Hardwick – Computing

National Curriculum

Early Years Foundation Stage

Pupils are taught to:

- Recognise a range of technology used in places such as home and school.
- Select and use technology for particular purposes.
- Use technology and the internet safely.

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.

Key Stage 1

Pupils should be taught to:

- 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
- Use technology purposefully to create, organise, store, manipulate and retrieve digital content
- Recognise common uses of information technology beyond school
- Use technology safely and respectfully, 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.

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.

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	Nursery Computer User	Reception Computer User	Year 1 Computer User	Year 2 Computer User
	Throughout the year, nursery children will have the opportunity to explore: • *Cause and Effect Toys* • *Electrical Objects* • *Cameras* • *Remote Control Toys* • *Technological Toys* • *Technological Equipment* ***Computer science*** 1. *Show skill in making toys work to achieve effects such as sound or movements.* 2. *Press buttons on a floor robot to make it move.* ***Digital Literacy*** 3. *Know that some technology is safe to use independently and some is not.* 4. *Know safe adults to speak to, to ask for help.* ***Information technology*** 5. *Draw attention to technology they see or use.* 6. *Use a camera to take a photo.*	***Computer Science*** ***Floor Robots (Bee-Bots)*** 1. *Describe a route that is in progress.* 2. *Purposefully use the buttons on a floor robot to make it move one step at a time.* 3. *Know how to plan and input a program of 2 or 3 steps into a floor robot and then run the program to make it move.* 4. *Know how to interpret simple instructions to predict the outcome.* ***Digital Literacy*** ***Online Safety*** 5. *Know how to show kindness to others.* 6. *Begin to be aware of the impact of a lot of screen time.* 7. *Know what technology is safe to use independently and what is not.* 8. *Know safe adults to speak to and the importance of asking adults for help.* 9. *Know what to do if they are unhappy about something online.*	***Computer Science*** ***Coding and Lego Builders*** 1. *Know what instructions are and predict what might happen.* 2. *Know how to plan and make a simple computer program e.g. fish moves right, crab moves up.* 3. *Know what objects, actions and backgrounds are within a coding environment.* 4. *Know what an event is and knows how to use an event to control an object.* 5. *Begin to know how code executes when a program is run.* ***Lego Builders*** 6. *Know the effects of completing tasks without complete instructions.* 7. *Know how to follow and create simple instructions on the computer.* 8. *Know that the order of instructions affects the end result.* ***Bee-Bots*** 9. *Predict the outcome of a sequence involving up to 4 commands.* 10. *Know how to plan and input a program into a floor robot, including different directions and 'turn'.* 11. *Identify the order of commands in a sequence and experiment with reaching the same destination with different commands.* 12. *Run a planned program and identify errors.* 13. *Know how to identify solutions and debug a program.* ***Digital literacy*** ***Introduction to Purple Mash*** 14. *Know how to use search to locate applications or resources on a platform such as Purple Mash.* 15. *Know how to enhance work by adding items such as text and images.* 16. *Know how to open, save and print work.* ***Technology Outside School*** 17. *Know that throughout history, technology has made people's lives easier.* 18. *Know that technology is used within school and outside of school and can give examples.* ***Online Safety*** 19. *Know how to log in safely.* 20. *Know how to navigate to a document area where saved work by child can be found.* 21. *Know the importance of logging out of an account.*	***Computer Science*** ***Coding*** 1. *Know what an algorithm is and can explain that it is a set of instructions that follow a sequence.* 2. *Know how to create a computer program, from a given design, using an algorithm.* 3. *Know that collision detection is an event type in coding.* 4. *Know how to design an algorithm that follows a timed sequence.* 5. *Know that there are different events in coding and knows what some of these events are.* 6. *Know the function of buttons in the coding environment.* 7. *Know how to interpret and debug simple programs.* ***Digital literacy*** ***Online Safety*** 8. *Know that digitally created work can be shared with others e.g. Purple Mash Display Boards.* 9. *Has knowledge and understanding about sharing more globally on the Internet.* 10. *Know that email is a type of communication tool.* 11. *Know how to open and send simple online communications in the form of email.* 12. *Know that there is an appropriate way to communicate with others in an online situation.* 13. *Know that information put online leaves a digital footprint.* 14. *Know some steps that can be taken to keep personal data and hardware secure.* ***Effective Searching*** 15. *Know the meaning of key Internet and searching terms.* 16. *Know the basic parts of a web search engine page.* 17. *Know how to navigate a web search results page.* 18. *Know how to search the Internet to some degree for answers to a quiz.* 19. *Know the premise of what effective Internet searching is.*

