

Computing long term plan

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

Attainment targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Key concepts

Key concepts to be compared and contrasted over different enquiries

<u>Systems and networks</u>	<u>Creating media</u>	<u>Programming</u>	<u>Data and information</u>
<p><u>Vocabulary which could relate to this concept</u></p> <p>algorithm, technology, store, network, share, information, computer, system, software, mouse, keyboard, typing, device, combine, recognise, input, output, process, connection, server, desktop, text, structure, internet, world wide web.</p>	<p><u>Vocabulary which could relate to this concept</u></p> <p>digital, create, design, media, sound, video, freehand, rhythm, animation, stop-frame, publishing, evaluate, convey, edit, layout, placeholder, object, project, audio, podcast, composition, edit, fake, real, feature, vector, resize, rotate, three-dimensional, modelling, ownership, copyright.</p>	<p><u>Vocabulary which could relate to this concept</u></p> <p>program, precise, instructions, debug, manipulate, select, object, command, sequence, sprite, value, block, series, function, content, sequence, event, action, character, avatar, bug, code, repetition, loop, repeat, modify, circuit, microcontroller, infinite, variable.</p>	<p><u>Vocabulary which could relate to this concept</u></p> <p>organise, retrieve, recognise, appropriate, properties, record, compare, identify, pictogram, attribute, ambiguous, unambiguous, purpose, branching, database, feedback, data, logging, interval, field, record, search, criterion, result, formula.</p>

Key Stage 1

<u>National Curriculum objectives</u>
<p>Pupils should be taught to</p> <ul style="list-style-type: none"> • 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.

Cycle B

<u>Systems and networks</u>	<u>Creating media</u>	<u>Programming</u>	<u>Data and information</u>
<p><u>Topic</u> Technology around us</p> <p><u>Key Question</u></p>	<p><u>Topic</u> Digital painting</p> <p><u>Key Question</u></p>	<p><u>Topic</u> Moving a robot</p> <p><u>Key Question</u></p>	<p><u>Topic</u> Grouping data</p> <p><u>Key Question</u></p>

<p>Can you recognise technology in school and use it responsibly?</p> <p><u>National Curriculum objectives</u> 1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p>1.5 - Recognise common uses of information technology beyond school.</p> <p>1.6 - 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.</p> <p><u>Key vocabulary</u> technology, system, network, computer, identify, part, switch, mouse, drag, drop, keyboard, cursor, key.</p>	<p>Can you choose appropriate tools in a program to create digital art?</p> <p><u>National Curriculum objectives</u> 1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p><u>Key vocabulary</u> digital, freehand, tool, recreate, appropriate, create, design.</p>	<p>Can you write short algorithms and programs for floor robots??</p> <p><u>National Curriculum objectives</u> 1.1 - Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.</p> <p>1.2 - Create and debug simple programs.</p> <p>1.3 - Use logical reasoning to predict the behaviour of simple programs.</p> <p>1.5 - Recognise common uses of information technology beyond school.</p> <p><u>Key vocabulary</u> explain, command, outcome, instruction, direction, robot, predict, sequence, combine, debug, program.</p>	<p>Can you explore object labels, then use them to sort and group objects by properties?</p> <p><u>National Curriculum objectives</u> 1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p>1.6 - 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.</p> <p><u>Key vocabulary</u> object, labels, grouping, data, properties, record, share.</p>
	<p><u>Topic</u> Digital writing</p> <p><u>Key Question</u> Can you use a computer to create and format text?</p> <p><u>National Curriculum objectives</u> 1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p>1.6 - Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or</p>	<p><u>Topic</u> Programming animations</p> <p><u>Key Question</u> Can you design and program the movement of a character on screen to tell stories?</p> <p><u>National Curriculum objectives</u> 1.1 - Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.</p> <p>1.2 - Create and debug simple programs.</p>	

