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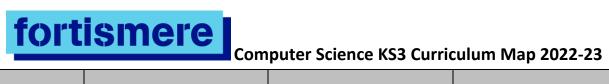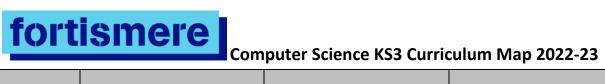
Computer Science KS3 Curriculum Map 2022-23

Yr7 (KS3)	Topic Area	Knowledge/Skills that are taught	Knowledge/Skills revisited	What does good look like?	Resources/support at home
Autumn 1	**Using Computers Safely Effectively and Responsibly + Baseline test**	This is a theoretical unit covering the necessary basic knowledge to use computers safely, effectively and responsibly. Pupils begin by looking at file management and security. The unit then moves on to e-safety (cyber-bullying, phishing etc.), and online profiles to give pupils a better understanding and awareness of using social media. The functionality and operation of email and search engines and how to use them effectively are covered, and a final lesson includes a multiple choice test on the contents of the unit and basic computer use.	Building on KS2 knowledge Y7-11 PSHE KS4 CS Cybersecurity KS4 CS Ethical, legal and environmental impacts	• **use basic file management techniques to create folders, save, copy, move, rename and delete files and folders and make backup copies of files** • **recognise extensions for common file types such as .doc or .docx, .ppt, .jpg etc** • **keep their files in well organised and appropriately named folders** • **explain what constitutes a "strong" password for an online account** • **describe a code of conduct** • **list some of the dangers and drawbacks of social networking sites**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/

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				• list some possible responses to cyberbullying • send and reply to emails, send attachments • use a search engine to find information	
Autumn 1	Computer Crime and Cyber Security	This unit covers some of the legal safeguards regarding computer use, including overviews of the Computer Misuse Act, Data Protection Act and Copyright Law and their implications for computer use. Phishing scams and other email frauds, hacking, "data harvesting" and identity theft are discussed together with ways of protecting online identity and privacy. Health and Safety Law and environmental issues such as the safe disposal of old computers are also discussed.	Building on KS2 knowledge Y7-11 PSHE KS4 CS Cybersecurity KS4 CS Ethical, legal and environmental impacts	• Name the major Acts concerning computer use • Describe briefly some of the dangers of putting personal data on social networking sites • Describe briefly ways of protecting online identity and how to report concerns • Identify some of the signs of fraudulent emails and respond appropriately • Adhere to Copyright Law when using written text, downloading music etc. • List some of the Health and Safety hazards associated with computer use • Describe how to	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/

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Computer Science KS3 Curriculum Map 2022-23

				safely dispose of an old computer	
Autumn 2	Games Programming in Scratch	In this unit pupils will be introduced to the Scratch programming environment and begin by reverse-engineering some existing games. They will then progress to planning and developing their own games, learning to incorporate variables, procedures (using the Broadcast function), lists and operators. They should be able to create a fully working game with lives, scoring and some randomisation of objects. Finally they will learn to test and debug their programs.	Design, use, and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems. Use two or more programming languages, one of which is textual, to solve a variety of computational problems; make appropriate use of data structures such as lists, tables or arrays; design and develop modular programs that use procedures or functions. Understand simple Boolean logic (such as AND, OR and NOT), and some of its uses in circuits and programming. Building on KS2 knowledge Y7 Spring 2 Y7 Summer 2 Y8 Aut1 Y8 Spring 1 Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 CS Programming	• **Relate computational abstractions and simple programming code to on-screen actions** • **Design simple algorithms to solve problems** • **Sequence instructions in order to make things happen** • **Use variables in programming structures** • **Assemble code in procedural blocks** • **Use simple Boolean operators in programming code** • **Identify and use screen objects in their own Scratch game** • **Carry out simple tests to debug their project**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ Scratch https://scratch.mit.edu/
Spring 1	Understanding Computers	The unit t is a theoretical	Understand the hardware and software components that	• **Distinguish between**	Google classroom PG Online

