| Computing at St Alban's CE Aided Primary (v01.24) |
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**Intention**

Computing at St Alban's school aims to give our pupils the life skills that will enable them to embrace and utilise all technology in a socially responsible and safe way. We want children to become autonomous, independent users of computing technologies, gaining confidence and enjoyment from their activities. We teach them to be digitally literate and competent end-users of technology and to develop creativity, resilience, problem-solving and critical thinking skills. The use of technology should be purposeful by supporting learning across the entire curriculum.

Our aim is to provide a broad and balanced curriculum whilst ensuring that pupils become digitally literate and digitally resilient. Technology is ever-evolving and we aim to develop pupils who can use their digital skills to express themselves and develop their ideas through, information and communication technology at a suitable level for the future workplace and as active participants in a digital world.

| Pupil approach: | Learning journey structure/steps |
| --- | --- |
| Working as computer scientists, pupils will:<br>• Identify and solve problems<br>• Create and design<br>• Use logical reasoning<br>• Think critically<br>• Be resilient<br>• Evaluate<br>• Communicate<br>• Use technology safely, respectfully and responsibly | Kapow Primary's Computing scheme of work has been designed as a spiral curriculum with the following key principles in mind:<br><br>✓ **Cyclical:** Pupils revisit the five key areas throughout KS1 and KS2.<br>✓ **Increasing depth:** Each time a key area is revisited, it is covered with greater complexity.<br>✓ **Prior knowledge:** Upon returning to each key area, prior knowledge is utilised so pupils can build on previous foundations rather than starting again.<br><br>Units within year groups can be taught in any order, with the exception of numbered units, which must be taught in the correct order e.g. Programming 1 followed by Programming 2. Any change in order needs to be approved by the subject leader prior to beginning teaching. |

| Teaching approach: non-negotiables for teachers | Key resources/documents for planning |
| --- | --- |
| • Each unit must begin with the completion of the Knowledge Catcher for that unit to establish a baseline of skills and knowledge.<br>• Lessons should be taught in the order they appear in this document and on the Kapow website.<br>• Before each lesson, staff should familiarise themselves with the software being used; watch the Teacher Video in Kapow and ensure any worksheets have been reviewed and printed.<br>• Individual lessons should follow the Kapow structure of:<br>    ○ Recap and Recall/Retrieval Practice (including vocabulary check)<br>    ○ Attention Grabber<br>    ○ Main Event<br>    ○ Wrapping Up<br>It should be noted that staff may condense or expand these sections to suit the needs of their class.<br>• Each unit should end with pupils completing the Unit Quiz. The method of delivery of this can be at the class teacher's discretion.<br>• Unplugged activities should be recorded and kept in an individual folder.<br>• All pupils should have access to the knowledge organiser for each unit to be kept in their folders.<br>• Each new unit should have a title page, Knowledge Catcher, Knowledge Organiser and End of Unit Quiz in one document. See Appendix 2 for example. | Computing Curriculum<br>• Kapow<br>• Education for a Connected World – 2020 Edition<br>• National curriculum in England: computing programmes of study.<br>• Computing Progression of Knowledge and Skills<br><br>E-safety Curriculum<br>• Kapow<br>• Supported with the PHSE Curriculum.<br>• Lee Haywood from Online Safety UK – 2 visits per year. |

## Implementation: Kapow's Alignment with the NC

The Kapow scheme of work fulfils the statutory requirements outlined in the **National curriculum (2014)**. The National Curriculum Programme of Study for Computing aims to ensure that all pupils:

Kapow has identified these three strands which run throughout our scheme of work:

★ 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.
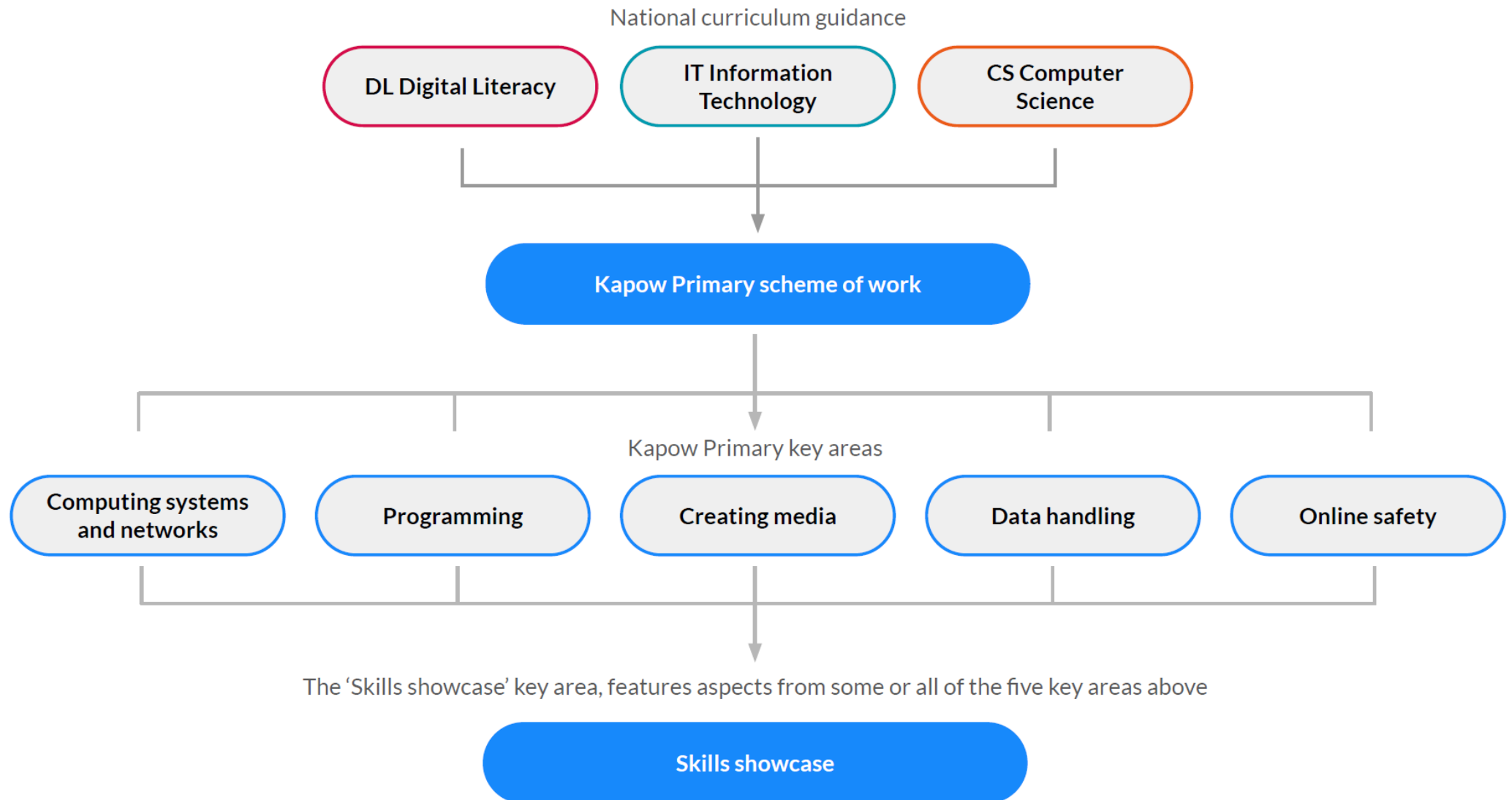
**Computer Science**

★ Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.

**Information Technology**

★ Are responsible, competent, confident and creative users of information and communication technology.