	<p>contact on the internet or other online technologies.</p> <p><u>Key vocabulary</u> identify, processor, recognise, text, digital, double-clicking, undo, compare, format.</p>	<p>1.3 - Use logical reasoning to predict the behaviour of simple programs.</p> <p>1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p><u>Key vocabulary</u> animation, command, purpose, compare, programming, tool, sprite, block, value, project, appropriate, algorithm.</p>	
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Cycle A

Systems and networks	Creating media	Programming	Data and information
<p><u>Topic</u> IT around us</p> <p><u>Key Question</u> Can you identify how IT improves our world in school and beyond?</p> <p><u>National Curriculum objectives</u> 1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p>1.5 - Recognise common uses of information technology beyond school.</p> <p>1.6 - Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or</p>	<p><u>Topic</u> Digital photography</p> <p><u>Key Question</u> Can you capture and change digital photographs for different purposes?</p> <p><u>National Curriculum objectives</u> 1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p>1.5 - Recognise common uses of information technology beyond school.</p> <p>1.6 - Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or</p>	<p><u>Topic</u> Robot algorithms</p> <p><u>Key Question</u> Can you create and debug programs and use logical reasoning to make predictions?</p> <p><u>National Curriculum objectives</u> 1.1 - Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.</p> <p>1.2 - Create and debug simple programs.</p>	<p><u>Topic</u> Pictograms</p> <p><u>Key Question</u> Can you collect data in tally charts to organise and present data on a computer?</p> <p><u>National Curriculum objectives</u> 1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p>1.6 - Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or</p>

<p>contact on the internet or other online technologies.</p> <p><u>Key vocabulary</u> system, network, recognise, information, technology, identify.</p>	<p>contact on the internet or other online technologies.</p> <p><u>Key vocabulary</u> digital, capture, device, portrait, landscape, identify, improve, experiment, explore, edit.</p>	<p>1.3 - Use logical reasoning to predict the behaviour of simple programs.</p> <p>1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p><u>Key vocabulary</u> algorithm, instruction, sequence, enacted, unambiguous, command, logical, reasoning, predict, code, debug.</p>	<p>contact on the internet or other online technologies.</p> <p><u>Key vocabulary</u> pictogram, tally chart, compare, record, represent, data, object, attribute, suitable.</p>
	<p><u>Topic</u> Making music</p> <p><u>Key Question</u> Can you use a computer as a tool to explore rhythms and melodies?</p> <p><u>National Curriculum objectives</u> 1.4 - Use technology purposefully to create, organise, store, manipulate and retrieve digital content.</p> <p><u>Key vocabulary</u> identify, rhythm, pattern, series, note, sequence, purpose, evaluate.</p>	<p><u>Topic</u> Programming quizzes</p> <p><u>Key Question</u> Can you design algorithms and programs to make an interactive quiz?</p> <p><u>National Curriculum objectives</u> 1.1 - Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.</p> <p>1.2 - Create and debug simple programs.</p> <p>1.3 - Use logical reasoning to predict the behaviour of simple programs.</p> <p><u>Key vocabulary</u> sequence, command, input, output, outcome, block, sprite, program, feature.</p>	

Key Stage 1 National Curriculum coverage

National Curriculum Coverage – Key Stage 1 Computing Curriculum	1.1 Technology around us	1.2 Digital painting	1.3 Moving a robot	1.4 Grouping data	1.5 Digital writing	1.6 Programming animations	2.1 Information technology around us	2.2 Digital photography	2.3 Robot algorithms	2.4 Pictograms	2.5 Making music	2.6 Programming quizzes
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	✓				✓	✓	✓			✓		

Lower Key Stage 2

National Curriculum objectives

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.

