Computing

Key Concepts/ Skills									
Be able to comprehend, design, create, and evaluate **algorithms**	Understand how **networks** can be used to retrieve and share information, and how they come with associated risks	Understand what a computer is, and how its constituent parts function together as a whole **(systems)**	Select and **create a range of media** including text, images, sounds, and video	Understand how **data is stored**, organised, and used to represent real-world artefacts and scenarios	Understand the activities involved in planning, **creating, and evaluating** computing artefacts	Use **software tools** to support computing work	Understand how individuals, systems, and society as a whole interact with computer systems	Create software to allow computers to solve problems **(Programming)**	Understand risks when using technology, and how to protect individuals and systems **(Safety)**

	Autumn	**Spring**	**Summer**
EYFS	Although there is no statutory requirement to teach computing in Early Years the children are naturally surrounded by technology both at home and at school. During the EYFS children are able to use the interactive whiteboard and iPads to interact with age-appropriate games and use technology to create pictures. The children are able to begin exploring programming through the use of Beebots.		

Key Stage 1

Pupils should be taught to:

1. understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
2. create and debug simple programs
3. use logical reasoning to predict the behaviour of simple programs
4. use technology purposefully to create, organise, store, manipulate and retrieve digital content
5. recognise common uses of information technology beyond school
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.

Year 1	**Key concept/Skill:** Programming A – Moving a robot **Know how to:** Explain what a given command will do Act out a given word Combine 'forwards' and 'backwards' commands to make a sequence Combine four direction commands to make sequences Plan a simple program Find more than one solution to a problem	**Key concept/Skill:** Computing systems and networks – Technology around us **Know how to:** Identify technology Identify a computer and its main parts Use a mouse in different ways Use a keyboard to type on a computer Use the keyboard to edit text Create rules for using technology responsibly **Key questions:** What is technology?	**Key concept/Skill:** Data and Information: Grouping Data **Know how to:** Label objects Identify that objects can be counted Describe objects in different ways Count objects with the same properties Compare groups of objects Answer questions about groups of objects **Key questions:**	**Key concept/Skill:** Creating media – Digital painting **Know how to:** Describe what different freehand tools do Use the shape tool and the line tools Make careful choices when painting a digital picture Explain why I chose the tools I used Use a computer on my own to paint a picture compare painting a picture on a computer and on paper	**Key concept/Skill:** Creating media – Digital writing **Know how to:** Use a computer to write add and remove text on a computer Identify that the look of text can be changed on a computer Make careful choices when changing text Explain why I used the tools that I chose Compare typing on a computer to writing on paper	**Key concept/Skill:** Programming B – Programming Animations **Know how to:** **Choose a command for a given purpose** Show that a series of commands can be joined together Identify the effect of changing a value Explain that each sprite has its own instructions Design the parts of a project Use my algorithm to create a program Key questions:

	Key questions: How can simple commands to be used to control a robot? How can you use two different programs to get to the same place How do we identify and solve bugs in a simple program? **Key vocabulary:** Code, algorithm, debug, program **Links to Prior Learning:** Maths and geography – giving and following directions	What are the main parts of a computer? How do we use technology safely? **Key vocabulary:** Social media, communication, post, online, mouse, keyboard **Cross curricula links:** Use of the school tablets in lessons. **Links to prior learning:** E-safety discussions in EYFS. Use of technology at home.	Why does data require labels? How can objects be described? How can different objects be classified? **Key vocabulary:** Labels, data, objects, **Cross Curricular Links:** **Topic-** technology used for Space travel. Use of the school tablets in lessons. **Links to prior learning:** Use of technology at home and in EYFS.	**Key questions:** How can digital media be used to create a piece of artwork? Which digital tools can be used to draw electronically? How do we save work digitally to access it later? **Key vocabulary:** Paint, drawing tool, save, gallery **Cross curricular links:** Art (drawing), science (animals including humans) **Links to Prior Learning:** Use of IWB technology for drawing and designing.	**Key questions:** How can digital media be used to create text? How do you edit text on a digital device? How do we save work digitally to access it later? **Key vocabulary:** Text, font, edit	How can coding blocks be used to design and create a simple animation? What is the effect of changing a value? How do we identify and solve bugs in a simple program? **Key vocabulary:** Code, algorithm, debug, program **Links to Prior Learning:** Exploratino of the app 'Scratch Jr'
Year 2	**Key concept/Skill:** Computing systems and networks – IT around us **Know how to:** Recognise the uses and features of information technology Identify the uses of information technology in the school identify information technology beyond school Explain how information technology helps us	**Key concept/Skill:** Creating media – digital photography. **Know how to:** Use a digital device to take a photograph Make choices when taking a photograph Describe what makes a good photograph Decide how photographs can be improved Use tools to change an image Recognise that photos can be changed **Key questions:** How can a digital device be used to take a photograph? How can tools be used to change an image?	**Key concept/Skill:** Creating media – making music **Know how to:** Say how music can make us feel Identify that there are patterns in music Experiment with sound using a computer Use a computer to create a musical pattern Create music for a purpose review and refine our computer work **Key questions:** How can digital device be used to create music?	**Key concept/Skill:** Data and information - Pictograms **Know how to:** Recognise that we can count and compare objects using tally charts Recognise that objects can be represented as pictures Create a pictogram Select objects by attribute and make comparisons Recognise that people can be described by attributes Explain that we can present information using a computer **Key questions**	**Key concept/Skill:** Programming A – Robot algorithms **Know how to:** Describe a series of instructions as a sequence Explain what happens when we change the order of instructions Use logical reasoning to predict the outcome of a program Explain that programming projects can have code and artwork Design an algorithm	**Key concept/Skill:** Programming B – An introduction to quizzes **Know how to:** Explain that a sequence of commands has a start Explain that a sequence of commands has an outcome Create a program using a given design Change a given design Create a program using my own design Decide how my project can be improved **Key questions:**