**Digital Literacy**

## Implementation: Organisaton of the Kapow Scheme of Work

National curriculum guidance

**DL Digital Literacy**

**IT Information Technology**

**CS Computer Science**

**Kapow Primary scheme of work**

Kapow Primary key areas

**Computing systems and networks**

**Programming**

**Creating media**

**Data handling**

**Online safety**

The 'Skills showcase' key area, features aspects from some or all of the five key areas above

**Skills showcase**

**Implementation: Key Areas of the Kapow Scheme of Work**

Kapow has categorised lessons into the five key areas below, which are returned to in each year group making it clear to see prior and future learning for pupils and how teaching fits into their wider learning journey.

| Computing systems and networks | Programming | Creating media | Data handling | Online safety |
|---|---|---|---|---|
| Identifying hardware and using software, while exploring how computers communicate and connect to one another. | Understanding that a computer operates on algorithms, and learning how to write, adapt and debug code to instruct a computer to perform set tasks. | Learning how to use various devices — record, capture and edit content such as videos, music, pictures and photographs. | Ensuring that information is collected, recorded, stored, presented and analysed in a manner that is useful and can help to solve problems. | Understanding the benefits and risks of being online — how to remain safe, keep personal information secure and recognising when to seek help in difficult situations. |

**Implementation: Skills Showcase Units in the Kapow Scheme of Work**

There are four units entitled Skills showcase. These units give children the chance to combine and apply skills and knowledge gained, from a range of the five key areas above, to produce a specific outcome.



Y1 - Rocket to the moon

Y4 - HTML

```
<h1> Heading </h1>
<h2> Heading 2 </h2>
<h3> Heading 3 </h3>
<h4> Heading 4 </h4>
<h5> Heading 5 </h5>
<h6> Heading 6 </h6>
```

Y5 - Mars Rover 2

Y6 - Inventing a product

# Implementation: Whole School Long-Term Plan – EYFS and KS1 (Kapow)

| | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
|---|---|---|---|---|---|---|
| Year 1 | **Computing systems and networks:** Improving mouse skills | **Programming 1:** Algorithms unplugged | **Skills showcase:** Rocket to the moon | **Programming 2:** Programming Bee-bots (virtual) | **Creating media:** Digital Imagery (Office 365) | **Data handling:** Introduction to data |
| E-safety | Using the internet safely | Online emotions | Always be kind and considerate | Posting and sharing online | How much time should we spend on technology? | |
| Year 2 | **Computing systems and networks 1:** What is a computer? | **Programming 1:** Algorithms and debugging | **Computing systems and networks 2:** Word processing | **Programming 2:** Programming: Scratch Jr | **Creating media:** Stop Motion: Tablet | **Data handling:** International Space Station |
| E-safety | How do I keep my things safe online? | How do I keep my things safe online? | It's my choice | | Is it true? | |
| Year 3 | **Computing systems and networks 1:** Networks and the internet | **Programming:** Scratch | **Computing systems and networks 2:** Emailing (Office 365) | **Computing systems and networks 3:** Journey inside a computer | **Creating media:** Video trailers (iPads) | **Data handling:** Comparison cards databases (Office 365) |
| E-safety | Beliefs, opinions and facts on the internet | Who should I ask? | When being online makes me upset | Sharing of information | Rules of social media platforms | |
| Year 4 | **Computing systems and networks:** Collaborative Learning (Office 365) | **Programming 1:** Further coding with Scratch | **Creating media:** Website design (Office 365) | **Skills showcase:** HTML | **Programming 2:** Computational thinking | **Data handling:** Investigating weather |
| E-safety | What happens when I search online? | How do companies encourage us to buy online? | Fact, opinion or belief? | What is a bot? | What is my #TechTimetable like? | |
| Year 5 | **Computing systems and networks:** Search engines | **Programming 1:** Programming music | **Data handling:** Mars Rover 1 | **Programming 2:** Micro:bit | **Creating media:** Stop motion animation | **Skills showcase:** Mars Rover 2 |
| E-safety | Online protection | Online communication | Online reputation | Online bullying | Online health | |
| Year 6 | **Computing systems and networks:** Bletchley Park (Office 365) | **Programming:** Intro to Python | **Data handling:** Big data 1 | **Creating media:** History of Computers | **Data handling:** Big data 2 | **Skills showcase:** Inventing a product |
| E-safety | Life online | Sharing online | Creating a positive online reputation | Capturing evidence | Password protection | Think before you click |

## Implementation: Medium Term Plan – Year 1 (Kapow)

### Autumn 1 - Computing Systems And Networks: Improving Mouse Skills

| Lessons | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: Logging in<br><br>L2: Click and drag skills<br><br>L3: Drawing shapes<br><br>L4: Drawing a story<br><br>L5: Self-portrait | • Learning how to explore and tinker with hardware to find out how it works.<br>• Learning where keys are located on the keyboard.<br>• Using a basic range of tools within graphic editing software.<br>• Developing control of the mouse through dragging, clicking and resizing of images to create different effects.<br>• Developing understanding of different software tools.<br>• Recognising devices that are connected to the internet.<br>• Logging in and out and saving work on their own account. | Log in<br>Login<br>Log out / off<br>Mouse<br>Mouse pointer<br>Click<br>Keyboard | Screen<br>Password<br>Account<br>Software<br>Duplicate<br>Ctrl<br>Tools<br>Right click | Menu<br>Layers<br>Username<br>Drag<br>Drag and drop<br>Digital photograph<br>Undo<br>Cursor |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Use computers more purposefully.<br>• Log in and navigate around a computer.<br>• Drag, drop, click and control a cursor using a mouse.<br>• Use software tools to create art on the computer. | • Using a keyboard and mouse confidently; predicting the function of different tools.<br>• Using more advanced tools such as menus to duplicate or snap tools to make artwork more symmetrical.<br>• Using accurately drawn shapes lined up inside each other; effectively using different styles and colours; using layers to add extra detail to their artwork.<br>• Logging in independently; using advanced tools such as layers to make their artwork more effective; discussing different tools and how they used each to alter their artwork.<br>• Supporting peers with logging in and out of computers; demonstrating easy use of the mouse; using various paint tools to create different effects. |

### Autumn 2 - Programming 1: Algorithms Unplugged

| Lessons | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: What is an algorithm?<br><br>L2: Algorithm pictures<br><br>L3: Virtual assistants<br><br>L4: Step by step<br><br>L5: Debugging directions | • To understand that an algorithm is when instructions are put in an exact order.<br>• To understand that decomposition means breaking a problem into manageable chunks and that it is important in computing.<br>• To understand that decomposition means breaking a problem into manageable chunks and that it is important in computing.<br>• To know that we call errors in an algorithm 'bugs' and fixing these 'debugging'. | Algorithm<br>Automatic<br>Bug<br>Chunks<br>Clear<br>Code<br>Debug<br>Decompose<br>Decomposition | Device<br>Directions<br>Input<br>Instructions<br>Manageable<br>Motion<br>Order<br>Organise<br>Output<br>Precise | Programming<br>Problem<br>Robot<br>Sensor<br>Sequence<br>Solution<br>Specific<br>Steps<br>Tasks<br>Virtual assistant |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Explain what an algorithm is.<br>• Write clear algorithms.<br>• Follow an algorithm.<br>• Explain what inputs and outputs are. | • Give detailed feedback to other groups and suggesting ways of improving their algorithms; explain why algorithms need to be precise; giving real-life examples of algorithms.<br>• Use clearer, more detailed algorithms; follow an algorithm precisely; explaining why it is important that algorithms are clear and precise. |

| | |
|---|---|
| • Create an achievable program. | • Recognise that some devices can be inputs and outputs; suggest where input and output devices might be found. |
| • Decompose a design into steps. | • Match up the designs with the decompositions and a clear decomposition of their design. |
| • Identify bugs in an algorithm and how to fix them. | • Create algorithms (and the correct answers) to match their own maps. |