Cycle A

Systems and networks	Creating media	Programming	Data and information
<p><u>Topic</u> Connecting computers</p> <p><u>Key Question</u> Can you identify that digital devices have inputs, processes and outputs, and how devices can be connected to make networks?</p> <p><u>National Curriculum objectives</u> 2.2 - Use sequence, selection, and repetition in programs; work with</p>	<p><u>Topic</u> Stop-frame animation</p> <p><u>Key Question</u> Can you capture and edit digital still images to produce a stop-frame animation that tells a story?</p> <p><u>National Curriculum objectives</u> 2.6 - Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create</p>	<p><u>Topic</u> Sequencing sounds</p> <p><u>Key Question</u> Can you create sequences in a block-based programming language to make music?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve</p>	<p><u>Topic</u> Branching databases</p> <p><u>Key Question</u> Can you build and use branching databases to group objects using yes/no questions?</p> <p><u>National Curriculum objectives</u> 2.6 - Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create</p>

<p>variables and various forms of input and output.</p> <p>2.4 - 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.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> digital, device, function, input, output, process, network, connection, server, wireless access point.</p>	<p>a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.</p> <p>2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p><u>Key vocabulary</u> animation, sequence, movement, predict, setting, evaluate, sequence, frame, edit, media</p>	<p>problems by decomposing them into smaller parts.</p> <p>2.2 - Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> programming, environment, attribute, object, block, command, outcome, connected, sequence, code, sprite, algorithm.</p>	<p>a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.</p> <p><u>Key vocabulary</u> branching, database, object, attribute, selection, grouping.</p>
	<p><u>Topic</u> <u>Desktop publishing</u></p> <p><u>Key Question</u> Can you create documents by modifying text, images, and page layouts for a specific purpose?</p> <p><u>National Curriculum objectives</u> 2.5 - Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p>	<p><u>Topic</u> <u>Events and actions</u></p> <p><u>Key Question</u> Can you write algorithms and programs that use a range of events to trigger a series of actions?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p>	

	<p>2.6 - 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.</p> <p><u>Key vocabulary</u> text, image, information, communication, layout, edit, font, style, template, purpose, orientation, placeholder, publishing.</p>	<p>2.2 - Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> sprite, action, relationship, program, project, character, maze, direction, adapt, programming, block, features, suitable, debug, code, outcome, modify, evaluate.</p>	
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Cycle B

<u>Systems and networks</u>	<u>Creating media</u>	<u>Programming</u>	<u>Data and information</u>
<p><u>Topic</u> The internet</p> <p><u>Key Question</u> Can you recognise the internet as a network of networks and why we should evaluate online content?</p>	<p><u>Topic</u> Audio editing</p> <p><u>Key Question</u> Can you capture and edit audio to produce a podcast, ensuring that copyright is considered?</p>	<p><u>Topic</u> Repetition in shapes</p> <p><u>Key Question</u> Can you use a text-based programming language to explore</p>	<p><u>Topic</u> Data logging</p> <p><u>Key Question</u> Can you recognise how and why data is collected over time and use</p>

<p><u>National Curriculum objectives</u> 2.1 - 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.</p> <p>2.5 - Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p> <p>2.6 - 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.</p> <p>2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p><u>Key vocabulary</u> network, connect, internet, information, shared, service, server, website, world wide web, access, media, content, online, evaluate.</p>	<p><u>National Curriculum objectives</u> 2.5 - Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p> <p>2.6 - 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.</p> <p>2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p><u>Key vocabulary</u> audio, editing, digitally, recorded, output, record, digital, device, podcast, file, stored, content, editing, recording, evaluate.</p>	<p>count-controlled loops when drawing shapes?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>2.2 - Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> code, purpose, repetition, program, command, algorithm, text-based, outcome, sequence, repetition, loop, values, predict, debug, modify.</p>	<p>data loggers to carry out an investigation?</p> <p><u>National Curriculum objectives</u> 2.2 - Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> data, digital, device, sensor, data logger, data points, interval, import, sorting, identify.</p>
	<p><u>Topic</u> Photo editing</p> <p><u>Key Question</u></p>	<p><u>Topic</u> Repetition in games</p> <p><u>Key Question</u></p>	

