



Orchard and Shepherdswell
Academy

Computing Curriculum 2018/2019



Orchard Academy

Computing Curriculum Overview 2018 / 2019

	<u>Autumn Term 1</u>	<u>Autumn Term 2</u>	<u>Spring Term 1</u>	<u>Spring Term 2</u>	<u>Summer Term 1</u>	<u>Summer Term 2</u>
Year 3	We are programmers <i>Programming an animation using Scratch</i>	We are bug fixers <i>Finding and correcting bugs in programs using Scratch</i>	We are presenters <i>Videoing performances</i>	We are network engineers <i>Exploring computer networks including the internet</i>	We are communicators <i>Communicating safely on the internet</i>	We are opinion pollsters <i>Collecting and analysing data</i>
Year 4	We are software developers <i>Developing a simple educational game</i>	We are toy designers <i>Prototyping an interactive toy</i>	We are musicians <i>Producing digital music</i>	We are HTML editors <i>Editing and writing HTML</i>	We are co-authors <i>Producing a wiki</i>	We are meteorologists <i>Presenting the weather</i>
Year 5	We are game developers <i>Developing an interactive game</i>	We are architects <i>Creating a virtual space</i>	We are artists <i>Fusing geometry and art</i>	We are web developers <i>Creating a website about cyber safety</i>	We are bloggers <i>Sharing experiences and opinions</i>	We are cryptographers <i>Cracking codes</i>
Year 6	We are app planners <i>Planning the creation of a mobile app</i>	We are project managers <i>Developing project management skills</i>	We are market researchers <i>Researching the app market</i>	We are interface designers <i>Designing an interface for an app</i>	We are app developers <i>Developing a simple mobile phone app</i>	We are marketers <i>Creating video and web content for a mobile app</i>

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.

Subject content:

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.



3	<u>Half Term 1</u>	<u>Half Term 2</u>
<u>Autumn Term</u>	<p><u>Unit Title: We are Programmers</u> <i>Programming an animation using Scratch</i></p> <p>In this unit, the children create an animated cartoon using characters they design. They use a paint tool to create characters and backgrounds. They then create an animation by translating a storyboard into a series of scripted instructions (program) for graphic objects.</p> <p><u>Outcome:</u> A short, scripted, animated cartoon to inform an audience about a chosen aspect of the history topic being studied.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Create an algorithm for an animated scene in the form of a storyboard. • Break the scene down into smaller sections of action and dialogue. • Write a program in Scratch to create the animation. • Put the blocks of their Scratch script into order. • Design programs that accomplish specific goals. • Solve problems by decomposing them into smaller parts. • Write programs that accomplish specific goals. • Use sequence in programs. 	<p><u>Unit Title: We are Big Fixers</u> <i>Finding and correcting bugs in programs using Scratch</i></p> <p>In this unit, the children work with six example Scratch projects. They explain how the scripts work, finding and correcting errors in them and explore creative ways of improving them. The children learn to recognise some common types of programming errors and practice solving problems through logical thinking.</p> <p><u>Outcome:</u> Debugged Scratch scripts and explanatory screencasts.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Correct 'off-by-one' in loop errors. • Improve the performance of the circle-drawing game. • Get the dialogue in the joke program to work in sequence. • Experiment with the speed variable and other factors in the racing car simulator. • Design programs that accomplish specific goals. • Work with variables; use logical reasoning to detect errors in programs.

3	<u>Half Term 1</u>	<u>Half Term 2</u>
<u>Spring Term</u>	<p><u>Unit Title: We are Presenters</u> <i>Videoing performance</i></p> <p>Do your children love watching sport or other performances on TV? This unit will give them a chance to make a short narrated video of themselves practising a sport or other skill and to use this to help improve their performance.</p> <p><u>Outcome:</u> A short narrated video about the United Kingdom, which can be shared for others to watch and use to support their learning.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Operate a simple video camera correctly. • Record useable footage. • Import and edit their footage. • Record an audio commentary for their footage. • Work with various forms of input. • Use software on a range of digital devices. • Combine software on a range of digital devices. 	<p><u>Unit Title: We are network engineers</u> <i>Exploring computer networks including the Internet</i></p> <p>In this unit, children investigate how computer networks work. They use a simulation to learn some simple command prompt (C:) tools for testing network connections.</p> <p><u>Outcome</u> Children use network diagnostic tools to test and explore network connections.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Name some of the hardware that connects computers. • Take part in a simulation of how data is transmitted via the Internet. • Use ping, ipconfig and tracert commands. • Appreciate the implications of how networks work for their online safety. • Understand computer networks including the Internet. • Use technology safely.