	Explain how to use information technology safely Recognise that choices are made when using information technology **Key questions:** What are the features of information technology? How information technology helps us? How can you use information technology safely? **Key vocabulary:** Information technology, computer, devices, benefits, safely, responsibly	How can light and focus affect an image? **Key vocabulary:** Photographs, capture, edit, landscape, portrait, tools, improve	What is a musical pattern? How can I change the music I have created using a computer? **Key vocabulary:** Patterns, music, notes, digitally, sequence, pitch duration, rhythm	How can information be presented using a computer? How can an information be compared using a computer? How can a computer be used to create simple graphs and charts? **Key vocabulary:** Compare, tally charts, represented, pictograms, attribute, comparison WW	Create and debug a program that I have written **Key questions:** How can we use logical reasoning to predict the outcome of a program? How does the order of instructions affect the outcome of a computer program? Why is it important to test and debug a program that I have written? **Key vocabulary:** Algorithm, instructions, sequence, order, outcome, programming, debug	How can the outcome of a sequence of commands be predicted? How can we change the backgrounds and characters of a design? What is an algorithm? **Key vocabulary:** Sequence, commands, outcome, program, features, debug, algorithm
Key Stage 2 Pupils should be taught to: • design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts • use sequence, selection, and repetition in programs; work with variables and various forms of input and output • use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs • understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration • use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content • select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information • use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact						
Year 3	**Key concept/Skill:** Computing systems and networks – Connecting computers **Know how to:** Explain how digital devices function	**Key concept/Skill:** Creating media – Animation **Know how to:** Explain that animation is a sequence of drawings or photographs.	**Key concept/Skill:** Desktop Publishing **Know how to:** Recognise how text and images convey Information	**Key concept/Skill:** Data and information – Branching databases **Know how to:** Create questions with yes/no answers	**Key concept/Skill:** Programming A - Sequencing sounds **Know how to:** Explore a new programming environment	**Key concept/Skill:** Programming B – Events and actions **Know how to** Explain how a sprite moves in an existing project

	Identify input and output devices Recognise how digital devices can change the way that we work Explain how a computer network can be used to share information Explore how digital devices can be connected Recognise the physical components of a network **Key questions:** How does a digital device work? What parts make up a digital device? How are computers connected? **Key vocabulary:** Input, output, server, wireless networks components	Relate animated movement with a sequence of images Plan an animation identify the need to work consistently and carefully Review and improve an animation Evaluate the impact of adding other media to an animation **Key questions:** What is stop frame animation? How can I make a picture move? How do I add media and effects to animations? **Key vocabulary:** Frame, audio, media, animation	recognise that text and layout can be edited Choose appropriate page settings Add content to a desktop publishing publication Consider how different layouts can suit different purposes Consider the benefits of desktop publishing **Key questions:** Why is desktop publishing used in the real world? How do you add images and text to desktop publishing software? How do different layout suit different purposes? **Key vocabulary:** templates, orientation, placeholders.	Identify the attributes needed to collect data about an object Create a branching database Explain why it is helpful for a database to be well structured Plan the structure of a branching database Independently create an identification tool **Key questions:** What is a branching database? Why are databases useful in everyday life? What is an identification tool? **Key vocabulary:** branching database, identification tool,	Identify that commands have an outcome Explain that a program has a start Recognise that a sequence of commands can have an order Change the appearance of my project Create a project from a task description **Key questions:** What does an effective programme require? Why is the sequence of commands important? How do you change the appearance of the environment in the programme? **Key vocabulary:** Sequence, commands, sprites, backdrops.	Create a program to move a sprite in four directions Adapt a program to a new context Develop my program by adding features Identify and fix bugs in a program Design and create a maze-based challenge **Key questions:** What do you need to consider when creating a program for a new context? How do you move a sprite? How do you identify and fix bugs? **Key vocabulary:** Bug, sprite, extension blocks.

