

Computing Scheme Of Work

A high-quality computing education equips pupils to understand and change the world through logical thinking and creativity, including by making links with mathematics, science, and design & technology. The core of computing is computer science, in which pupils are taught the principles of information and computation, and how digital systems work. Computing equips pupils to use information technology to create programs, systems and a range of media. It 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. We also promote awareness of online safety, online behaviours and how to keep themselves safe online.

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, and determine the veracity of online content
- are responsible, competent, confident and creative users of information and communication technology.
- are aware of the risks of a variety of online activities and know how to stay safe

There are several strands, which run from KS1 to Y6, progressively developing skills and knowledge in each area:

- Acquiring basic skills and awareness of the computer environment.
- Control technology, programming and algorithms
- Data and information handling
- Word processing and Desktop Publishing
- The Internet and networking
- Modelling and simulation
- Online safety

The objectives in the scheme of work are intended to teach the children a wide range of computing skills in a variety of tasks and activities. However, it is important that the children are encouraged to apply these skills **independently**, both in conducting further computing work, but most importantly in support of their work in other subjects – computing teaches skills to be used in other subjects rather than as a discrete subject itself. For example, children will be able to construct a spreadsheet and graph to present their science data, with little further instruction, after initial teaching in computing lessons.

Tasks such as retrieving resources from the WWW are repeated in all year groups for use in other computing activities or again, as independent research to support other curriculum areas. Use of the datalogger can be a valuable aid in science and both should be used to support delivery of the subject, where appropriate. Many websites, eg www.bbc.co.uk have useful text, graphics and animations or video clips to support other curriculum areas.

The scheme is a guide to objectives, which should be completed to ensure coverage and progression, not to constrain the activities conducted by class teachers. Staff should feel free to use equipment or a particular objective whenever appropriate. Similarly, children should be encouraged

to use Computing as independently as any other resource. Most importantly, computing should be used regularly to support the delivery of *all* curriculum areas. It is important to note that children should be expected to use computing in other areas *following* initial teaching of skills in computing lessons – these should, in turn, be taught in the context of other subjects.

Progression From KS1

In control technology, KS1 children learn the basics of algorithms, writing and debugging code, as well as using Beebots, which progress to Robots in KS2. These skills are then continued in KS2 in a progressively deeper and more independent way, for example writing code in Scratch. In data handling, children progress from presenting data in graphs and charts to manipulating and interrogating data by writing formulae in spreadsheets and searching databases. In DTP and digital imaging, children develop a variety of document and presentation skills, producing documents and manipulating or editing a variety of images, sounds and information in film and multimedia to present their research in a variety of ways. Also in KS2, they move on to using digital images to produce graphical models and simulations related to their topics.

Year 3 Objectives	Curriculum Links	Suggested Activities
Use screen-based programming software. Control a robot forward, back and through degree rotations.	Numeracy Design and Technology	Use Roamer and Scratch programs to illustrate and reinforce angles. Design and build a maze/path that the roamer must stay within. Use roamer to illustrate basic measurement and programming
Access information from internet. Visit a selection of websites by address. Type up text in Word, resizing letters for a title. Insert picture from Paint.	English History and Geography topics Art	Independent research from WWW Type up researched info for topic folder or display.
Enter/retrieve data from branching database in Textease.	Science Numeracy	Use database to identify and classify specimens. Branching database can be used in most subjects eg to classify Tudor royals; similarly with 2D shapes.
Draw, group, move & colour a shape in Textease. (Polygon skills)	Art Design and Technology	Use patterns to decorate art and technology projects eg repeated tessellation, greetings cards, wrapping paper, gift boxes, buggies etc. Emulate patterns by hand in various art techniques. Develop Textease polygon skills: emulate eg Matisse, Mondrian pictures.