	<p>Can you manipulate digital images and reflect on the impact of changes?</p> <p><u>National Curriculum objectives</u> 2.5 - Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content. 2.6 - 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.</p> <p>2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p><u>Key vocabulary</u> editing, photograph, composition, edit, edited, scenario, retouch, effect, appropriate, tool, fake, real, compare, element, feedback.</p>	<p>Can you use a block-based programming language to explore count-controlled and infinite loops when creating a game?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>2.2 - Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> instruction, repetition, modify, code, loop, outcome, programming, enable, evaluate, sequence, program, effects, design, modify.</p>	
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Lower Key Stage 2 National Curriculum coverage

National Curriculum Coverage – Years 3 and 4	3.1 Connecting computers	3.2 Stop-frame animation	3.3 Sequencing sounds	3.4 Branching databases	3.5 Desktop publishing	3.6 Events and actions in programs	4.1 The Internet	4.2 Audio editing	4.3 Repetition in shapes	4.4 Data logging	4.5 Photo editing	4.6 Repetition in games
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							✓	✓			✓	

Lower Key Stage 2

National Curriculum objectives

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.

Cycle A

<u>Systems and networks</u>	<u>Creating media</u>	<u>Programming</u>	<u>Data and information</u>
<p><u>Topic</u> <u>Sharing information</u></p> <p><u>Key Question</u> Can you identify and explore how information is shared between digital systems?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>2.2 - Use sequence, selection, and repetition in programs; work with</p>	<p><u>Topic</u> <u>Video editing</u></p> <p><u>Key Question</u> Can you plan, capture and edit a video to produce a short film?</p> <p><u>National Curriculum objectives</u> 2.5 - Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p> <p>2.6 - Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create</p>	<p><u>Topic</u> <u>Selection in physical computing</u></p> <p><u>Key Question</u> Can you explore conditions and selection using a programmable microcontroller?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>2.2 - Use sequence, selection, and repetition in programs; work with</p>	<p><u>Topic</u> <u>Flat-file databases</u></p> <p><u>Key Question</u> Can you use a database to order data and create charts to answer questions?</p> <p><u>National Curriculum objectives</u> 2.5 - Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p> <p>2.6 - Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create</p>

<p>variables and various forms of input and output.</p> <p>2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p> <p>2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p><u>Key vocabulary</u> repetition, program, evaluate, algorithm, input, process, output, system, network, digital, device, internet, public, private.</p>	<p>a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.</p> <p>2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p><u>Key vocabulary</u> video, feature, visual, media, format, recording, device, microphone, technique, reshooting, editing, store, retrieve, export, recording, outcome.</p>	<p>variables and various forms of input and output.</p> <p>2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> crumble, circuit, connect, microcontroller, infinite, loop, switch, sequence, conditional, response, input, outcome, statement, flow, debug, algorithm, project.</p>	<p>a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.</p> <p><u>Key vocabulary</u> field, information, data, record, flat-file, database, branching, sorting, grouping, statement, refine.</p>
	<p><u>Topic</u> Vector drawing</p> <p><u>Key Question</u> Can you create images in a drawing program by using layers and groups of objects?</p> <p><u>National Curriculum objectives</u> 2.6 - 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,</p>	<p><u>Topic</u> Selection in quizzes</p> <p><u>Key Question</u> Can you explore selection in programming to design and code an interactive quiz?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p>	

	<p>including collecting, analysing, evaluating and presenting data and information.</p> <p><u>Key vocabulary</u> vector, resize, move, rotate, duplicate, alignment, handle, modify, zoom, layer.</p>	<p>2.2 - Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> selection, condition, identify, modify, recall, program, outcome, statement, infinite, loop, flow, branching, algorithm, code.</p>	
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Cycle B