## Spring 1 - Skills Showcase: Rocket To The Moon

| | |
|---|---|
| L1: Rocket materials | **Key knowledge for this unit** |
| L2: Rocket design | • To know that when we create something on a computer it can be more easily saved and shared than a paper version. |
| L3: Rocket building instructions | • To know some of the simple graphic design features of a piece of online software. |
| L4: Making a rocket | • To know that a spreadsheet is an electronic 'table' for sorting data. |
| L5: Making a rocket | |

| Key Vocabulary | | |
|---|---|---|
| Annotate | Document | Program |
| Cells | E-document | Order |
| Components | Edit | Robot |
| Create | Editing program | Save |
| Data | Evaluate | Sequence |
| Debug | Folder | Share |
| Designing | Input | Software |
| Digital content | Instructions | Spreadsheet |
| Digital image | Log in | Table |
| | Photo | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Use a computer to make a list | • Use more appropriate language when comparing the different forms of digital content, eg: text/images/audio, and explaining the advantages and disadvantages of each. Research different ways of making rockets. |
| • Explain the benefits of making a list on the computer | • Create a detailed design for a rocket on graphics editing software that could be printed. |
| • Use a basic range of tools on graphics editing software to design a rocket | • Suggest what they would program the rocket to do to help them find out more about the moon; demonstrate an understanding of algorithms and how to give clear, unambiguous instructions. |
| • Sequence instructions | |
| • Follow instructions to build their model rocket | • Take photos of their finished rocket and annotating it with how they would improve upon it. |
| • Input data about their rockets into a table or spreadsheet | • Compare data in a spreadsheet and explaining their interpretations. |

## Spring 2 - Programming 2: Programming Bee-Bots (Virtual)

| | |
|---|---|
| L1: Getting to know a virtual device | **Key knowledge for this unit** |
| L2: Making a virtual Bee-Bot video | • To understand the basic functions of a virtual Bee-Bot. |
| L3: Precise instructions | • To know that you can use a camera/tablet to make simple videos. |
| L4: Bee-Bot world virtual | • To know that algorithms move a virtual Bee-Bot accurately to a chosen destination. |
| L5: Bee-Bot adventures | |

| Key Vocabulary | | |
|---|---|---|
| Algorithm | Demonstration | Predict |
| Artificial intelligence | Emulator | Program |
| Bee-Bot | Filming | Tinker |
| Clear | Inputting | Video |
| Code | Instructions | Video recording |
| Debug | Pause | Virtual |
| | Precise | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • To understand the basic functions of a virtual Bee-Bot. | • Recognise the cause and effect of the buttons they press to move the Bee-Bot or the choices they make and explain these; show links to other technology in the real world, for example, cross usually means delete, or arrows usually mean move forwards; explain how they used their first try to help them on their second try. |
| • To know that you can use a camera/tablet to make simple videos. | • Explain how to make the video clearer for the audience; change the focus, for example using a different map for the Bee- |

| | |
|---|---|
| • To know that algorithms move a virtual Bee-Bot accurately to a chosen destination. | Bot to do a demonstration.<br>• Predict and planning an increasing number of steps. Correct instructions that do not work first time.<br>• Discuss the most efficient route with as few steps as possible; avoid obstacles.<br>• Show an awareness of route efficiency; suggest alternative routes. |

## Summer 1 - Creating Media: Digital Imagery (Office 365)

| L1: Planning a photo story | **Key knowledge for this unit** | **Key Vocabulary** | Drag and drop | Photograph |
|---|---|---|---|---|
| | • To understand that holding the camera or device still and considering angles and light are important to take good pictures. | Background | Edit | Resize |
| L2: Taking photos | | Blurred | Editing software | Save as |
| | • To know that you can edit, crop and filter photographs. | Camera | Filter | Screen |
| L3: Editing photos | • To know how to search safely for images online. | Clear | Image | Search engine |
| | | Crop | Import | Sequence |
| L4: Searching for images | | Delete | Internet | Software |
| | | Device | Keyword | Storage space |
| | | Digital camera | Online | Visual effects |
| L5: Photo collage | | Download | | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Plan a pictorial story using photographic images in sequence.<br>• Explain how to take clear photos.<br>• Take photos using a device.<br>• Edit photos by cropping, filtering and resizing.<br>• Search for and import images from the internet.<br>• Explain what to do if something makes them uncomfortable online.<br>• Organise images on the page, orientating where necessary. | • Explain how their photos will show their story. Discuss where characters will be placed.<br>• Explain what they've done to make their photos clearer; describe what creates a blurred photo. Understand that zooming in creates a lower quality image and it is better to get physically closer when possible.<br>• Suggest reasons for changing photos. Experiment with a range of image editing tools.<br>• Resize images appropriate to scale, e.g. A tree isn't smaller than a dinosaur; understand the importance of using a png file.<br>• Consider the layout; resize and add decoration appropriately. |

## Summer 2 - Data Handling: Introduction To Data

| L1: Zoo data | **Key knowledge for this unit** | **Key Vocabulary** | Data collection | Pictogram |
|---|---|---|---|---|
| | • To know that charts and pictograms can be created using a computer. | Bar chart | Data record | Pie chart |
| L2: Picture data | • To understand that a branching database is a way of classifying a group of objects. | Block graph | Data representation | Process |
| | | Branching database | Edit | Record |
| L3: Minibeast hunt | • To know that computers understand different types of 'input'. | Categorise | Input | Resize |
| | | Chart | Keyboard | Sort |
| | | Click and drag | Line graph | Table |
| L4: Animal branching databases | | Compare | Mouse | Tally |
| | | Count | Information | Values |
| L5: Inventions | | Data | Label | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Represent animal-themed data in different ways, using objects and technology. | • Represent data in a variety of organised ways, allowing them to quickly find the relevant information to answer questions; discuss the positives and negatives of different data representations. |

| | |
|---|---|
| <ul><li>Log in and use mouse and keyboard skills to navigate the computer.</li><li>Represent the same data as a pictogram and a table or chart.</li><li>Collect data about minibeasts using a tally chart and represent their data digitally.</li><li>Click and drag objects to sort data using a branching database.</li><li>Consider the types of input that would be used to gather different forms of data when designing an invention.</li></ul> | <ul><li>Explore Sketchpad's features independently and including further appropriate labels for their pictogram.</li><li>Record the number of minibeasts they find in a structured, organised way (e.g. tally chart) and represent this data in multiple ways.</li><li>Play 20 questions independently with a peer and develop questions that lead to the correct answer quickly.</li><li>Explain and annotate their design in detail, demonstrating an understanding of various different forms of input and experiment with different fonts and colours.</li></ul> |

## E-saftey

| | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: Using the internet safely | <ul><li>To know that the internet is many devices connected to one another.</li><li>To know what to do if you feel unsafe or worried online – tell a trusted adult.</li><li>To know that people you do not know on the internet (online) are strangers and are not always who they say they are.</li><li>To know that to stay safe online it is important to keep personal information safe.</li><li>To know that 'sharing' online means giving something specific to someone else via the internet and 'posting' online means placing information on the internet.</li></ul> | app | kindness | report |
| | | appropriate | offline activity | responsible digital citizen |
| L2: Online emotions | | device | online activity | screen time |
| | | digital footprint | online experience | sharing online |
| L3: Always be kind and considerate | | feelings | online interactions | stranger |
| | | going online | online safety | technology |
| L4: Posting and sharing online | | in-person interactions | personal information | trusted adult |
| | | internet | pop-up | unkind |
| L5: How much time should we spend on technology? | | | posting online | website |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| <ul><li>Explain what is meant by online information.</li><li>Recognise what information is safe to be shared online.</li><li>Explain why we need passwords and what makes a strong password.</li><li>Understand that they need to ask permission before sharing content online and explain why.</li><li>Understand that they have the right to deny their permission to information about them being shared online.</li><li>Say who they can ask for help with online worries.</li><li>Use some strategies to work out if online information is reliable or not.</li></ul> | <ul><li>Explain the pros and cons of online activities (such as the affect they can have on their eyes and feelings); describe signs that someone might be spending too much time looking at screens; recommend ways other people can balance their screen time.</li><li>Explain how internet use may affect mood or emotions; can name a trusted adult and clearly describe how they can help with online problems; explain how to stay safe and happy when using the internet.</li><li>Identify ways in which kindness can be shown in both the online and real-world; explain how kindness can be shown in their everyday lives.</li><li>Identify rules to help others avoid sharing or posting inappropriate information; set some rules for their own internet activities.</li><li>Explain the pros and cons of online activities (such as the affect they can have on their eyes and feelings); describe signs that someone might be spending too much time looking at screens; recommend ways other people can balance their screen time.</li></ul> |