3	Half Term 1	Half Term 2
Summer Term	<p>Unit Title: <u>We are communicators</u> <i>Communicating safely on the Internet</i></p> <p>This unit allows children to learn about a number of e-safety matters in a positive way. They will work with a partner in another class, learning how to use email and video conferencing safely.</p> <p>Outcome: Children will communicate with others through email and video conferencing to share and explore the world's different artists and artworks of interest.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Realise that email and video conferencing work via the Internet. • Use email and video conferencing to communicate. • Use text and video for communication. • Ensure they use of email and video conferencing complies with the school's AUP. • Understand how computer networks can provide multiple services. • Understand that computer networks offer opportunities for communication. • Work with various forms of input and output. • Use technology safely. 	<p>Unit Title: <u>We are opinion pollsters</u> <i>Collecting and analysing data</i></p> <p>In this unit, the children create their own opinion polls, seek responses and then analyse the results.</p> <p>Outcome Children will create online opinion poll surveys and charts showing analysis of data and a brief illustrated report linked to the trip to data collected by the children.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Collect data via the internet, • Treat data collected in a way that shows respect for individuals. • Use Google Forms to collect data. • Use Google Slides to present their finds. • Understand the opportunities computer networks offer for communication. • Use technology respectfully. • Collecting data. • Presenting data.



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4	<u>Half Term 1</u>	<u>Half Term 2</u>
<u>Autumn Term</u>	<p><u>Unit Title: We are Software Developers</u> <i>Developing a simple educational game</i></p> <p>The children start by playing and analysing educational computer games, identifying those features that a game successful. They then plan and design a game, with a clear target audience in mind. They create a working prototype and then develop it further to add functionality and improve the user interface. They test their game and make any necessary changes.</p> <p><u>Outcome:</u> 'Drill-and-practice' style educational software aimed at reinforcing learning in another area of the curriculum.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Design an interactive educational game. • Develop an interactive educational game. • Put Scratch blocks into the right order for their game. • Use the IF/THEN/ELSE block correctly. • Use the keyboard for input and then screen for output. • Design programs that accomplish specific goals. • Write programs that accomplish specific goals. • Use sequence in programs. • Use selection in programs. • Work with various forms of input and output. 	<p><u>Unit Title: We are toy designers</u> <i>Prototyping an interactive toy</i></p> <p>In this unit, the children work together to design a simple toy that incorporates sensors and outputs and then create an on-screen prototype of their toy in Scratch, Finally, they pitch their toy idea to a Dragons' Den-style panel.</p> <p><u>Outcome</u> Script for an on-screen prototype of a computer-controlled toy, Dragons' Den-style presentation.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Design a toy with computer-controlled input and output. • Write an algorithm to show how their toys would produce output in response to the input received. • Test input and output on a simulation of their toy using simple scripts. • Identify ways in which their simulated toy does not function as expected. • Design programs that control simulated systems. • Work with various forms of input and output. • Debug programs that control simulated systems.

4	Half Term 1	Half Term 2
Spring Term	<p>Unit Title: <u>We are Musicians</u> <i>Producing digital music</i></p> <p>How many children in your class play an instrument? How many like singing, or simply enjoy listening to music? In this unit, the children produce music suitable for any purpose they choose.</p> <p>Outcome: A piece of backing music to accompany work in another medium. Produce music with a rainforest theme to accompany rainforest videos.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Explain how digital technology contributes to creating music. • Create simple compositions using sequencing software. • Record samples for use in sequencing software. • Combine samples to produce a piece of music. • Export their composition in a standard compressed format. • Understand the opportunities networks offer for collaboration. • Design and create content. • Work with various forms of input. • Design and create content. 	<p>Unit Title: <u>We are HTML editors</u> <i>Editing and writing HTML.</i></p> <p>In this unit the children learn about the history of the web, before studying HTML (hypertext mark-up language), the language in which web pages are written. They learn to edit and write HTML and then use this knowledge to create a web page.</p> <p>Outcome HTML challenges and a personal homepage.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Understand the difference between the web and the Internet. • Understand that web pages are written and transmitted in HTML. • Know and use some simple HTML tags. • Edit the HTML for a web page, • Create web pages that do not reveal pupil's personal information. • Understand computer networks including the Internet. • Understand how computer networks provide the World Wide Web. • Use a variety of software (including internet services) to present information. • Use a variety of software to present information. • Use technology safely, respectfully and responsibly.

Unit Title: We are Co-authors*Producing a wiki*

Wikipedia is a free online encyclopaedia that anyone can view and edit. In this unit, children collaborate to create a mini Wikipedia. They then go on to add or amend content on the real Wikipedia.

Outcome: Class wiki and amended pages of Wikipedia. As a class create a wiki based around the topic being studied.