<u>Systems and networks</u>	<u>Creating media</u>	<u>Programming</u>	<u>Data and information</u>
<p><u>Topic</u> Internet communication</p> <p><u>Key Question</u> Can you recognise how the internet can be used to communicate and be searched to find information?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or</p>	<p><u>Topic</u> Webpage creation</p> <p><u>Key Question</u> Can you design and create webpages, giving consideration to copyright, aesthetics and navigation?</p> <p><u>National Curriculum objectives</u> 2.5 - Use search technologies effectively, appreciate how results</p>	<p><u>Topic</u> Variables in games</p> <p><u>Key Question</u> Can you explore variables when designing and coding a game?</p> <p><u>National Curriculum objectives</u> 2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve</p>	<p><u>Topic</u> Introduction to spreadsheets</p> <p><u>Key Question</u> Can you answer questions by using spreadsheets to organise and calculate data?</p> <p><u>National Curriculum objectives</u> 2.6 - Select, use and combine a variety of software (including internet services) on a range of</p>

<p>simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>2.4 - 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.</p> <p>2.5 - Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p> <p>2.6 - 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.</p> <p>2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p><u>Key vocabulary</u> search, engine, communication, internet, crawler, index, rank, limitations.</p>	<p>are selected and ranked, and be discerning in evaluating digital content.</p> <p>2.6 - 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.</p> <p>2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p><u>Key vocabulary</u> media, website, internet, HTML, layout, purpose, feature, fair use, copyright, ownership, content, device, navigation, hyperlink.</p>	<p>problems by decomposing them into smaller parts.</p> <p>2.2 - Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>2.6 - 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.</p> <p><u>Key vocabulary</u> variable, value, placeholder, program, algorithm, project, code, share, evaluate.</p>	<p>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.</p> <p><u>Key vocabulary</u> data, spreadsheet, format, cell, construct, formula, calculate.</p>
	<p><u>Topic</u> 3D modelling</p>	<p><u>Topic</u> Sensing</p>	

Key Question

Can you plan, develop and evaluate 3D computer models of physical objects?

National Curriculum objectives

2.6 - 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.

2.7 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

Key vocabulary

three-dimensional, digital, object, select, move, delete, identify, resize, position, duplicate, placeholder, construct, modify, evaluate.

Key Question

Can you design and code a project that captures inputs from a physical device?

National Curriculum objectives

2.1 - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.

2.2 - Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.

2.3 - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.

2.6 - 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.

Key vocabulary

programming, sensing, environment, emulator, controllable, device, flow, selection, condition, variable, statement, input, output, value.

Upper Key Stage 2 National Curriculum coverage

National Curriculum Coverage – Years 5 and 6	5.1 Sharing information	5.2 Video editing	5.3 Selection in physical computing	5.4 Flat-file databases	5.5 Vector drawing	5.6 Selection in quizzes	6.1 Internet communication	6.2 Webpage creation	6.3 Variables in games	6.4 Introduction to spreadsheets	6.5 3D modelling	6.6 Sensing
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	✓	✓						✓	✓		✓	

Skills objectives for each year group

Skills objectives	Year group
<ul style="list-style-type: none"> - to identify technology - to identify a computer and its main parts - to use a mouse in different ways - to use a keyboard to type on a computer - to use the keyboard to edit text - to create rules for using technology responsibly 	Year 1
<ul style="list-style-type: none"> - to describe what different freehand tools do - to use the shape tool and the line tools - to make careful choices when painting a digital picture - to explain why I chose the tools I used - to use a computer on my own to paint a picture - to compare painting a picture on a computer 	Year 1
<ul style="list-style-type: none"> - to explain what a given command will do - to act out a given word - to combine forwards and backwards commands to make a sequence - to combine four direction commands to make sequences - to plan a simple program - to find more than one solution to a problem 	Year 1
<ul style="list-style-type: none"> - to label objects - to identify that objects can be counted - to describe objects in different ways - to count objects with the same properties - to compare groups of objects - to answer questions about groups of objects 	Year 1
<ul style="list-style-type: none"> - to use a computer to write - to add and remove text on a computer - to identify that the look of text can be changed on a computer - to make careful choices when changing text - to explain why I used the tools that I chose - to compare typing on a computer to writing on paper 	Year 1
<ul style="list-style-type: none"> - to choose a command for a given purpose - to show that a series of commands can be joined together - to identify the effect of changing a value - to explain that each sprite has its own instructions - to design the parts of a project - to use my algorithm to create a program 	Year 1
<ul style="list-style-type: none"> - to recognise the uses and features of information technology - to identify the uses of information technology in the school - to identify information technology beyond school - to explain how information technology helps us - to explain how to use information technology safely - to recognise that choices are made when using information technology 	Year 2