# Implementation: Medium Term Plan – Year 2 (Kapow)

## Autumn 1 - Computing Systems And Networks 1: What Is A Computer?

| Lessons | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: Computer parts<br><br>L2: Inputs<br><br>L3: Technology safari<br><br>L4: Invention<br><br>L5: Real-world role play | • Name some computer peripherals and their function.<br>• Recognise that buttons cause effects.<br>• Explain that technology follows instructions.<br>• Recognise different forms of technology.<br>• Design an invention which includes inputs and outputs.<br>• Explain the role of computers in the world around them. | Battery<br>Buttons<br>Camera<br>Computer<br>Desktop<br>Device<br>Digital<br>Digital recorder | Electricity<br>Function<br>Input<br>Invention<br>Keyboard<br>Laptop<br>Monitor<br>Mouse<br>Output | Paying till<br>Scanner<br>Screen<br>System<br>Tablet<br>Technology<br>Video<br>Wires |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Name some computer peripherals and their function.<br>• Recognise that buttons cause effects.<br>• Explain that technology follows instructions.<br>• Recognise different forms of technology.<br>• Design an invention which includes inputs and outputs.<br>• Explain the role of computers in the world around them. | • Identify how to operate a computer that does not have the same peripherals, e.g. a tablet.<br>• Suggest how we know technology is doing what we want it to, i.e. outputs.<br>• Give a more detailed explanation about what different technology does.<br>• Add clear labels and explanations to their design.<br>• Suggest how the computers are connected in different contexts. |

## Autumn 2 - Programming 1: Algorithms And Debugging

| Lessons | Key knowledge for this unit | Key Vocabulary | |
|---|---|---|---|
| L1: Dinosaur algorithm<br><br>L2: Machine learning<br><br>L3: Through the maze<br><br>L4: Making maps<br><br>L5: Unplugged debugging | • To understand what machine learning is and how it enables computers to make predictions.<br>• To know that loops in programming are where you set a certain instruction (or instructions) to be repeated multiple times.<br>• To know that abstraction is the removing of unnecessary detail to help solve a problem. | Abstraction<br>Algorithm<br>Artificial intelligence<br>Bug<br>Clear<br>Correct<br>Data | Debug<br>Decompose<br>Error<br>Key features<br>Loop<br>Predict<br>Unnecessary |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Decompose a game to predict the algorithms.<br>• Give a definition for 'decomposition'.<br>• Write clear and precise algorithms.<br>• Create algorithms to solve problems.<br>• Use loops in their algorithms to make their code more efficient. | • Give accurate predictions of the algorithms behind the game; give a detailed explanation of decomposition.<br>• Explain why algorithms need to be clear and precise; explain the best way to do this by referencing parts of their own algorithms.<br>• Explain their chosen algorithms clearly; use loops to make the algorithm more efficient.<br>• Discuss the level of abstraction (e.g. Too much/too little detail); justify the level of detail in their plans. |

| • Explain what abstraction is. | • Understand that the instructions are an important part of debugging; explain how the 'computers' needed the 'programmers' to be correct in their algorithmic construction for the processes to work correctly. |
|---|---|

## Spring 1 - Computing Systems And Networks 2: Word Processing

| L1: Getting to know the keyboard | **Key knowledge for this unit** | **Key Vocabulary** | Home screen | Paste |
|---|---|---|---|---|
| L2: Getting started with word processing | • To know that touch typing is the fastest way to type. | Backspace | Image | Redo |
| | • To know that I can make text a different style, size and colour. | Bold | Import | Search |
| | • To know that "copy and paste" is a quick way of duplicating text. | Copy | Italics | Space bar |
| L3: Newspaper writer | | Copyright | Keyboard | Text |
| | | Cut | Keyboard character | Text effects |
| L4: Poetry book | | Delete | Keyboard shortcut | Touch typing |
| | | Forward button | Keyword | Underline |
| | | Highlight | Layout | Undo |
| L5: Digital writer | | Home row | Navigate | Word processing |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Explain which are the home row keys and how to find them for typing. | • The ability to type words with increasing confidence and a faster rate. |
| • Use the spacebar and backspace correctly. | • Use keyboard shortcuts to confidently make changes to text; understand a large selection of word processing tools and having the confidence to experiment. |
| • Type and make simple alterations to text using buttons on a word processor. | • Use a wide variety of modifications to text including using keyboard shortcuts, bold and italic text, multiple images or even adding a second page to their article. |
| • Search for, import and alter appropriate images for a text document. | • Use keyboard shortcuts confidently to create a document which features a broad range of different edited features; credit source materials and explaining the importance of this. |
| • Modify text in a document. | • Include multiple images with a clear layout as well as adding a link to a website which is relevant to the topic of their writing. |
| • Use copy and paste to copy text from one document to another. | |
| • Explain what information is safe to be shared online. | |

## Spring 2 - Programming 2: Programming: Scratch Jr

| L1: Using ScratchJr | **Key knowledge for this unit** | **Key Vocabulary** | Icon |
|---|---|---|---|
| | • To know that coding is writing in a special language so that the computer understands what to do. | Algorithm | Imitate |
| L2: Creating an animation | | Animation | Instructions |
| | • To understand that the character in ScratchJr is controlled by the programming blocks. | Blocks | Loop |
| L3: Making a musical instrument | | Bug | 'On tap' |
| | • To know that you can write a program to create a musical instrument or tell a joke. | Button | Programming |
| L4: Programming a joke | | CGI | Repeat |
| | | Computer code | ScratchJR |
| | | Code | Sequence |
| L5: 'The Three Little Pigs' algorithms | | Debug | Sound recording |
| | | Fluid | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Explore a new application independently. | • Explain what the different colours of the blocks mean; describe how they used their first try to help them on their second try. |
| • Explain what the blocks on ScratchJr do and use them for a purpose. | |

- Recognise a loop in coding and why it is useful.
- Use a code to create an animation of an animal moving.
- Use code to follow and create an algorithm.
- Program code to run 'on tap'.
- Explain the role of the blocks in a program they have created.

- Describe how different combinations of blocks created a more realistic movement for that animal.
- Include more visual clues, to show that the musical instrument is playing.
- Use loops or numbers to use fewer blocks in a program.
- Recognise the pattern from one little pig to the other (for example, the code would be the same); apply the algorithm for one and using it to start programming the second part of the story.