Software/hardware: Learning platform wiki tools / MediaWiki / Google Sites / Other hosted wiki. Laptops, Web server (if hosting MediWiki)

During this unit children should be able to:

- Find and read an article on Wikipedia.
- Create content for a wiki.
- Edit their own content.
- Edit the HTML for a web page.
- Use search technologies effectively.
- Use Internet services to create content that presents information.
- Use a variety of software (including internet services) to present information.
- Use Internet services to create and evaluate content that presents information.

Unit Title: We are meteorologists*Presenting the weather*

This unit brings together data measurements, analysis and presentation, as the children take on the role of meteorologists and weather presenters.

Outcome Spread sheet of weather data collected; charts, maps and graphs of weather data collected; TV style weather presentation. .

Software/hardware: Excel/ Google sheets, Web Browser, Powerpoint, IWB software, weather station by Netatmo, Weather Station.UK, Numbers Laptops, Measuring equipment

During this unit children should be able to:

- Use weather measurement equipment safely.
- Enter data.
- Take digital photos.
- Create simple charts.
- Make predictions.
- Create a presentation for their weather forecast.
- Collecting data.
- Work with various forms of input.
- Collecting information.
- Analysing data.
- Presenting data and information.



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5	<u>Half Term 1</u>	<u>Half Term 2</u>
<u>Autumn Term</u>	<p><u>Unit Title: We are Game Developers</u> <i>Developing an interactive game</i></p> <p>Children plan their own simple computer games. They design characters and backgrounds and create a working prototype, which they develop further based on feedback they receive.</p> <p><u>Outcome:</u> An original computer game, ideally uploaded to the Scratch community site based on history topic.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Create an algorithm for a game. • Create images and sounds for use in their game • Use sequences of instructions • Detect errors in their game • Design programs that accomplish specific goals. • Create content. • Use sequence in programs. • Use logical reasoning to detect errors in algorithms and programs. 	<p><u>Unit Title: We are Architects</u> <i>Creating a virtual space</i></p> <p>In this unit, the pupils research examples of art gallery architecture, before using Trimble SketchUp to create their own virtual gallery. Finally, they use the gallery to exhibit their own artwork.</p> <p><u>Outcome</u> A virtual gallery displaying the pupils' work.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Use the web to explore virtual art galleries. • Create simple objects using SketchUp. • Create a simple gallery space in SketchUp. • Add furniture to their gallery in SketchUp. • Add their artwork to the gallery. • Create an animated walkthrough of their gallery. • Analyse information. • Design and create content. • Use search technologies. • Present information.

5	<u>Half Term 1</u>	<u>Half Term 2</u>
<u>Spring Term</u>	<p><u>Unit Title: We are Artists</u> <i>Fusing geometry and art</i></p> <p>Children use vector and turtle graphics to explore geometric art, taking inspiration from the work of Escher, Riley and traditional Islamic artists, as well as experimenting with complex 'fractal' landscapes.</p> <p><u>Outcome:</u> Produce pieces of geometric art and a Scratch computer program for drawing shapes.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Create a tessellating pattern. • Write a program to draw a simple shape. • Create a patter using overlapping shapes. • Create a pattern using repeating, varied shapes. • Create a computer-generated landscape. • Design and create content. • Design and create programs. 	<p><u>Unit Title: We are web developers</u> <i>Creating a website about cyber safety</i></p> <p>In this unit, children work together to create a website explaining online safety and responsible online behaviour. This unit could be extended further to link with the topic being studied within the year group.</p> <p><u>Outcome</u> Create a website offering advice on all aspects of safe and responsible internet use, or a website related to the topic of study.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Review others' content. • Appreciate how Google selects web pages in search results. • Show awareness of other search engines. • Create or curate content to demonstrate knowledge of safe, respectful and responsible use of technology. • Create or curate content to demonstrate knowledge of how to report concerns. • Evaluating information. • Appreciate how results are selected. • Use search technologies effectively. • Use technology safely, respectfully and responsibly. <p>Identify a range of ways to report concerns about content and contact.</p>