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	Nursery Computer User	Reception Computer User	Year 1 Computer User	Year 2 Computer User
Progression and Assessment Criteria		***Information technology*** ***Photography*** 10. *Know how to take photos using a device.* 11. *Know how to crop photos.* ***Technology around us*** 12. *Know the technology used in the home.* 13. *Identify how technology is used outdoors.* ***Interactive games (including drawing)*** *Know how to:* 14. *Choose and open an app.* 15. *Play simple games.* 16. *Purposefully mark make on the screen.* 17. *Draw using a touch screen.* 18. *Erase ports of pictures.*	***Information technology*** ***Pictograms*** 22. *Know data can be represented in picture form e.g. pictogram.* 23. *Know how to contribute to a class pictogram.* 24. *Know how to use a software to record results into a pictogram format.* ***Spreadsheets*** 25. *Know what a spreadsheet program environment looks like including cells, rows and columns.* 26. *Know how to enter data into spreadsheet cells.* 27. *Know how to add images to cells.* 28. *Know how to use some tools within spreadsheets e.g. lock cell, move cell and count.*	***Information technology*** ***Questioning and Databases*** 23. *Know that there are other data handling tools that can give more information than pictograms.* 24. *Know how to use yes/no questions to separate information.* 25. *Know how to use a binary tree database to answer questions.* 26. *Know how to use a database to answer more complex search questions.* ***Presenting Ideas*** 27. *Know that digital content can be presented in many different forms e.g. stories.* 28. *Know that data can be structured in tables to make it useful for an audience.* 29. *Know how to add images such as clipart and photos to presentational software.* 30. *Know how to collect, organise and present data and information in digital format.* ***Creating Pictures*** 31. *Know the purpose and benefits of painting software tools e.g. 2Paint a Picture.* 32. *Know how to reproduce the style of an artist e.g. William Morris by using repeating patterns, manipulating patterns and adding multiple effects in painting software.* ***Spreadsheets*** 33. *Know how to use prior learning to perform composite task of e.g. creating a counting machine.* 34. *Know how to copy, cut and paste in spreadsheet software.* 35. *Know what totalling tools are and how to use them.* 36. *Know how to use a spreadsheet to perform calculations for purpose e.g. adding and totalling money.* 37. *Know how to use some tools within a spreadsheet to support calculations e.g. the equals tool.* 38. *Knows how to create a manual block graph within a spreadsheet from data.*

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Vocabulary	Sound, movement, safe, directions	Route, instructions, technology, safe, unsafe, internet	• Online Safety and Introduction to Purple Mash: Device, file name, login, log out, password, private, saving • Pictograms: data, pictogram • Lego Builders: algorithm, code, computer, debugging, program, sequence • Coding: algorithm, code, code blocks, command, debug, object • Spreadsheets: cell, data, spreadsheet • Tech outside school: computer, technology	• Coding: algorithm, bug, collision, command, debug, execute, object, run, sequence • Online safety: digital footprint, internet, personal/private information, search • Spreadsheets: cell, data • Questioning: data, database, information, sort • Searching: device, digital footprint, internet, network, search engine, web address/page/site, world wide web.