## Summer 1 - Creating Media: Stop Motion: Tablet

| | | | |
|---|---|---|---|
| L1: What is animation?<br><br>L2: What is stop motion?<br><br>L3: My first animation<br><br>L4: Planning my project<br><br>L5: Creating my project | **Key knowledge for this unit**<br>• To understand that an animation is made up of a sequence of photographs.<br>• To know that small changes in my frames will create a smoother looking animation.<br>• To understand what software creates simple animations and some of its features e.g. onion skinning. | **Key Vocabulary**<br>Animation<br>Background<br>Decompose<br>Digital device<br>Drawing<br>Flipbook | Frames<br>Moving images<br>Object<br>Onion skinning<br>Plan<br>Still images |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Create a flip book animation.<br>• Decompose a story into smaller parts to plan a stop motion animation.<br>• Create stop motion animations with small changes between images. | • Create a flip book animation of a balloon which changes sizes and include another object e.g. a pin to pop it.<br>• Create a fluid animation between the frames.<br>• Create a short stop motion with small changes between images ensuring the background and tablet remains still between frames.<br>• Plan out an animation with two objects.<br>• Create an animation that includes two objects which both move between individual frames. The animation should be fluid and coherent. |

## Summer 2 - Data Handling: International Space Station

| | | | | |
|---|---|---|---|---|
| L1: Homes in space<br><br>L2: Space bag<br><br>L3: Warmer, colder<br><br>L4: Experiments in space<br><br>L5: Goldilocks planets | **Key knowledge for this unit**<br>• To understand that you can enter simple data into a spreadsheet.<br>• To understand what steps you need to take to create an algorithm.<br>• To know what data to use to answer certain questions.<br>• To know that computers can be used to monitor supplies. | **Key Vocabulary**<br>Algorithm<br>Astronaut<br>Data<br>Digital<br>Digital content<br>Experiment<br>Galaxy | Insulation<br>Interactive map<br>International Space Centre<br>International Space Station<br>Interpret<br>Laboratory | Monitor<br>Planet<br>Satellite<br>Sensor<br>Space<br>Temperature<br>Thermometer<br>Water reservoir |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Describe and explain how astronauts' survival needs are met aboard the ISS. | • Use the digital map efficiently to extract specific information about how astronauts live aboard the space station; consider other ways to help create a home in space.<br>• Draw items that cover a range of human needs, including food, water, oxygen, exercise equipment, cleaning, |

| | |
|---|---|
| • Identify and digitally draw items which fulfil basic human needs when aboard the ISS.<br>• Read the correct temperature on a thermometer.<br>• Design a display showing everything that needs to be monitored by sensors on the ISS.<br>• Create an algorithm that addresses all plants' needs.<br>• Explain how space exploration can benefit life on Earth.<br>• Read data to identify whether a planet might be habitable. | and clothing; consider how a computer could monitor what is used on the ISS and how this information could be used.<br>• Take accurate readings from a thermometer and comparing the temperature to that on the ISS; explain the importance of sensors and data collection; create a clear display to show how conditions would be monitored.<br>• Create an algorithm that includes the use of sensors to collect data; suggest more ideas for how space exploration could benefit life on Earth.<br>• Explain why water is essential to life and what would happen if the temperature were too high or low; identify whether a planet might be habitable by reference to both temperature and size. |

| E-saftey | | | | |
|---|---|---|---|---|
| L1: How do I keep my things safe online?<br><br>L2: How do I keep my things safe online?<br><br>L3: It's my choice<br><br>L4: Is it true? | **Key knowledge for this unit**<br>• To understand the difference between online and offline.<br>• To understand what information I should not post online.<br>• To know how to create a strong password.<br>• To know that you should ask permission from others before sharing about them online and that they have the right to say 'no.'<br>• To understand that not everything I see or read online is true. | **Key Vocabulary**<br>accepting<br>consent<br>denying permission<br>fake<br>giving permission<br>offline | online<br>password<br>permission<br>personal information<br>pop-up<br>pressure | private information<br>real<br>reliable<br>sharing online<br>source<br>trusted adult |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Explain what is meant by online information.<br>• Recognise what information is safe to be shared online.<br>• Explain why we need passwords and what makes a strong password.<br>• Understand that they need to ask permission before sharing content online and explain why.<br>• Understand that they have the right to deny their permission to information about them being shared online.<br>• Say who they can ask for help with online worries.<br>• Use some strategies to work out if online information is reliable or not. | • Explain that we can keep ourselves safe online by controlling how much detail we share in our posts (for example, sharing a picture of the skatepark is safe for John, but tagging the location is sharing too much information); share ideas about permissions and consent.<br>• Understand why we use passwords to secure our devices; identifying strategies for creating a strong password; explain the difference between personal and private information; discuss the implications of not keeping private information secure.<br>• Provide examples of when they may want to deny their permission; understand the importance of asking a trusted adult before clicking 'accept'.<br>• Explain strategies for checking the reliability of information they find online; explain reasons why people might post false information online. |

# Implementation: Medium Term Plan – Year 3 (Kapow)

## Autumn 1 - Computing Systems And Networks 1: Networks And The Internet

| | Key knowledge for this unit | Key Vocabulary | |
|---|---|---|---|
| L1: What is a network?<br><br>L2: A file's journey<br><br>L3: How a website works<br><br>L4: Routers<br><br>L5: What is packet data? | • To understand that a network is a group of interconnected devices.<br>• To know the components that make up a network (Wireless access point/WAP, Network switch, Router, Server and devices).<br>• To know that a server is central to a network and responds to requests made.<br>• To know that the internet connects all the networks around the world.<br>• To know that a router connects us to the internet.<br>• To know what a packet is and why it is important for website data transfer. | device<br>file<br>internet<br>network<br>network switch<br>packet data<br>router | server<br>the cloud<br>user<br>WiFi<br>wired<br>wireless<br>wireless access point |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Recognise that a network is two or more devices connected and its purpose.<br>• Identify key components that make up the school's network.<br>• Explain the difference between wired and wireless connections.<br>• Recognise that files are saved on a server.<br>• Understand the role of the server in a network when requesting a website.<br>• Identify parts of a website's journey to reach your computer.<br>• Recognise that routers connect to send information.<br>• Understand that data is broken into packets. | • Explain why networks are used and what they are used for; link their learning to the wider world.<br>• Explain how real-life network situations work and identifying more examples than the ones explored in the lesson; begin to consider problems that may occur in a network and how these are dealt with.<br>• Acknowledge that a website is a sent file; explain the role of each part of the network in the journey of a website including the role of the cloud.<br>• Suggest ways in which websites could load more quickly, e.g. The server being in a fast connection area or having multiple servers.<br>• Explain how data is transferred and the role of the router within this process; identify why data is broken into packets. |

## Autumn 2 - Programming: Scratch

| | Key knowledge for this unit | Key Vocabulary | |
|---|---|---|---|
| L1: Tinkering with Scratch<br><br>L2: Using loops<br><br>L3: Making an animation<br><br>L4: Storytelling<br><br>L5: Programming a game | • Scratch is a programming language and some of its basic functions.<br>• How to use loops to improve programming.<br>• How decomposition is used in programming.<br>• That you can remix and adapt existing code. | algorithm<br>animation<br>application<br>code<br>code block<br>debug<br>decompose<br>game<br>interface | loop<br>predict<br>program<br>remixing code<br>repetition code<br>review<br>Scratch<br>sprite<br>tinker |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Explain what some of the blocks do in Scratch.<br>• Explain what a loop is and include one in their program. | • Explain a wider range of blocks from different groups.<br>• Recognise how the project can be made clearer by adding visual clues to sprites. |

| | |
|---|---|
| • Suggest possible additions to an existing program by remixing code.<br>• Recognise where something on screen is controlled by code.<br>• Use a systematic approach to find bugs.<br>• Understand the definitions of decomposition and algorithm and how they are used to create accurate code. | • Use less common blocks, such as 'sensing'; improve their code without further support and with greater independence.<br>• Add more instructions at each stage (e.g. Sound effects); control more sprites.<br>• Begin to form algorithms independently by completing challenge activities (see resource: robot bop remix – challenge). |