<ul style="list-style-type: none"> - to use a digital device to take a photograph - to make choices when taking a photograph - to describe what makes a good photograph - to decide how photographs can be improved - to use tools to change an image - to recognise that photos can be changed 	Year 2
<ul style="list-style-type: none"> - to describe a series of instructions as a sequence - to explain what happens when we change the order of instructions - to use logical reasoning to predict the outcome of a program - to explain that programming projects can have code and artwork - to design an algorithm - to create and debug a program that I have written 	Year 2
<ul style="list-style-type: none"> - to recognise that we can count and compare objects using tally charts - to recognise that objects can be represented as pictures - to create a pictogram - to select objects by attribute and make comparisons - to recognise that people can be described by attributes - to explain that we can present information using a computer. 	Year 2
<ul style="list-style-type: none"> - to say how music can make us feel - to identify that there are patterns in music - to show how music is made from a series of notes - to create music for a purpose - to review and refine our computer work 	Year 2
<ul style="list-style-type: none"> - to explain that a sequence of commands has a start - to explain that a sequence of commands has an outcome - to create a program using a given design - to change a given design - to create a program using my own design - to decide how my project can be improved 	Year 2
<ul style="list-style-type: none"> - to explain how digital devices function - to identify input and output devices - to recognise how digital devices can change the way we work - to explain how a computer network can be used to share information - to explore how digital devices can be connected - to recognise the physical components of a network 	Year 3
<ul style="list-style-type: none"> - to explain that information is a sequence of drawings of photographs - to relate animated movement with a sequence of images - to plan an animation - to identify the need to work consistently and carefully - to review and improve an animation - to evaluate the impact of adding other media to an animation 	Year 3
<ul style="list-style-type: none"> - to explore a new programming environment - to identify that commands have an outcome - to explain that a program has a start - to recognise that a sequence of commands can have an order - to change the appearance of my project 	Year 3

<ul style="list-style-type: none"> - to create a project from a task description 	
<ul style="list-style-type: none"> - to create questions with yes/no answers - to identify the object attributes needed to collect relevant data - to create a branching database - to explain why it is helpful for a database to be well structured - to identify objects using a branching database - to compare the information shown in a pictogram with a branching database 	Year 3
<ul style="list-style-type: none"> - to recognise how text and images convey information - to recognise that text and layout can be edited - to choose appropriate page settings - to add content to a desktop publishing publication - to consider how different layouts can suit different purposes - to consider the benefits of desktop publishing 	Year 3
<ul style="list-style-type: none"> - to explain how a sprite moves in an existing project - to create a program to move a sprite in four directions - to adapt a program to a new context - to develop my program by adding features - to identify and fix bugs in a program - to design and create a maze-based challenge 	Year 3
<ul style="list-style-type: none"> - to describe how networks physically connect to other networks - to recognise how networked devices make up the internet - to outline how websites can be shared via the web - to describe how content can be added and accessed on the web - to recognise how the content of the web is created by people - to evaluate the consequences of unreliable content 	Year 4
<ul style="list-style-type: none"> - to identify that sound can be digitally recorded - to use a digital device to record sound - to explain that a digital recording is stored as a file - to explain that audio can be changed through editing - to show that different types of audio can be combined and played together - to evaluate editing choices made 	Year 4
<ul style="list-style-type: none"> - to identify that accuracy in programming is important - to create a program in a text-based language - to explain what 'repeat' means - to modify a count-controlled loop to produce a given outcome - to decompose a task into small steps - to create a program that uses count-controlled loops to produce a given outcome 	Year 4
<ul style="list-style-type: none"> - to explain that data gathered over time can be used to answer questions - to use a digital device to collect data automatically - to explain that a data logger collects data points from sensors over time - to use data collected over a long duration to find information - to identify the data needed to answer questions - to use collected data to answer questions 	Year 4
<ul style="list-style-type: none"> - to explain that digital images can be changed - to change the composition of an image 	Year 4