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	Year 3 Computer User	Year 4 Computer User	Year 5 Computer User	Year 6 Computer User
	Computer science ***Coding*** 1. *Know what a flowchart is and how to use a flowchart to create a computer program.* 2. *Know that there are different types of timers used in coding environments and which timer should be used for a given purpose.* 3. *Know what a repeat command is and how to use it.* 4. *Know how to create a range of programs using coding knowledge.* 5. *Know how to run, test and debug their own programs.* 6. *Know what nesting is and that this should be considered when debugging.* 7. *Know how to change attributes/properties of any objects in a program they have made.* ***Pro-Bots*** 10. *Know how to plan and input a programme into a floor robot with increasing complexity e.g. multiples of a single command (forward 5).* 11. *Create algorithms using a series of commands to follow a specified route e.g. draw a line, corner or N shape.* 12. *Use the 'repeat' command to follow a specified route.* 13. *Identify solutions to debug a program with increasing complexity.*	***Computer science*** ***Coding*** 1. *Begin to know what selection is in computer programming.* 2. *Know how an IF statement works.* 3. *Know how to interpret an IF statement and therefore know how to create a program that includes an IF statement.* 4. *Know how to use co-ordinates in computer programming.* 5. *Know what the 'repeat until' command is.* 6. *Know how an IF/ELSE statement works.* 7. *Know what a variable is in programming.* 8. *Know how to use variables within their programs.* 9. *Know how to create a playable game using a block coding environment.* ***Pro-Bots*** 10. *Predict the outcome of a sequence with increasing complexity.* 11. *Know how to plan and input a programme into a floor robot with increasing complexity e.g. the repeat function and angles.* 12. *Create algorithms to follow a specified route e.g. draw regular polygons using 'repeat' and Logo to calculate angles.* 13. *Identify solutions to debug a program with increasing complexity.*	***Computer science*** ***Coding*** 1. *Begin to know how to simplify code in order to make programming more efficient.* 2. *Know how to create a simple simulation e.g. a traffic light sequence.* 3. *Know what decomposition and abstraction are in computer science.* 4. *Know the need to start coding at a basic level of abstraction to remove superfluous details from own programs.* 5. *Know how to use decomposition to make a plan of a real-life situation.* 6. *Know what a function is in coding and know how to use a function in own programs.* 7. *Know what different variable types are.* 8. *Know what strings are and how to use them.* 9. *Know how to set and change variable values in code.* 10. *Know and use concatenation in own programs.* ***Micro:bits*** 11. *Understand the micro:bit is a tiny computer which needs instructions in code to make it work.* 12. *Create instructions in code and transfer them to the micro:bit.* 13. *Understand that animations create an illusion of movement by showing a sequence of still images and that sequence and timing is important.* 14. *Code the micro:bit to show simple animations on its LED display output.* 15. *Use loops to make animations run longer using fewer instructions.* 16. *Understand that inputs and outputs involve the flow of data in and out of computers and apply this to the micro:bit.*	***Computer science*** ***Coding*** 1. *Know how to create a game with timers and a score.* 2. *Know how to arrange code in multiple tabs.* 3. *Know the different options of generating user input in a coding programme.* 4. *Know how to attribute variables to user input.* 5. *Know the need to code for all possibilities.* 6. *Building on existing knowledge of debugging, know how to debug more effectively.* ***Networks*** 7. *Know the difference between the World Wide Web and the Internet.* 8. *Know what a WAN and LAN is and the key differences between them.* 9. *Know how a school network accesses the Internet.* 10. *Know the history of the Internet.* 11. *Know some of the major changes in technology which have taken place in their lifetime.* ***Text Adventures*** 12. *Know what a text based adventure and how to convert a simple story with 2 or 3 levels of decision making into a logical design.* 13. *Know the difference between a map-based game and a sequential story-based game.* 14. *Know how to use written plans to code a map based adventure* 15. *Use computing knowledge to support coding and debugging a map-based adventure game e.g. using functions, two-way selection (IF/ELSE statements) and repetition.* ***Utilising Micro:bits*** 16. *Create a program to run on a controllable device.* 17. *Explain that selection can control the flow of a program.* 18. *Update a variable with a user input.* 19. *Use a conditional statement to compare a variable to a value.* 20. *Design a project that uses inputs and outputs on a controllable device.* 21. *Develop a program to use inputs and outputs on a controllable device.* 22. *Evaluate the success of the program.*