Year 4	**Key concept/ skills:** Computing systems and networks – the internet **Know how to:** Describe how networks physically connect to other networks. Recognise how networked devices make up the internet. Outline how websites can be shared via the World Wide Web (WWW). Describe how content can be added and accessed on the World Wide Web (WWW). Recognise how the content of the WWW is created by people. Evaluate the consequences of unreliable content. **Key questions:** What is the internet made of? What is a website? How do I know that I can trust the things I find on the internet? **Key vocabulary:** WWW Unreliable material Content Website Internet Network	**Key concept/ skills:** Creating media: audio editing **Know how to:** Identify the input and output devices used to record and play sound Explain that audio recordings can be edited. Recognise the different components of a podcast. Apply audio editing skills independently. Combine audio to enhance my podcast project evaluate the effective use of audio. **Key questions:** How can input and output devices be used to create digital content? How can audio recordings be edited? How can you combine a range of audio recordings to enhance a podcast? **Key vocabulary:** File Audio Editing Recording	**Key concept/ skills:** Programming A – repetition in shapes **Know how to:** Identify that accuracy in programming is important. Create a program in a text-based language. Explain what 'repeat' means. Modify a count-controlled loop to produce a given outcome. Decompose a task into small steps. Create a program that uses count-controlled loops to produce a given outcome. **Key questions:** Why is accuracy important when programming? How can a repeat command be used to simplify a program and make it shorter? Why is it important to break tasks down into smaller components when programming? How can a command **Key vocabulary:** Count-controlled loop Repeat Text-based language	**Key concept/ skills:** Data and information: data logging **Know how to:** Explain that data gathered over time can be used to answer questions Use a digital device to collect data automatically Explain that a data logger collects 'data points' from sensors over time Recognise how a computer can help us analyse data Identify the data needed to answer questions Use data from sensors to answer questions **Key questions:** Why is data collected over time? How can we use data loggers to collect information? How do you review data collected? **Key vocabulary:** Data Data points Digital device	**Key concept/ skills:** Creating media: photo editing **Know how to:** Explain that the composition of digital images can be changed Explain that colours can be changed in digital images Explain how cloning can be used in photo editing Explain that images can be combined combine images for a purpose Evaluate how changes can improve an image **Key questions** What changes can be made to a digital image? What is cloning? When is it inappropriate to edit / clone images? **Key vocabulary:** Composition Tools Cloning Rotate Resize	**Key concept/ skills:** Programming B: repetition in games **Know how to:** Develop the use of count-controlled loops in a different programming environment Explain that in programming there are infinite loops and count-controlled loops Develop a design that includes two or more loops which run at the same time Modify an infinite loop in a given program Design a project that includes repetition Create a project that includes repetition **Key questions:** How can shapes be created using count-controlled loops? How can loops be modified? How can you predict the output of a code? **Key vocabulary:** Repetition Infinite loop Count-controlled loop Algorithm

