the component parts of hardware which allow computers to join and form a network. | Resilience  Creativity  Curiosity  Critical thinking | Use TinkerCad to design (link to DT) |
| **Information Technology** | Use search engines 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 and presenting data and information. | Use and understand the function, features and layout of a search engine.  Assess given webpages for credibility and information at a basic level.  Choose and use most appropriate software when presenting information and data.  Create linked content using a range of software (e.g. 2Connect, 2Publish)  Share digital content within their community. | Creativity  Critical thinking | Take a photo to display in the Highfield Hall gallery. |
| **Digital Literacy** | Use technology safely, respectively and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concern about content or contact. | Explain to others the importance of keeping safe online.  Name a range of ways to report unacceptable content and contact. | Respect  Compassion  Responsibility  Mental well-being | Visit from a blogger/police officer to talk about online safety. |

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| **Year 5** | | | | |
|  | **Breadth of Study** | **Skills** | **Core and British Values** | **Additional Cultural Capital Experiences** |
| **Computer science** | Design, write and debug programs that accomplish specific goals, including controlling or stimulating 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. | Write an algorithm, of a real-life situation, for a program by deconstructing into manageable parts.  Test and debug their programs as they go, using logical methods to identify the cause of any bug (may need support to identify the specific code)  Translate algorithms, which include sequence, selection and repetition, into code.  Combine sequence, selection and repetition with other coding structures in their algorithm design.  Use tabs to organise code.  Name variables.  Discuss the value and the main dangers of computer networks.  Explain what is meant by ‘personal information’ and how to keep it safe.  Select the most appropriate form of online communications, depending on audience and digital content. | Resilience  Creativity  Curiosity  Critical thinking | Use TinkerCad to design (link to DT) |
| **Information Technology** | Use search engines 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 and presenting data and information. | Explain how credible a webpage, and the information it contains, is.  Create content and solutions using digital features within software.  Use several ways of sharing digital content. | Creativity  Critical thinking |  |
| **Digital Literacy** | Use technology safely, respectively and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concern about content or contact. | Demonstrate safe and respectful use of a few different technologies and online services.  Relate appropriate online behaviour to their right to personal privacy and mental wellbeing of themselves and others. | Respect  Compassion  Responsibility  Mental well-being | Visit from a blogger/police officer to talk about online safety. |

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| **Year 6** | | | | |
|  | **Breadth of Study** | **Skills** | **Core and British Values** | **Additional Cultural Capital Experiences** |
| **Computer science** | Design, write and debug programs that accomplish specific goals, including controlling or stimulating 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. | Turn a more complex programming task into an algorithm by identifying the important aspects of the task.  Test and debug their programs as they go; identifying the cause of the bug and demonstrating a systematic approach to identify a particular line of code.  Translate algorithms that include sequence, selection and repetition into code  Interpret a program in parts and make logical attempts to put the separate parts of a complex algorithm together to explain the program as a whole.  Explain, in some depth, the difference between the internet and the World Wide Web.  Explain what WAN and LAN are and describe how they access internet in school. | Resilience  Creativity  Curiosity  Critical thinking | Use TinkerCad to design (link to DT)  Design an app |
| **Information Technology** | Use search engines 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 and presenting data and information. | Apply filters when searching for digital content.  Compare a range of digital content sources and are able to them in terms of content quality and accuracy.  Use critical thinking skills in everyday use of online communication.  Design and create digital content with a clear audience in mind.  Design and create their own blogs (e.g. 2Blog) | Creativity  Critical thinking | Make a Clips Video advertising the school for prospective parents (to go on school websites) |
| **Digital Literacy** | Use technology safely, respectively and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concern about content or contact. | Demonstrate safe and respectful use of a range of different technologies and online services.  Explain why it is important to keep their own information private, for their own and others online safety. | Respect  Compassion  Responsibility  Mental well-being | Visit from a blogger/police officer to talk about online safety. |