		unit covering the basic principles of computer architecture and use of binary. Pupils will revise some of the theory on input and output covered in previous learning and continue to look at the Input-Process-Output sequence and the Fetch-Decode-Execute cycle through practical activities. Pupils will then look at some simple binary to decimal conversion and vice versa, and learn how text characters are represented using the ASCII code. This will be followed by some simple binary addition. Pupils will learn more in depth how storage devices represent data using binary patterns and physically save these patterns. Finally, they will look at a brief history of communication devices, how new technologies and applications are emerging and the pace of change.	make up computer systems, and how they communicate with one another and with other systems. Understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds, and pictures) can be represented and manipulated digitally, in the form of binary digits; be able to convert between binary and decimal, and perform simple binary arithmetic Building on KS2 knowledge Y7 Aut1 Y8 Aut 2 Y9 Spring 2 KS4 CS Fundamentals of data representation KS4 CS Systems architecture	hardware and software ● Give examples of computer hardware and software ● Draw a block diagram showing CPU, input, output and storage devices ● Name different types of permanent storage device ● Suggest appropriate input and output devices for a simple scenario ● Explain what RAM and ROM are used for ● Show how numbers and text can be represented in binary ● Explain the impact of future technologies	https://www.pgonline.co.uk/resources/computer-science/ks3/
Spring 2	Introduction to coding through Kodu	This unit is an introduction to the fundamentals of computer programming and	Undertake creative projects that involve selecting, using, and combining multiple	● Identify what the terms program, navigate, object and world mean in	Google classroom PG Online https://www.pgonline.co.uk/resources/com

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		games design via Kodu, a highly intuitive graphical development environment developed by Microsoft Games Lab. Pupils will be introduced to the idea of computer programs requiring a precise series of statements and, through using Kodu, will understand how to build a world and program characters and objects before moving on to enhance their games with more advanced features.	applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions Design, use and evaluate computational abstractions that model the state and behaviour of real world problems and physical systems Building on KS2 knowledge Y7 Spring 2 Y7 Summer 2 Y8 Aut1 Y8 Spring 1 Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 CS Programming	<mark>computer games design</mark> • <mark>Explain that a computer program requires a precise series of instructions to operate</mark> • <mark>Create and alter basic landscape features in Kodu</mark> • <mark>Describe the possible ways in which a character can be made to move within Kodu</mark> • <mark>Describe a range of game techniques such as pathing, clones and creatables</mark> • <mark>Explain how behaviours can change for a character</mark> • <mark>Describe what is meant in programming by the term selection</mark>	puter-science/ks3/ http://www.kodugamelab.com/ Micro:bit https://microbit.org/

Summer 1	Spreadsheet modelling	This unit is a practical, skills-based unit covering the principles of creating and formatting basic spreadsheets to produce and use simple computer models. It is suitable for pupils who have a basic knowledge of spreadsheets including cell references, simple formulae and formatting, although these topics are revised in the first lesson, making it also suitable for pupils new to spreadsheets. The unit is centred around creating a financial model for a TV show. Pupils start by looking at different types of model and then use basic spreadsheet techniques to create and format a simple financial model to calculate the expected income from viewers' voting. The model is then extended to include sales from merchandising,	Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems. Y8 Summer 2 Y 9 Summer 1 Y 9 Summer 2 KS4 Data processing and modelling	• **Give examples of how computer models are used in the real world** • **Format a simple spreadsheet model** • **Use simple formulae and functions** • **Name cells in a spreadsheet model** • **Use a simple spreadsheet model to explore different "what if" scenarios** • **Create a basic pie chart to display results**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ Microsoft Excel Google Sheets

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		with the introduction of "what if" scenarios. Finally the pupils create a seating plan, book seats and calculate income from seat sales. Spreadsheet features covered include SUM, MAX, IF and COUNTIF functions, cell naming for absolute referencing, conditional formatting, validation, charting and simple macros.			
Summer 2	App development in AppShed	The aim of this unit is to teach the pupils how to build their own apps using a web-based app builder. It will give them all the tools and resources to build a working web app which can be used on any HTML5 compatible device. In the unit they will evaluate existing apps, mock up their own designs and build, test and evaluate their own apps. By the end of this unit they will have an understanding of a good user interface, know the difference between web apps and native apps, and be able to find and create	Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users. Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability Building on KS2 knowledge Y7 Spring 2 Y7 Summer 2 Y8 Aut1 Y8 Spring 1	• **evaluate a simple GUI (Graphical User Interface)** • **create a simple GUI (Graphical User Interface) within a web application** • **explain the processes involved in building an app** • **understand the term 'Home Screen'** • **build a photo gallery** • **use the map building tool**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ AppShed https://appshed.com/