## Spring 1 - Computing Systems And Networks 2: Emailing (Office 365)

| L1: Communicating with technology<br><br>L2: Sending an email<br><br>L3: Adding attachments<br><br>L4: Be kind online<br><br>L5: Fake emails | **Key knowledge for this unit**<br>• To understand that email stands for 'electronic mail.'<br>• To know that an attachment is an extra file added to an email.<br>• To understand that emails should contain appropriate and respectful content.<br>• To know that cyberbullying is bullying using electronics such as a computer or phone. | **Key Vocabulary**<br>Attachment<br>Bcc (Blind carbon copy)<br>Cc (Carbon copy)<br>Compose<br>Content<br>Cyberbullying<br>Document<br>Domain<br>Download<br>Email | Email account<br>Email address<br>Emoji<br>Emotions<br>Fake<br>Font<br>Genuine<br>Hacker<br>Icons<br>Inbox<br>Information | Link<br>Log in<br>Log out<br>Negative language<br>Password<br>Personal information<br>Positive language<br>Reply<br>Responsible digital citizen<br>Scammer | Settings<br>Send<br>Sign in<br>Spam email<br>Subject bar<br>Theme<br>Tone<br>Username<br>Virus<br>WiFi |

| | |
|---|---|
| Pupils who are **secure** will be able to:<br>• Log in and out of email.<br>• Send a simple email with a subject plus 'To' and 'From' in the body of the text.<br>• Edit an email.<br>• Type in the email address correctly and send the email.<br>• Add an attachment to an email.<br>• Write an email using positive language, with an awareness of how it will make the recipient feel.<br>• Recognise unkind behaviour online and know how to report it.<br>• Offer advice to victims of cyberbullying.<br>• Recognise when an email may be fake and explain how they know. | Pupils working at **greater depth** indicated by:<br>• Explain how technology has evolved and how we use technology today. Write an email that uses a tone of voice which is appropriate for the chosen recipient.<br>• Send and reply to emails; think carefully about the content of their message to ensure they are using appropriate language.<br>• Understand how to use more than one attachment including images and hyperlinks.<br>• Use editing tools within their email account to add safe hyperlinks and alter text appearance.<br>• Explain in their emails how to avoid scammers as well as showing a clear understanding of how to avoid fake emails. |

## Spring 2 - Computing Systems And Networks 3: Journey Inside A Computer

| L1: Inputs and outputs<br><br>L2: Building a paper laptop<br><br>L3: Following instructions<br><br>L4: Computer memory | **Key knowledge for this unit**<br>• To know the roles that inputs and outputs play on computers.<br>• To know what some of the different components inside a computer are e.g. CPU, RAM, hard drive, and how they work together. | **Key Vocabulary**<br>Algorithm<br>Assemble<br>CPU (central processing unit)<br>Data<br>Decompose<br>Desktop | GPU (graphics processing unit)<br>Hard drive HDD (hard disk drive)<br>Infinite loop<br>Input<br>Keyboard<br>Laptop | Microphone<br>Monitor<br>Mouse<br>Output<br>Photocopier<br>Program<br>QR Code | RAM (random access memory)<br>ROM (read only memory)<br>Storage<br>Tablet device<br>Technology<br>Touchscreen |

| L5: Dismantling a tablet | • To know what a tablet is and how it is different from a laptop/desktop computer. | Disassemble | Memory | Touchpad |
|---|---|---|---|---|

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Recognise inputs and outputs and that the computer sends and receives information.<br>• Explain that the parts of a laptop work together and the purpose of each part.<br>• Explain what an algorithm is.<br>• Suggest what memory is for inside a computer.<br>• Make comparisons between different types of computer. | • Explain, with little support, the instructions that are being sent and received.<br>• Suggest how the parts work together and what messages they send to each other.<br>• Give a clear explanation of the link between activity and computer part.<br>• Suggest how memory works with the cpu to control the computer; explain the connection between different parts.<br>• Explain what each component does. |

## Summer 1 - Creating Media: Video Trailers (iPads)

| L1: Planning a book trailer<br><br>L2: Filming<br><br>L3: Editing the trailer<br><br>L4: Transitions and text<br><br>L5: Video reviews | **Key knowledge for this unit**<br>• To know that different types of camera shots can make my photos or videos look more effective.<br>• To know that I can edit photos and videos using film editing software.<br>• To understand that I can add transitions and text to my video. | **Key Vocabulary**<br>Application<br>Camera angle<br>Clip<br>Cross dissolve<br>Edit<br>Fade to black<br>Fade to white<br>Film | Film editing software<br>Graphics<br>Import<br>Key events<br>Music<br>Photo<br>Plan<br>Recording<br>Slide | Sound effects<br>Storyboard<br>Time code<br>Trailer<br>Transition<br>Video<br>Voiceover<br>Wipe |
|---|---|---|---|---|

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Describe the purpose of a trailer.<br>• Create a storyboard for a book trailer.<br>• Consider camera angles when taking photos or videos.<br>• Import videos and photos into film editing software.<br>• Add text to a video.<br>• Incorporate transitions between images.<br>• Evaluate their own and others' trailers. | • Create a detailed storyboard for their book trailer from the main character's perspective, understand their audience and the purpose of the trailer as well as describing the impact of music and sound effects.<br>• Use a range of camera angles to film scenes for their trailer and planning relevant sound effects, voiceovers and music to match.<br>• Import videos and photos into film editing software; incorporate text into their video to provide context on what is happening on the screen.<br>• Add text to their trailer at relevant times and incorporating a variety of transitions between shots.<br>• Share ideas for the success criteria for both book trailers and videos in general, based on book trailers they have seen; share ideas on how to recommend books to others. |

## Summer 2 - Data Handling: Comparison Cards Databases (Office 365)

| L1: Records, fields and data<br><br>L2: Race against the computer<br><br>L3: Sorting and filtering | **Key knowledge for this unit**<br>• To know that a database is a collection of data stored in a logical, structured and orderly manner.<br>• To know that computer databases can be useful for sorting and filtering data. | **Key Vocabulary**<br>Categorise<br>Category<br>Chart<br>Data<br>Database | Graph<br>Information<br>Interpret<br>PDF<br>Questionnaire<br>Record |
|---|---|---|---|

| L4: Representing data | • To know that different visual representations of data can be made on a computer. | Excel<br>Fields<br>Filter | Representation<br>Sort<br>Spreadsheets |
|---|---|---|---|
| L5: Planning a holiday | | | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Explain what is meant by 'field,' 'record,' and 'data.'<br>• Compare paper and computerised databases.<br>• Put values into a spreadsheet.<br>• Sort, filter and interpret data in a spreadsheet.<br>• Create a graph on Microsoft Excel.<br>• Explain the purpose of visual representations of data. | • Efficiently scan a field for relevant information and comparing numbers; consider other ways of comparing the information on the cards.<br>• Independently create a list of the advantages and disadvantages of computerised and paper databases.<br>• Create an online set of questions about the data that demonstrates a secure understanding of the data and why it is useful to sort and filter by different values.<br>• Create multiple graphs and describing the advantages and disadvantages of each as well as interpreting the information quickly and easily.<br>• Conduct a range of different searches independently and comparing the information to reach their own conclusions. |

| E-saftey |
|---|

| L1: Beliefs, opinions and facts on the internet | **Key knowledge for this unit**<br>• That not everything on the internet is true: people share facts, beliefs and opinions online.<br>• The internet can affect people's moods and feelings.<br>• Privacy settings limit who can access important personal information, such as names, ages, gender etc.<br>• What social media is and that age restrictions apply. | **Key Vocabulary**<br>accurate<br>age restrictions<br>autocomplete<br>belief<br>charity<br>content<br>digital device | fact<br>fake news<br>hoax<br>internet<br>internet of things<br>opinion<br>online emotions<br>organisation | permission<br>privacy settings<br>reliable<br>search<br>search engine<br>share<br>smart devices<br>social media platforms |
|---|---|---|---|---|
| L2: Who should I ask? | | | | |
| L3: When being online makes me upset | | | | |
| L4: Sharing of information | | | | |
| L5: Rules of social media platforms | | | | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Differentiate between fact, opinion and belief online.<br>• Explain how to deal with upsetting online content.<br>• Recognise that digital devices communicate with each other to share personal information.<br>• Explain what social media platforms are used for.<br>• Recognise why social media platforms are age-restricted. | • Recognise that not everything we read online is true; knowing how to look for whether a source of information is reliable.<br>• Think critically about the content they share about themselves and others and how it makes them feel; explain why they should seek permission of the person the content is about or ask their own guardian if it is about themselves.<br>• Identify organisations, charities and helplines that can provide advice when a trusted adult is not available; explain how different strategies can help in dealing with upsetting issues.<br>• Recognise how devices communicate with the internet to provide information and data; identify examples of devices (e.g. Supermarkets, smart motorways etc.).<br>• Understand the age restrictions of social media platforms; articulate why these restrictions are in place; identify the available features of social media platforms (e.g. Live chat, instant messaging and picture sharing) on a range of sites online. |