			Programming			

Year 5	**Key concept/Skill: Programming A –** Selection in Physical Computing **Know how to:** Control a simple circuit connected to a computer. Write a program that includes count-controlled loops Explain that a loop can stop when a condition is met. Explain that a loop can be used to repeatedly check whether a condition has been met. Design a physical project that includes selection To create a program that controls a physical computing project **Key questions:** How do I control a simple circuit connected to a computer? What is the role of a loop in a program? How do I create a program that controls a physical computing object? **Key vocabulary:** Loops, program, input, output, components. **Cross curricular links:** Creating a working playground carousel. Links to Victorian fairgrounds. **Links to Prior Learning:**	**Key concept/Skill: Computing systems and networks** – Sharing information **Know how to:** Explain that computers can be connected together to form systems Recognise the role of computer systems in our lives 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 **Key questions:** What is the role of computer systems in our lives? How do search engines select results? How are results ranked **Key vocabulary:** Search Engines, rank, Index, Web crawlers. **Links to Prior Learning:** Computer systems and network (year 4)	**Key concept/Skill: Creating media** – Video editing **Know how to:** Explain what makes a video effective/ identify digital devices that can record video. Capture video using a range of techniques. Create a storyboard. Identify that video can be improved through reshooting and editing. Consider the impact of the choices made when making and sharing a video **Key questions**: How do you record a video? What is a the role of a storyboard when createing a video? How do I edit and improve my video using editing software? **Key vocabulary:** Frame, Angles.	**Key concept/Skill: Creating media** – Vector drawing **Know how to** To identify that drawing tools can be used to produce different outcomes. Create a vector drawing by combining shapes, to use tools to achieve a desired effect, to recognise that vector drawings consist of layers. Group objects to make them easier to work with. Evaluate vector drawing.**:** **Key questions:** What is a vector drawing? What are layers within vector drawing software? How and why do I group objects? **Key vocabulary:** Vectors, layers, tools,	**Key concept/Skill: Data and information** – Flat-file databases **Know how to:** Use a form to record information. Compare paper and computer-based databases. Outline how grouping and then sorting data allows us to answer questions Explain that tools can be used to select specific data. Explain that computer programs can be used to compare data visually. Apply my knowledge of a database to ask and answer real-world questions **Key questions:** What are fields and records? How do I use tools within a database to select specific data? How do I use a database to answer questions? **Key vocabulary:** Fields, Records, Database, Sorting	**Key concept/Skill: Programming** B – Selection in quizzes **Know how to:** Explain how selection is used in computer programs. Relate that a conditional statement connects a condition to an outcome. Explain how selection directs the flow of a program. Design a program which uses selection. Create a program which uses selection. Evaluate my program **Key questions:** Why and how is selection used in computer programs? What is a conditional statement and outcome? How do I design a program which uses selection? **Key vocabulary:** Selection, algorithm, program, sequence, repetition Links to programming in year 3/4

	Science – Electricity (Year 4)					

Year 6	**Key concept/Skill: <u>Computing systems and networks – Communication</u>** **Know how to:** Explain the importance of internet addresses. Recognise how data is transferred across the internet Explain how sharing information online can help people to work together Evaluate different ways of working together online Recognise how we communicate using technology Evaluate different methods of online communication **Key questions:** How is data transferred across the internet? How does the internet enable people to work together? What are the different methods of online communication? **Key vocabulary:** Domain, server, IP address, data packets, networks, communication, collaboration.	**Key concept/Skill: <u>Creating media – 3D Modelling</u>** **Know how to:** Recognise that you can work in three dimensions on a computer Identify that digital 3D objects can be modified Recognise that objects can be combined in a 3D model Create a 3D model for a given purpose Plan my own 3D model create my own digital 3D model **Key questions:** How can computer software be used to create a 3D model? How do I combine multiple objects to create a 3D object? What are the benefits of grouping objects? **Key vocabulary:** 3D modelling, group, ungroup,rotate, perspective, resize, duplicate	**Key concept/Skill: <u>Creating media – Web page creation</u>** **Know how to:** review an existing website and consider its structure plan the features of a web page consider the ownership and use of images (copyright) recognise the need to preview pages outline the need for a navigation path recognise the implications of linking to content owned by other people **Key questions:** How do I create a website? What is HTML? What are copyright free-images? **Key vocabulary:** HTML, copyright, Navigation path, hyperlinks	**Key concept/Skill: <u>Data and information – Spreadsheets</u>** **Know how to:** Create a data set in a spreadsheet Build a data set in a spreadsheet Explain that formulas can be used to produce calculated data Apply formulas to data Create a spreadsheet to plan an event Choose suitable ways to present data **Key questions:** What is a spreadsheet? How can a spreadsheet be used to calculate? Why do different cells require different formats? **Key vocabulary:** Excel, spreadsheet, formula, cell, data, information, formatting, columns, rows	**Key concept/Skill: <u>Programming A – Variables in games</u>** **Know how to:** Define a 'variable' as something that is changeable Explain why a variable is used in a program Choose how to improve a game by using variables Design a project that builds on a given example Use my design to create a project Evaluate my project **Key questions:** What is a variable? How can variables improve a game? How do I test a code that I have written? **Key vocabulary:** variables, design, create, debug, sequence, repetition, input, output, algorithms, Scratch.	**Key concept/Skill: <u>Programming B – Sensing</u>** . **Know how to:** Create a program to run on a controllable device Explain that selection can control the flow of a program Update a variable with a user input Use a conditional statement to compare a variable to a value Design a project that uses inputs and outputs on a controllable device Develop a program to use inputs and outputs on a controllable device **Key questions:** How do I create a code which achieves the desire output? What are conditional statements? How are conditional statements used to direct the flow of a program? **Key vocabulary:** micro-bit, sequence, selection, repetition, variables, input, output, algorithms, conditional statement