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		resources such as icons and backgrounds. The demonstration app included in the unit and shown on the PowerPoint slides is about the Periodic Table, but pupils are expected to come up with their own ideas.	Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 Pre-production skills KS4 User interface design KS4 Audience needs and purpose		

Yr8 (KS3)	**Topic Area**	**Knowledge/Skills that are taught**	**Knowledge/Skills revisited**	**What does good look like?**	**Resources/support at home**
Autumn 1	Control systems with Flowol	This unit is a practical unit covering the principles of producing control and monitoring solutions using a flowchart-based interface (Flowol 4 or earlier). Pupils will start by producing systems that use simple loops and basic outputs, and then move on to look at systems that have multiple inputs and outputs. They will refine their solutions using subroutines and variables.	Design, use and evaluate computational abstractions that model the state and behaviour of real world problems and physical systems Design and develop modular programs that use procedures or functions Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems Building on KS2 knowledge Y7 Spring 2	• **Identify everyday situations where computer control is used** • **Identify common types of sensors used by control systems** • **Identify control flowchart symbols and understand how they are used to break down problems** • **Produce flowchart-based solutions for control systems that include sequences and loops**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ Flowol http://www.flowol.com/Flowol4.aspx

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			Y7 Summer 2 Y8 Aut1 Y8 Spring 1 Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 CS Programming KS4 CS Fundamentals of algorithms		
Autumn 2	AI and machine learning	The unit is a mixture of theoretical aspects of AI with practical application of these ideas in the second half of the unit. Practical aspects of the unit are given in Scratch. Whilst the programs given to students make use of advanced features of Scratch, such as new Blocks (subroutines) and lists, tasks have been written to be accessible by students who have only rudimentary understanding of Computer Science programming with a visual interface. Students should have had some experience programming algorithms, through a visual or text interface, prior to undertaking this unit. This	Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions Building on KS2 knowledge Y7 Spring 2 Y7 Summer 2 Y8 Aut1	• **Understand the origin and uses of AI** • **Understand how rules are used in AI decision making** • **Understand what ethics is** • **Consider some simple ethical hypothetical problems** • **Understand how intelligence can be measured in humans and computers** • **Know what the Turing test is and how it works**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ Scratch https://scratch.mit.edu/

		unit is not an instructional unit in how to use Scratch. As such, students will be considering how existing programs work and adapting them. The unit first looks at what AI is and the history and developments behind it. It then moves onto machine learning, which is used in more modern AI applications today. Ethics of AI are covered with students being able to consider a number of different areas of ethical concern. Students then apply theory to knowledge with three projects. First an image detection program is considered that can identify shapes. A chatbot is then adapted to serve customers in an online shop. Finally, a program that can create a rating on a text review is considered. These same techniques could be used to identify fake reviews on a website.	Y8 Spring 1 Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 CS Programming KS4 CS Fundamentals of algorithms		
Spring 1	Introduction to Python	It is an introduction to Python, a powerful but easy-to-use high-level	Use two or more programming languages, one of which is textual, to solve a	• **Run simple Python programs in Interactive and Script**	Google classroom PG Online https://www.pgonline

		programming language. The focus is on getting pupils to understand the process of developing programs, the importance of writing correct syntax, being able to formulate algorithms for simple programs and debugging their programs.	variety of computational problems; make appropriate use of data structures; design and develop modular programs that use procedures and functions Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem. Building on KS2 knowledge Y7 Spring 2 Y7 Summer 2 Y8 Aut1 Y8 Spring 1 Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 CS Programming KS4 CS Fundamentals of algorithms KS4 CS Languages and IDEs	mode ● **Write pseudocode to outline the steps in an algorithm prior to coding** ● **Write programs using different types of data (e.g. strings and integers)** ● **Correctly use different variable types (e.g. integer and floating point), assignment statements, arithmetic operators** ● **Distinguish between syntax and logic errors and be able to find and correct both types of error** ● **Use relational operators to control the order in which program statements are executed and in what order (if and while statements)** ● **Use comments to document their programs and explain how they work** ● **Write an error-free, well-documented program involving selection and**	.co.uk/resources/computer-science/ks3/ Replit https://replit.com/