# Implementation: Medium Term Plan – Year 4 (Kapow)

## Autumn 1 - Computing Systems And Networks: Collaborative Learning (Office 365)

| | | | |
|---|---|---|---|
| L1: Teamwork | **Key knowledge for this unit** <br> • To understand that software can be used collaboratively online to work as a team. <br> • To know what type of comments and suggestions on a collaborative document can be helpful. <br> • To know that you can use images, text, transitions and animation in presentation slides. | **Key Vocabulary** <br> Animations <br> Average <br> Bar chart <br> Collaboration <br> Comment <br> Contribution <br> Data <br> Edited <br> Email account <br> Format | Freeze <br> Icon <br> Images <br> Insert <br> Link <br> Multiple choice <br> Numerical data <br> Pie chart <br> Presentations <br> Resolved | Reviewing comments <br> Share <br> Slides <br> Software <br> Spreadsheets <br> Suggestions <br> Survey <br> Teamwork <br> Themes <br> Transitions |
| L2: Sharing a document | | | | |
| L3: Microsoft Forms 1 | | | | |
| L4: Microsoft Forms 2 | | | | |
| L5: Shared spreadsheets | | | | |

Pupils who are **secure** will be able to:
- Understand the need to be thoughtful when working on a collaborative document.
- Use comments to suggest changes to a document and understand how to resolve comments.
- Plan a survey for Microsoft Form with a range of different questions types that will provide different types of answer, e.g. text, multiple choice or numerical values.
- Create a Microsoft Form with a range of different question types that will provide different types of answer, e.g. text, multiple choice or numerical values.
- Export data to a spreadsheet, highlighting data, using conditional formatting and calculating averages and sums of numbers.

Pupils working at **greater depth** indicated by:
- Suggesting thoughtful and considerate ways to make collaborative learning more successful.
- Using edits and suggestions; showing a clear understanding of how to accept and approve ideas.
- Exploring various question types that provide more in-depth data; writing detailed questions with logical answer types, e.g. Using short paragraphs when necessary.
- Exploring various question types that provide more in-depth data; writing detailed questions with logical answer types, e.g. Using short paragraphs when necessary.
- Exploring the power of spreadsheets in more depth; creating graphs.

## Autumn 2 - Programming 1: Further Coding With Scratch

| | | | |
|---|---|---|---|
| L1: Scratch reminder | **Key knowledge for this unit** <br> • That a variable is a value that can change (depending on conditions) and know that you can create them in Scratch. <br> • What a conditional statement is in programming. <br> • That using variables can help you to create a quiz on Scratch. | **Key Vocabulary** <br> code block <br> conditional statement <br> coordinates <br> decompose <br> feature <br> information <br> negative number <br> orientation | position <br> program <br> project <br> script <br> sprite <br> stage <br> tinker <br> variable |
| L2: Identifying what code does | | | |
| L3: Introduction to variables | | | |
| L4: Making a variable | | | |
| L5: Times tables project | | | |

Pupils who are **secure** will be able to:
- Understand how to create a simple script in Scratch.
- Add or change a sprite and prevent it from rotating.

Pupils working at **greater depth** indicated by:
- Using complex scripts which demonstrate further understanding of how to use Scratch, such as loops, additional events and motion blocks.

| | |
|---|---|
| • Use decomposition to identify key features and understand how to decipher actions that make the quiz game work.<br>• Understand what a variable is and how to use the 'say' and 'ask' blocks.<br>• Create a variable and be able to use a variable to record a score.<br>• Understand what a variable is and how it works within a program. | • Identifying some of the blocks that might have been used for the project; explaining the function of specific code blocks.<br>• Understanding how to use a conditional block to evaluate a response to a question.<br>• Using multiple variables to track scores and questions; tinkering to tell the user their score at the end of the game.<br>• Using a range of variables to improve a Scratch game; tinkering to change the sprite's costume depending on whether a user gives a correct or incorrect answer. |

## Spring 1 - Creating Media: Website Design (Office 365)

| L1: Getting to know Microsoft Sway<br><br>L2: Book review webpage<br><br>L3: Adding features<br><br>L4: Planning my website<br><br>L5: Creating my website | **Key knowledge for this unit**<br>• To know that a website is a collection of pages that are all connected.<br>• To know that websites usually have a homepage and subpages as well as clickable links to new pages, called hyperlinks.<br>• To know that websites should be informative and interactive. | **Key Vocabulary**<br>Assessment<br>Audience<br>Checklist<br>Collaboration<br>Content<br>Contribution<br>Create<br>Design<br>Embed<br>Evaluate | Features<br>Google Sites<br>Hobby<br>Homepage<br>Hyperlinks<br>Images<br>Insert<br>Online<br>Plan<br>Progress | Published<br>Record<br>Review<br>Style<br>Subpage<br>Tab<br>Theme<br>Web page<br>Website<br>World Wide Web |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Create a Sway with a title, image and a completed first header section.<br>• Create a clear plan for their web page and beginning to create it.<br>• Create a professional-looking web page with useful information and a clear style, which is easy for the user to read and find information from.<br>• Create a clear plan by referring back to their checklist to include a range of features.<br>• Create a web page with clear sections and with a range of features in. | • Experimenting with other features such as layout and themes.<br>• Selecting a range of additional features such as adding a hyperlink to create a web page. Children are also able to explain how to create a webpage.<br>• Including more advanced features, e.g. Relevant youtube video content embedded into their page.<br>• Creating a clear plan which includes a range of additional features such as media as well as maintaining a clear style throughout.<br>• Creating a web page with at least three sections with a range of features and a consistent style throughout their site. |

## Spring 2 - Skills Showcase: HTML

| L1: Introduction to HTML<br><br>L2: Remixing HTML<br><br>L3: Changing HTML and CSS<br><br>L4: Website hacking | **Key knowledge for this unit**<br>• To understand and identify examples of HTML tags.<br>• To understand what changing the HTML and CSS does to alter the appearance of an object on the web.<br>• To understand that copyright means that those images are protected and to understand that we should do a "creative commons" image search if we wish to use images from the internet. | **Key Vocabulary**<br>Code<br>Component<br>Content<br>Copyright<br>CSS<br>End tag<br>Fake news | Heading<br>Headline<br>Hex code<br>HTML<br>Input<br>Internet browser<br>Output<br>Paragraph | Permission<br>Remixing<br>Script<br>Start tag<br>Tags<br>Text<br>URL<br>Webpage |

| L5: Replacing images | • To know what "fake news" is and ways to spot websites that carry this type of misinformation.<br>• To know what the "inspect" elements tool is and ways of using it to explore and alter text and images. | Hacking | | |
|---|---|---|---|---|