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	Year 3 Computer User	Year 4 Computer User	Year 5 Computer User	Year 6 Computer User
Progression and Assessment Criteria	***Digital literacy*** ***Online Safety*** 14. *Know what makes a safe password and how to keep it safe.* 15. *Know the main outcomes of not keeping passwords safe.* 16. *Know common ways the Internet enables people to effectively communicate.* 17. *Know that some information held on websites may not be accurate or true.* 18. *Begin to know how to search the Internet and how to think critically about the results returned.* 19. *Know why there are age restrictions on digital media and devices.* 20. *Know where to turn to for help if they see inappropriate content or have inappropriate contact from others.*	***Digital literacy*** ***Online Safety*** 10. *Know that information put online leaves a digital footprint or trail.* 11. *Know some of the ways children can protect themselves from online identity theft.* 12. *Know that information put online by users could be used for identity theft.* 13. *Know the main risks and benefits of installing software and applications.* 14. *Know that copying work of others and presenting it as their own is plagiarism (which has consequences).* 15. *Knows appropriate behaviour when participating or contributing to collaborative online projects for learning.* 16. *Know some of the main positive and negative influences technology has on health and the environment.* 17. *Knows the importance of balancing screen time with non-screen time.*	***Digital literacy*** ***Online Safety*** 17. *Know the impact that sharing digital content can have with increasing complexity.* 18. *Know how to think critically about information they share online.* 19. *Know responsibilities they have for themselves and others regarding online behaviour.* 20. *Develop knowledge of maintaining secure passwords.* 21. *Know about image manipulation using software and the advantages or disadvantages of this when shared online.* 22. *Know what is meant by appropriate and inappropriate text, photographs and videos.* 23. *Know about the impact of sharing media such as photographs and videos online.* 24. *Know about the importance of citing content online from others and know how to do this.* 25. *Know how to select keywords and search techniques to find relevant information to increase reliability.*	***Digital literacy*** ***Blogging*** 23. *Know the purpose and features of successful blog writing, including how information is presented.* 24. *Know how to plan and write a blog post and how to contribute to others' blogs.* 25. *Know the importance of having an approval process when creating blog content or modifying it.* 26. *Know from Online Safety knowledge that content within blogs applies e.g. know the issues surrounding inappropriate posts and cyberbullying.* ***Online Safety*** 27. *Know the benefits and risks of mobile devices broadcasting the location of the user/device, e.g., apps accessing location.* 28. *Know what secure sites are and that secure sites will have industry standard seals of approval.* 29. *Build on knowledge of Digital Footprints e.g. know how and why people use their information.* 30. *Build on knowledge of appropriate online behaviours and how this can protect themselves and others from possible online dangers e.g. the dangers of promoting inappropriate content online.* 31. *Know the effects on individual health when having too much screen time and how to make more informed choices of how free time is used.*