				iteration, but with some help given	
Spring 2	Introduction to Python continued				
Summer 1	Database development	This is a practical unit covering the basic theory, creation and use of a single-table database and a simple relational database involving two tables in a one-to-many relationship. Pupils will start by looking at an existing single-table database, learning how to add records and make queries. In subsequent lessons they will create a flat-file or two-table relational database of their own, using suitable field types and adding in appropriate validations an input form with help text, combo boxes and list boxes queries and a report using data from one or both tables a front end menu for their application linking to the database input form and	Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems Y7 Aut 1 Y7 Spring 1 Y8 Summer 2 Y9 Summer 2 KS4 CS Relational databases and SQL	• **Give examples of databases used by organisations which are accessible to the public via the Internet** • **Create a database table using several fields with different data types** • **State the purpose of a primary key in a database** • **Create a basic input form to input data** • **Query the database using more than one criterion to find answers to user queries** • **Create a basic report with suitable headings** • **Create a front-end application menu with buttons linking to a form and a report**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ MS Access

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		report MS Access is used in this unit.			
Summer 2	Project - Theme Park HTML and web development Graphics	Pupils will learn the basics of HTML and CSS, and how to create a responsive design which adapts to any size of screen for viewing on, say, a mobile phone or a PC. They will learn how to create text styles and add content, including text and graphics, in a specified position on a page, as well as navigation links to other pages on their website and to external websites. The basics of good design are covered and, with the help of worksheets, pupils will develop their own templates in a text editor such as Notepad. They will decide on a topic for their websites, document their designs and collect suitable text and images. They will then use their HTML templates to create their websites, including a web	Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability Understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits Y7 Aut 1 Y7 Summer 2 Y9 Summer 1 KS4 CS Fundamentals of data representation KS4 User interface design KS4 Design principles	• **Write HTML code to create a simple web page and display it in a browser** • **Write CSS to define the styles used in a web page** • **Create a simple navigation system using HTML** • **Use a design to create a template for a web page using HTML** • **Create their own multi-page website** • **Insert text, images and links on their web pages** • **Create an online form** • **Create an email merge** • **Explain that bitmap images are made up of**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ Google Docs, Slides, Sites, Sheets, Gmail and Forms Notepad W3Schools https://www.w3schools.com/ Google email merge https://developers.google.com/workspace/solutions/mail-merge Adobe Photoshop

		form. Pupils can view the data collected by the web form into a simulated database. This also helps to stimulate discussion on the privacy of data. It is an introduction to graphics and graphic file types. The unit explores how bitmap and vector images are represented and stored by the computer. There is also opportunity for pupils to practise skills in design, photo-editing and image manipulation using a suitable graphics package		**individual pixels** ● **Explain that in the case of a vector graphic, properties such as position, fill, stroke colour and dimensions are stored** ● **Create and manipulate a simple group of objects to form a logo design** ● **Change the saturation, brightness and contrast in an image** ● **Add text to a graphic** ● **Use a graphics package to create an artwork; for example, a poster**	

Yr9 (KS3)	Topic Area	Knowledge/Skills that are taught	Knowledge/Skills revisited	What does good look like?	Resources/support at home
Autumn 1	Networks	This is a theoretical unit covering the basic principles and architecture of local and wide area networks. Pupils will learn that the World Wide Web is part of the Internet, and how web addresses are constructed	Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems Understand a range of ways to use technology safely,	● **State that the Internet is a wide area network and the world wide web is part of the Internet** ● **Define the meaning of the terms "domain**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/