Year 4 Objectives	Curriculum Links	Suggested Activities
Create objects to model eg Tudor garden, coastline on a Textease template. Use gradation (colour) command in Textease.	Art History. Geography Design and technology	Use patterns to decorate art and technology projects eg repeated tessellation, greetings cards, wrapping paper, gift boxes, buggies etc. Emulate patterns by hand in various art techniques. Use Textease skills to model villages, garden/coastline designs.
Introduce basic spreadsheets to produce graphs and pie charts and present data.	Numeracy. Science	Gather data on eg mini-beasts, hair colour etc. Present findings from investigations
Basic control technology using Probotix Control robot with a procedure containing at least five commands inc. sound	Numeracy Design and Technology Geography	Use Probotix and Scratch to develop spatial awareness & use of angles. Design and build a more intricate maze/path that the roamer must navigate. Use roamer to draw shapes/ repeating patterns - link to Maths
Use Word for text: choose font style, size & colour. Insert web/digital pics. Search WWW by keyword. Use graphics/text for typing (no copy & paste)	English History and Geography topics	Independent research from WWW Type up researched info for topic folder or display.
Enter/retrieve data from branching database in Pinpoint or Textease	Numeracy. Science. Topics.	Use database to identify and classify specimens. Branching database can be used in most subjects eg collate data on class members.

Year 5 Objectives	Curriculum Links	Suggested Activities
--------------------------	-------------------------	-----------------------------

Use Scratch to program simple games and algorithms.	Numeracy. Geography Science. Art.	Link to angles and map work. Link to science topics. Link to art topics; tessellation, circle patterns, repeating patterns. Naming properties of 2D shapes. Using angles to draw precisely.
Take, download and save photographs/ video clips with digital camera. Experience of editing film and audio. Create DTP document in Word: choose font size, style and colour. Use Wordart for title. Insert pictures from WWW, network or digital photographs	Literacy. History and Geography topics etc.	Children should <i>independently</i> research and produce a piece of DTP on a chosen subject. Emphasis is on discussion and choices, regarding the research and layout of this piece. Children should be encouraged to use all Word tools they know.
Use Data logger to gather temp. sound or light data. Enter data into Excel spreadsheet & use formulae for calculations. Use Excel to model projected outcomes and produce graphs.	Numeracy. Science	Gathering valid data eg sound levels, from experiments can support an objective, provide useful discussion & vary presentation of children's findings Spreadsheets can be used to help solve problems eg VE Day party planner & model outcomes when variables are changed eg recipe calculators.
Create own Textease template and objects to model eg classroom, village etc. Use a Textease model to predict and test different relevant scenarios/problems - varied classroom layouts & associated problems	DT Geography, History	Simulate different situations and scenarios by creating a model, to test eg different layouts of a village, garden, classroom etc.

Year 6 Objectives	Curriculum Links	Suggested Activities
Use Scratch to program simple games and algorithms, using input variables.	Numeracy. Geography Science. Art.	As year 5. Emphasis should be on the investigation and trouble-shooting written procedures. Eg games Children should recognise that input/output is how many real life systems function.
Use Datalogger to record external effects eg changes in temp. noise & light Use Excel to calc. totals, multiplications etc in spreadsheets using formulae Use Excel to model projected outcomes and produce graphs from data.	Numeracy. Science	As year 5. Emphasis is on the <i>independent application</i> of skills to support other subjects and self evaluation/improvement of children's work.
Create DTP document in Word. Take, download and save photographs with digital camera. Create and save sound files with dig. mic. Produce a multimedia presentation. Experience of editing film and audio.	Topics. Literacy	Children should research and produce a presentation on relevant, purposeful subjects eg topics, literacy reports etc. Films may be documentary, on topics, or readings of English work.
Create own Textease template and objects to model eg classroom, village etc. Use a Textease model to predict and test different relevant scenarios/problems eg classroom layouts & associated problems	DT Geography, History	Simulate different situations and scenarios by creating a model, to test eg different layouts of a village, garden, classroom etc.

POS	Year 3	WTS	EXP	GDS
------------	---------------	-----	-----	-----

	1. Use screen based programming software such as Probotix.			
	2. Control a robot forward, back and through degree rotations.			
	3. Research information from internet. (No copy and paste).			
	4. Visit a selection of websites by address.			
	5. Type up text in Word, resizing letters for a title. Insert picture from camera or web.			
	6. Enter/retrieve data from branching database in Textease.			
	7. Draw, group, move & colour a shape in Textease. (Polygon skills)			
	8. Use Excel to present and total data, and create graphs.			
	9. Understand algorithms and use in Scratch programming.			
	10. Control and modelling with Crystal Rainforest.			