5	Half Term 1	Half Term 2
Summer Term	<p>Unit Title: We are Bloggers <i>Sharing experiences and opinions</i></p> <p>Outcome: A media rich online blog linked to the topic of conflict. Comment on key events linked to conflict throughout history.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Understand how to use blogs safely and responsibly. • Understand how the Internet makes blogging possible. • Write a blog post. • Comment on a blog post. • Add an image, audio or video blog post. • Use technology safely and responsibly. • Understand the opportunities the Internet offers for communication. • Create content. • Understand the opportunities the Internet offers for communication. • Presenting information. 	<p>Unit Title: We are Cryptographers <i>Cracking codes</i></p> <p>Children learn more about communicating information securely through an introduction to cryptography (the science of keeping communication and information secret). They investigate early methods of communicating over distances, learn about two early ciphers, and consider what makes a secure password.</p> <p>Outcome Morse and semaphore messages, encrypted and decrypted messages in various ciphers.</p> <p>Software/hardware: Scratch, Snap!, The Black chamber (website) Pyonkee, Laptops</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Send and receive messages using Morse code and semaphore. • Encrypt and decrypt messages using the Caesar and substitution ciphers. • Recognise the importance of keeping passwords entirely secret. • Recognise the need for encryption when using the web. • Understand opportunities for communication. • Understand networks and the opportunities they offer for communication. • Use technology safely and responsibly. • Understand how the Internet can provide the World Wide Web.



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6	<u>Half Term 1</u>	<u>Half Term 2</u>
<u>Autumn Term</u>	<p><u>Unit Title: We are app planners</u> <i>Planning the creation of a mobile app</i></p> <p>The Year 6 units form a sequence, beginning with this one in which the pupils learn about the capabilities of smartphones, think of a problem that a smartphone or tablet app could solve, and then pitch the idea for their app.</p> <p><u>Outcome:</u> A presentation to pitch a smartphone or tablet app</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Understand that a smartphone is a programmable computer. • View geotagged photos on a map. • Identify interesting problems. • Search for apps addressing the problems they have identified. • Evaluate the quality of a range of competing products. • Create an effective presentation to pitch their idea. • Use a range of digital devices. • Analysing and evaluating data and information. • Design and create systems. • Use search technologies effectively. • Be discerning in evaluating digital content. • Present information. 	<p><u>Unit Title: We are project managers</u> <i>Developing project management skills</i></p> <p>This is the second in a sequence of six Year 6 units in which pupils work collaboratively to develop a smartphone or tablet app. Pupils apply computational thinking to the task of managing a complex project.</p> <p><u>Outcome</u> A clear and detailed plan for managing the app development project.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Identify the principal aspects of the project. • Identify the tasks that need to be completed for the various aspects of the project. • Identify the tools and resources needed to complete the project. • Create original content for use in their app. • Evaluate the quality of work already undertaken. • Solve problems by decomposing them into smaller parts. • Design and create content. • Be discerning in evaluating digital content.

6	Half Term 1	Half Term 2
Spring Term	<p><u>Unit Title: We are market researchers</u> <i>Researching the app market</i></p> <p>The pupils conduct research into the potential market for their app, using an online survey together with interviews or focus groups. They analyse the data and information they obtain and create a presentation summarising their findings.</p> <p><u>Outcome:</u> A presentation identifying the market for their app and establishing users' expectations of it.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Create an online survey. • Use simple charts to analyse the results of a survey. • Conduct an interview or focus group. • Analyse the information obtained in an interview or focus group. • Present findings from their market research. • Collect data. • Analyse data. • Collect information. • Analyse information. • Present information. 	<p><u>Unit Title: We are interface designers</u> <i>Designing an interface for an app</i></p> <p>In this unit, the children will start to design the look/ feel of their app's interface. They begin by sketching ideas, planning the different screen layouts for their app and developing these using a wireframing tool.</p> <p><u>Outcome</u> Wireframe designs and media assets for their apps.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Sketch ideas for the design of their app. • Use a prototyping tool to develop a set of screen layouts for their app. • Think through elements of interaction design for their app. • Be aware of accessibility issues in apps and other software. • Source media assets for their app. • Design systems. • Use software to design systems. • Be discerning in evaluating digital content.

6	Half Term 1	Half Term 2
Summer Term	<p><u>Unit Title: We app developers</u> <i>Developing a simple mobile app</i></p> <p>In this unit, the pupils draw on their work from the previous Year 6 units to create a working app. They write down their algorithms, and use a programming toolkit to code them.</p> <p><u>Outcome:</u> A working app.</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Develop clear written algorithms for their app. • Implement their algorithms as code. • Use trial and improvement approaches to debug their code. • Design programs that accomplish specific goals. • Write programs that accomplish specific goals. • Debug programs that accomplish specific goals. 	<p><u>Unit Title: We are marketers</u> <i>Creating video and web copy for a mobile app</i></p> <p>Children work collaboratively to produce marketing materials for the app they have been developing in the Year 6 units. They create a poster or flyer, develop a simple website, and shoot a short video.</p> <p><u>Outcome</u> A Advertising material for the children's apps (printed and online).</p> <p>During this unit children should be able to:</p> <ul style="list-style-type: none"> • Create a marketing flyer that incorporates images and text. • Develop a website containing text and other media for their app. • Shoot and source video and other media for promotional video. • Create content to present information.