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		and stored as IP addresses. Client-server, peer-to-peer networks and the concept of cloud computing are all described. Ways of keeping data secure and simple encryption techniques are also covered.	respectfully, responsibly and securely	name", http protocol ● **Explain the basic principle of packet switching** ● **Give examples of LANs and WANs** ● **State three different network topologies** ● **Describe what is meant by a client-server network and state some of its advantages** ● **State why some transmissions are encrypted, and use a simple algorithm to encrypt and decrypt a message**	
Autumn 2	Python Next Steps	In this unit pupils use **for** loops and compare their use with **while** loops, before moving on to arrays (lists), which are introduced as a new data structure and are used in conjunction with **for** loops. Procedures and functions with parameters are covered to help pupils understand the concept and benefits of modular	Use two or more programming languages, one of which is textual, to solve a variety of computational problems; make appropriate use of data structures; design and develop modular programs that use procedures and functions Understand several key algorithms that reflect computational thinking [for	● **Use data types correctly and convert between them when necessary** ● **Write programs that use a loop to repeat a section of code** ● **Write programs that use lists (known as 'arrays' in some languages)**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ Replit https://replit.com/

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		programming. This unit is designed to take pupils right up to a point where a GCSE in Computing can pick up from and should provide ample experience of programming in order to confirm any decision to pursue Computing as a GCSE option.	example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem. Building on KS2 knowledge Y7 Spring 2 Y7 Summer 2 Y8 Aut1 Y8 Spring 1 Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 CS Programming KS4 CS Fundamentals of algorithms KS4 CS Languages and IDEs	• **Create and call a function or procedure** • **Find and debug syntax errors** • **Look at a given section of code and describe its function**	
Spring 1	Python Next Steps continued				
Spring 2	Computational Thinking	This unit introduces students to the world of computational thinking and logic. With the help of many unplugged activities, students get to understand the power of problem solving and the different methods that Computer Scientists use to tackle problems. This unit includes many novel activities to introduce	Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative	• **Be able to ask logical questions to solve problems** • **Know the common Boolean operators:** • **AND** • **OR** • **NOT**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ Scratch https://scratch.mit.edu/

		key topics. For example, logical deductions and logical puzzles are used to show logical thinking, water pipes are used to introduce logic gates, network topology is used to show how mazes can be solved and phone messaging is used to demonstrate decomposition. One lesson contains a practical activity in Scratch.	algorithms for the same problem Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions Understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal] Building on KS2 knowledge Y7 Spring 2 Y7 Summer 2 Y8 Aut1 Y8 Spring 1 Y8 Spring 2 Y9 Aut2	• **Know different logic gates including:** • **AND gates** • **OR gates** • **NOT gates** • **Understand what an algorithm is** • **Create a sequence of instructions to achieve a goal**	

			Y9 Spring1 KS4 CS Programming KS4 CS Fundamentals of algorithms Unit 2: Problem solving and theory of computation		
Summer 1 and 2	Fortitude project HTML and web development Graphics Animation Creating a video	In this unit pupils revisit knowledge and skills from Y8 Summer 1 Website development and Graphics to create an entire promotional campaign for the school festival 'Fortitude'. In Creating a Video pupils will work in groups to analyse, plan, shoot and edit a short advertisement for the Fortitude Festival, a short promotional video. The clip should ideally be limited to 30-60 seconds in order to fit within the timescales allowed. Pupils will first analyse existing TV advertisements, movie clips or film trailers, then storyboard their ideas in small groups and shoot each scene. They will then edit the clips gathered in filming into a short movie or advert.	Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users. Y7 Aut 1 Y7 Summer 2 Y8 Summer 2 KS4 CS Fundamentals of data representation KS4 User interface design KS4 Design principles	• **Work as part of a team to complete an appropriate advertisement or movie** • **Work collaboratively on editing and giving feedback on the work of others** • **Show discrimination in selecting accompanying material such as still images, sound effects and background music** • **Use a range of digital devices** • **Use video transitions and video effects to improve their movie** • **Create a simple animation using simple drawing and frame-by-frame techniques** • **Explain how frame rate and speed affect the**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/ks3/ Google Sites and Google Forms Notepad W3Schools https://www.w3schools.com/ Google email merge https://developers.google.com/workspace/solutions/mail-merge Adobe Photoshop Adobe Premiere Pro Adobe Animate Google Docs, Slides, Sites, Sheets, Gmail

		In Animation pupils will learn basic graphic drawing and animation techniques such as frame-by-frame animation and tweening, working with layers and adding simple interactivity and ActionScript. They will undertake a creative project to plan, create and evaluate a short animation of their own, as well as studying professionally made animations.		**smoothness of the animation** ● **Create an animation that carries a simple message**	and Forms