Can follow simple instruction to achieve a specific objective.	Work is set and entirely teacher-led, to learn a skill.	Relies on support, often step by step.	Unable to comment or give an evaluation of task	
Activities are purposeful, with a useful, meaningful outcome.	Children explore task to meet open ended objective.	Follow instructions from task start; v. little support.	They explain instructions followed and share ideas.	
They use I.C.T. to make enquiries and present data	Decision making activities. They make & revise choices	Carry out an explained task with no support.	Describe how they revise ideas & changes caused	

POS	Year 4	WTS	EXP	GDS
	1. Control floor robot with procedure containing at least 5 commands inc. sound			
	2. Search WWW by keyword. Use graphics/text for typing (no copy & paste)			
	3. Comment on the logic of WWW information.			
	4. Model basic control technology using Probotix			
	5. Use Word for text: choose font style, size & colour. Insert web/digital pictures.			
	6. Enter/retrieve data from branching database in Pinpoint or Textease			
	7. Use gradation (colour) command in Textease to illustrate eg a hill			
	8. Draw & group Textease objects to model Tudor garden, Saxon village, coastline			
	9. Introduce basic spreadsheet formulae to produce graphs and pie charts.			
	10. Programming in Scratch.			
	11. Control and modelling with Crystal Rainforest.			

Can follow simple instruction to achieve a specific objective.	Work is set and entirely teacher-led, to learn a skill.	Relies on support, often step by step.	Unable to comment or give an evaluation of task	
Activities are purposeful, with a useful, meaningful outcome.	Children explore task to meet open ended objective.	Follow instructions from task start; v. little support.	They explain instructions followed & share ideas.	
They use I.C.T. to make enquiries and present data	Decision making activities. They make & revise choices	Carry out an explained task with no support.	Describe how they revise ideas & changes caused	

POS	Year 5	WTS	EXP	GDS
	1. Use Scratch to program simple games and algorithms.			

	2. Search WWW by keyword. Use graphics/text and sounds.					
	3. Use modelled control in Crystal Rainforest 2: Mission Control.					
	4. Create DTP document in Word: choose font size, style and colour. Use Wordart for title. Insert pictures from WWW, network or digital photographs.					
	5. Enter/retrieve data from database in Textease. Use complex searches & troubleshoot any arising ambiguities.					
	6. Create own Textease template and objects to model eg classroom, village etc.					
	7. Use a Textease model to predict and test different relevant scenarios/problems eg various classroom layouts & associated problems					
	8. Take, download and save photographs/ video clips with digital camera.					
	9. Experience of editing film and audio.					
	10. Use Data logger to independently gather temp. sound or light data.					
	11. Enter data into Excel spreadsheet & use formulae for calculations.					
	12. Use Excel to model projected outcomes and produce graphs.					
	13. Combine sound, graphics, photographs, video and text to produce a multimedia document.					
Activities are purposeful, with a useful, meaningful outcome	Children explore task to meet open ended objective.	Follow instructions from task start; v. little support.	They explain instructions followed and share ideas.			
They use I.C.T. to make enquiries and present data	Decision making activities. They make & revise choices	Carry out an explained task with no support.	Describe how they revise ideas & changes caused			
Manipulate variety of info, inc. complex database enquiries.	Able to check & refine errors in enquiries & robot program	Carry out tasks & explore/develop them in own way.	Describe whether or not results/data are plausible.			
POS	Year 6			WTS	EXP	GDS
	1. Use Scratch to program simple games and algorithms, using input variables.					
	2. Search WWW by keyword. Use graphics/text, sounds and other resources.					
	3. Use modelled control in Crystal Rainforest 2: Mission Control.					
	4. Create DTP document in Word: choose font size, style and colour. Use Wordart, insert pictures from WWW, network or digital photographs. Include page border, paragraphs, bullets and text wrapping.					
	5. Enter/retrieve data from database in Textease. Use complex searches & troubleshoot any arising ambiguities.					
	6. Create a Textease model and predict/test different relevant scenarios/problems. Eg comparison of maps with aerial photos.					
	7. Take, download and save photographs with digital camera.					
	8. Create and save sound files with digital microphone. Manipulate in Audacity.					
	9. Experience of editing film and audio.					
	10. Use Datalogger to record external effects eg changes in temp. noise & light					
	11. Use Excel to calc. totals, multiplications etc in spreadsheets using formulae					
	12. Use Excel to model projected outcomes and produce graphs from data.					
	13. Use modelled control in Crystal Rainforest 2: Mission Control.					
	14. Combine sound, graphics, photographs, video and text to produce a multimedia document.					
They use I.C.T. to make enquiries and present data	Decision making activities. They make & revise choices	Carry out an explained task with no support.	Describe how they revise ideas & changes caused			
Manipulate variety of info, inc. complex database enquiries.	Able to check & refine errors in enquiries & robot program	Carry out tasks & explore/develop them in own way.	Describe whether or not results/data are plausible.			
Children choose own task to achieve desired outcome.	Tasks are adventurous & support other subjects	Confidently extend or design tasks without aid.	Explain their choices & methods for desired aim.			