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	Year 3 Computer User	Year 4 Computer User	Year 5 Computer User	Year 6 Computer User
	Information technology	***Information technology***	***Information technology***	***Information technology***
	Spreadsheets	***Spreadsheets***	***Spreadsheets***	***Spreadsheets***
	21. Know how to create tables of data within a spreadsheet.	*18. Know what cell formatting is and how to format cells as currency, percentage, decimal or fraction.*	*26. Know how to use formulae within a spreadsheet e.g. to convert measurements of length.*	*32. Know the spreadsheet environment including key vocabulary e.g. cells, columns, rows, cell names, sheets, workbooks.*
	22. Know how to use a spreadsheet program to create charts and graphs from data.	*19. Know how to use formula wizard tools.*	*27. Know how to use more advanced formulae effectively e.g. to calculate area/perimeter of shape.*	*33. Know the uses of spreadsheets and how they can be used to carry out basic calculations including addition, subtraction, multiplication and division formulae.*
	23. Know how to use various features within a spreadsheet to support solutions to calculations e.g. 'more than', 'less than', and 'equals'.	*20. Know how to combine spreadsheet tools to create a purposeful spreadsheet e.g. x times table test.*	*28. Know how to use tools within a spreadsheet e.g. the count tool to answer hypotheses. For example, to answer hypotheses about common letters in use.*	*34. Know that using formulae allows the data to change and the calculations to update automatically.*
	24. Know how to describe a cell location in a spreadsheet.	*21. Know how to use a spreadsheet to model a real-life situation e.g. budget planner.*		*35. Know how to use the SUM function and how to create formulae that deals with percentages, averages, max and min.*
	25. Know how to find specified locations in a spreadsheet.	*22. Know how to add a formula to a cell*		*36. Know that there are ways to present data graphically.*
		Effective Searching	***Databases***	*37. Know how to use charting features to create charts from data in cells.*
	Branching Databases	*23. Know how to find information from a search results page.*	*29. Know the different ways to search for information in a database.*	*38. Know how to use sparklines and data bars to illustrate data.*
	26. Know how to sort objects using just YES/NO.	*24. Know how to search effectively to find out information.*	*30. Know how to add information into a shared database.*	
	27. Know how YES/NO questions are structured and answered.	*25. Know how to identify if an information source is true and reliable.*	*31. Know how to create own database and create new records.*	
	28. Know how to complete a branching database, including debugging.		*32. Know what fields are and know how to correctly add information.*	
	29. Know how to edit and adapt a branching database.	***Animation***	*33. Know how to phrase questions so they can be correctly answered using a search of database.*	
		26. Know how animations are created by hand.		
	Email	*27. Know how animations are created using computers.*	***Word Processing***	
	30. Know the different methods of communication including strengths and weaknesses.	*28. Know what onion skinning is when referring to animation.*	*34. Know what a word processing tool is for.*	
	31. Know how to open and respond to email.	*29. Know that animations can be enhanced using features in software such as background and sounds.*	*35. Know how to alter the look of text and navigate around a document.*	
	32. Know how to use an address book to write an email.	*30. Know what 'stop motion' animation is*	*36. Know how to alter page layout including heading and columns.*	
	33. Know how to use an email environment safely.		*37. Know how to add and edit images.*	
	34. Know how to add attachments to an email.	***Artificial Intelligence***	*38. Know how to add features to enhance look and usability within a document e.g. textboxes, hyperlinks, contents pages.*	
		31. Know the basic concept of what artificial intelligence is.	*39. Know how to use tables to present information.*	
	Graphing	*32. Know the key impact of artificial intelligence on daily life.*		
	35. Know how to set up a graph with a given number of fields using graphing software.	*33. Know real-life examples of the current use of artificial intelligence.*		
	36. Know how to enter data for a graph.	*34. Know how to think critically about artificial intelligence including its use in the future.*		
	37. Know how to select the most appropriate chart type for their data and explain reasoning.	*35. Know how to utilise artificial intelligence to create media such as images and music.*		
	38. Know how to sort data in graphing software to enable easier analysis.			

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	• *Year 3 Computer User*	• *Year 4 Computer User*	• *Year 5 Computer User*	*Year 6 Computer User*
Vocabulary	• Coding: algorithm, code, command, debugging, input, output, object, repeat, run • Online safety: appropriate/inappropriate, internet, password, personal information, website • Spreadsheets: cell address, data • Email: email, inbox, password, trusted contact • Databases: branching database, data, debugging,	• Coding: algorithm, code blocks, command, debugging, event, 'if' statement, 'if/else' statement, input, object, run, selection, sequence, variable • Online safety: copyright, digital footprint, malware, plagiarism, SMART rules, software, virus • Spreadsheets: data, formula • Animation: animation, frame, stop motion • Searching: internet, key words, results page, search engine • AI: artificial intelligence, algorithm, data	• Coding: algorithm, command, debug, event, input, object, output, random, repeat, sequence, simulation, variable • Online safety: appropriate, copyright, digital footprint, malware, secure password, personal information, SMART rules • Spreadsheets: data, formula • Databases: data, databases, field, search • Microsoft Word: copy and paste, document, hyperlink	• Coding: action, algorithm, command, debugging, event, execute, function, input, object, output, procedure, repeat until, selection, sequence, simulation, text object, variable • Online safety: digital footprint, inappropriate, secure password • Blogging: blog, blog post, vlog • Text adventures: debug, function, repeat, selection, text adventures, variables • Networks: data, , hub/switch, IP address, network, router, search engine, web page/server/site, wi-fi • Excel: cell, cell reference, data, formatting, formula bar, spreadsheet, workbook