<ul style="list-style-type: none"> - to describe how images can be changed for different uses - to make good choices when selecting different tools - to recognise that not all images are real - to evaluate how changes can improve an image 	
<ul style="list-style-type: none"> - to develop the use of count-controlled loops in a different programming environment - to explain that in programming there are infinite loops and count controlled loops - to develop a design that includes two or more loops which run at the same time - to modify an infinite loop in a given programme - to design a project that includes repetition - to create a project that includes repetition 	Year 4
<ul style="list-style-type: none"> - to explain that computers can be connected together to form systems - to recognise the role of computer systems in our lives - to recognise how information is transferred over the internet - to explain how sharing information online lets people in different places work together - to contribute to a shared project online - to evaluate different ways of working together online 	Year 5
<ul style="list-style-type: none"> - to explain what makes a video effective - to identify digital devices that can record video - to capture video using a range of techniques - to create a storyboard - to identify that video can be improved through reshooting and editing - to consider the impact of the choices made when making and sharing a video 	Year 5
<ul style="list-style-type: none"> - to control a simple circuit connected to a computer - to write a program that includes count-controlled loops - to explain that a loop can stop when a condition is met - to explain that a loop can be used to repeatedly check whether a condition has been met - to design a physical project that includes selection - to create a program that controls a physical computing project 	Year 5
<ul style="list-style-type: none"> - to use a form to record information - to compare paper and computer-based databases - to outline how grouping and then sorting data allows us to answer questions - to explain that tools can be used to select specific data - to explain that computer programs can be used to compare data visually - to apply my knowledge of a database to ask and answer real-world questions 	Year 5
<ul style="list-style-type: none"> - to identify that drawing tools can be used to produce different outcomes - to create a vector drawing by combining shapes - to use tools to achieve a desired effect - to recognise that vector drawings consist of layers - to group objects to make them easier to work with - to evaluate my vector drawing 	Year 5
<ul style="list-style-type: none"> - to explain how selection is used in computer programs - to relate that a conditional statement connects a condition to an outcome - to explain how selection directs the flow of a program - to design a program which uses selection - to create a program which uses selection 	Year 5

- to evaluate my program	
- to identify how to use a search engine - to describe how search engines select results - to explain how search results are ranked - to recognise why the order of results is important, and to whom - to recognise how we communicate using technology - to evaluate different methods of online communication	Year 6
- to review an existing website and consider its structure - to plan the features of a web page - to consider the ownership and use of images (copyright) - to recognise the need to preview pages - to outline the need for a navigation path - to recognise the implications of linking to content owned by other people	Year 6
- to define a 'variable' as something that is changeable - to explain why a variable is used in a program - to choose how to improve a game by using variables - to design a project that builds on a given example - to use my design to create a project - to evaluate my project	Year 6
- to identify questions which can be answered using data - to explain that objects can be described using data - to explain that formulas can be used to produce calculated data - to apply formulas to data, including duplicating - to create a spreadsheet to plan an event - to choose suitable ways to present data	Year 6
- to use a computer to create and manipulate 3D digital objects - to compare working digitally with 2D and 3D graphics - to construct a digital 3D model of a physical object - to identify that physical objects can be broken down into a collection of 3D shapes - to design a digital model by combining 3D objects - to develop and improve a digital 3D model	Year 6
- to create a program to run on a controllable device - to explain that selection can control the flow of a program - to update a variable with a user input - to use an conditional statement to compare a variable to a value - to design a project that uses input and outputs on a controllable device - to develop a program to use inputs and outputs on a controllable device	Year 6