RECORDING

In recording and assessing, staff should note the objectives covered and the degree of independence with which children conduct them. Useful questions and phrases might be:

Greater Depth:

X can conduct tasks independently after instructions have been given.

X shows good retention of skills and is able to apply them independently to create new tasks.

X can develop and extend tasks in their own way, using their own knowledge of computing.

X is able to describe what they have achieved and how.

X is able to check procedures/enquiries/outcomes recognising whether they make sense.

X can identify problems and find their own solutions.

Expected:

X can conduct tasks after instructions have been given, with reminders.

X shows retention of skills and is able to apply them in given tasks.

X can conduct given tasks, using their own knowledge of computing.

X is able to describe what they have achieved, but may not articulate exactly how.

X is able to recognise problems in procedures/enquiries/outcomes when pointed out.

X can identify problems and find their own solutions with guidance.

Working Towards:

X needs step by step guidance to conduct a given task.

X does not retain skills or teaching and is unable to apply them in given tasks, without support.

X is reliant on, or simply adapts, examples to produce work.

X struggles to articulate what they have done to conduct their task.

X often requires support in conducting tasks, particularly in following the next logical step.

X does not recognise why procedures/enquiries/outcomes do not make sense.

DIFFERENTIATION

Example: Year 5 spreadsheet activity. "Party Planner"

11. Enter data into Excel spreadsheet & use formulae for calculations.

12. Use Excel to model projected outcomes and produce graphs.

1) John has £50 to spend on a party. Using the price list on your worksheet, make a party planner spreadsheet to help him work out how much to spend.

This shows a simple multiplication; $=B2*C2$

	A	B	C	D
1	Item	Unit Price	Quantity	Total
2	Hats	£1.09	10	£10.90
3	Streamers	£0.49	30	£14.70
4	Cola	£0.63	20	£12.60
5	Crisps	£0.36	10	£3.60

Children can then make a total spent calculation. $=SUM(D2:D5)$

	A	B	C	D
1	Item	Unit Price	Quantity	Total
2	Hats	£1.09	10	£10.90
3	Streamers	£0.49	30	£14.70
4	Cola	£0.63	20	£12.60
5	Crisps	£0.36	10	£3.60
6	TOTAL			£41.20

More able children should be set the challenge of how to subtract the running total from the budget. $=(E2-D3)$

	A	B	C	D	E
1	Item	Unit Price	Quantity	Total	Amount left
2	BUDGET				£50.00
3	Hats	£1.09	10	£10.90	£39.10
4	Streamers	£0.49	30	£14.70	£24.40
5	Cola	£0.63	20	£12.60	£11.80
6	Crisps	£0.36	10	£ 3.60	£ 8.20
7	TOTAL			£41.20	

Those who are able should be encouraged to manipulate border styles etc. this spreadsheet can be used to generate a graph. Those who are able may select and manipulate the graph independently eg styles, colours, shading, titles. Less able children will need instruction and may produce a more basic graph.

2) Two of John's friends are unable to go to the party. This means John will need two less hats and six less streamers. Use the spreadsheet to show how many more colas & crisps he can buy and still stay in his budget.

3) He also finds he has lost £5. What is the most of each item he can still buy, for 8 guests?

These tasks allow the children to **model** possible outcomes, using the spreadsheet they have already created.

This also has applications in Numeracy for word problems. Children would need to work out similar calculations to solve such problems.

Eg. John buys 2 hats and 3 packets of crisps. He pays with a £10.00 note. How much change does he have?