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Add text between the heading and paragraph tags.<br>• Easily activate the goggles to investigate a web page.<br>• Explain how they altered the HTML to create their own posters.<br>• Change the colours and sizes of their object elements. Explain how they created their story.<br>• Adapt the basic elements of a story within a web page using the 'Inspect Elements' tool.<br>• Change an image within a web page and create their own news story, replacing the text and images of a webpage. | • Explaining the general order of HTML tags and how text must be between a start tag and an end tag; finding some less common tags and being able to explain how these are used.<br>• Explaining how they altered the HTML to create their own posters and making more complex changes to the HTML and some change to the Style.CSS sheet too.<br>• Creating a fully customised story – potentially having changed it entirely from the first slide. Altering the colours and sizes of the elements.<br>• Adapting a number of different elements within a live web page and creating a believable fake story.<br>• Adapting longer articles, with more images and investigating some of the other HTML tags within the code. |

## Summer 1 - Programming 2: Computational Thinking

| L1: What is computational thinking?<br><br>L2: Decomposition<br><br>L3: Abstraction and pattern recognition<br><br>L4: Algorithm design<br><br>L5: Applying computational thinking | **Key knowledge for this unit**<br>• To know that combining computational thinking skills can help you to solve a problem.<br>• To understand that pattern recognition means identifying patterns to help them work out how the code works.<br>• To understand that algorithms can be used for a number of purposes e.g. animation, games design etc. | **Key Vocabulary**<br>Abstraction<br>Algorithm<br>Code<br>Computational thinking<br>Decomposition<br>Input | Logical reasoning<br>Output<br>Pattern recognition<br>Script<br>Sequence<br>Variable |
|---|---|---|---|

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Understand that problems can be solved more easily using computational thinking.<br>• Understand what the different code blocks do and create a simple game.<br>• Understand the terms 'pattern recognition' and 'abstraction' and how they help to solve a problem.<br>• Create a Scratch program which draws a square and at least one other shape.<br>• Understand how computational thinking can help to solve problems and apply computational thinking to problems they face. | • An understanding of what the core strands of computational thinking are and what they mean; able to identify how computational thinking can support them in other areas.<br>• Creating a game which uses many of the features in the original game plus a few independently created scripts that add extra features to the game.<br>• Editing the animal and food sprites; altering the text spoken by the Abby sprite so that the game is familiar but has very different objects.<br>• Understanding how to alter the existing code to create a variety of different shapes and predicting the output of the code they have read.<br>• Applying computational thinking skills to their challenges to solve them quickly and accurately; discussing and reviewing answers with their partners. |

## Summer 2 - Data Handling: Investigating Weather

| | | |
|---|---|---|
| L1: What is computational thinking? | **Key knowledge for this unit**<br>• To know that combining computational thinking skills can help you to solve a problem.<br>• To understand that pattern recognition means identifying patterns to help them work out how the code works.<br>• To understand that algorithms can be used for a number of purposes e.g. animation, games design etc. | **Key Vocabulary**     Logical reasoning<br>Abstraction     Output<br>Algorithm     Pattern recognition<br>Code     Script<br>Computational thinking     Sequence<br>Decomposition     Variable<br>Input |
| L2: Decomposition | | |
| L3: Abstraction and pattern recognition | | |
| L4: Algorithm design | | |
| L5: Applying computational thinking | | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Understand that problems can be solved more easily using computational thinking.<br>• Understand what the different code blocks do and create a simple game.<br>• Understand the terms 'pattern recognition' and 'abstraction' and how they help to solve a problem.<br>• Create a Scratch program which draws a square and at least one other shape.<br>• Understand how computational thinking can help to solve problems and apply computational thinking to problems they face. | • An understanding of what the core strands of computational thinking are and what they mean; able to identify how computational thinking can support them in other areas.<br>• Creating a game which uses many of the features in the original game plus a few independently created scripts that add extra features to the game.<br>• Editing the animal and food sprites; altering the text spoken by the Abby sprite so that the game is familiar but has very different objects.<br>• Understanding how to alter the existing code to create a variety of different shapes and predicting the output of the code they have read.<br>• Applying computational thinking skills to their challenges to solve them quickly and accurately; discussing and reviewing answers with their partners. |

## E-saftey

| | | |
|---|---|---|
| L1: What happens when I search online? | **Key knowledge for this unit**<br>• To understand some of the methods used to encourage people to buy things online.<br>• To understand that technology can be designed to act like or impersonate living things.<br>• To understand that technology can be a distraction and identify when someone might need to limit the amount of time spent using technology.<br>• To understand what behaviours are appropriate in order to stay safe and be respectful online. | **Key Vocabulary**   Distractions   Recommendations<br>Accuracy   Fact   Reliable<br>Advantages   Hashtag   Risks<br>Advertisements   Implications   Screen time<br>Belief   In-app purchases   Search results<br>Bot   Influencer   Snippets<br>Chatbot   Opinion   Sponsored<br>Computer   Program   Trustworthy |
| L2: How do companies encourage us to buy online? | | |
| L3: Fact, opinion or belief? | | |
| L4: What is a bot? | | |
| L5: What is my #TechTimetable like? | | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Describe how to search over multiple platforms and are aware of the accuracy of the results presented.<br>• Describe some of the methods used to persuade people to buy online.<br>• Explain the difference between fact, opinion and belief and recognise these online.<br>• Explain what a bot is and give examples of different bots. | • Will be able to describe how to search effectively over a multiple of technologies and can explain with reasons the accuracy of the results shown.<br>• Describing a range of methods used to persuade people to buy online and recognising these over multiple platforms.<br>• Using examples to explain the difference between facts, opinions and beliefs found online and describe why it is important to create your own judgements about what you have read.<br>• Explain the benefits and risks of bots around the home and workplace. |

| | |
|---|---|
| • Explain some positive and negative distractions of using technology and small strategies on how to reduce the amount of time spent on technology. | • Being able to recognise and explain the positive and negative distractions the technology they use has on them and recognise changes they may need to make to reduce the amount of time spent on technology. |

# Implementation: Medium Term Plan – Year 5 (Kapow)

## Autumn 1 – Computing Systems And Networks: Search Engines

| Lessons | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: Searching basics <br><br> L2: Inaccurate information <br><br> L3: Web quest <br><br> L4: Information poster <br><br> L5: Web crawlers | • Developing searching skills to help find relevant information on the internet. <br> • Learning how to use search engines effectively to find information, focussing on keyword searches and evaluating search returns. <br> • Learn about different forms of communication that have developed with the use of technology. <br> • Recognising that information on the Internet might not be true or correct and learning ways of checking validity. | Algorithm <br> Appropriate <br> Copyright <br> Correct <br> Credit <br> Data leak <br> Deceive | Fair <br> Fake <br> Inappropriate <br> Incorrect <br> Index <br> Information <br> Keywords <br> Network | Privacy <br> Rank <br> Real <br> Search engine <br> TASK <br> Web crawler <br> Website |

Pupils who are **secure** Web crawlers
will be able to:
- Explain what a search engine is, suggesting several search engines to use and explain how to use them to find websites and information.
- Suggest that things online aren't always true and recognise what to check for.
- Explain why keywords are important and what TASK stands for, using these strategies to search effectively.
- Recognise the terms 'copyright' and 'fair use' and combine text and images in a poster.
- Make parallels between book searching and internet searching, explaining the role of web crawlers and recognising that results are rated to decide rank.

Pupils working at **greater depth** indicated by:
- Understanding which words do and do not need to be included in a search query.
- Skimming pages to identify validity straight away.
- Using searching skills effectively; explaining why following these strategies helps to find relevant information.
- Explaining how they have adhered to copyright (e.g. written in their own words); explaining their colour, font and size choices.
- Suggesting ways to make a website of their choice rank higher.

## Autumn 2 – Programming 1: Programming Music (Sonic Pi)

| Lessons | Key knowledge for this unit | Key Vocabulary | | | |
|---|---|---|---|---|---|
| L1: Tinkering with Sonic Pi <br><br> L2: Sonic soundtracks <br><br> L3: Musical storytelling <br><br> L4: Live loops <br><br> L5: Battle of the bands | • To know that a soundtrack is music for a film/video and that one way of composing these is on programming software. <br> • To understand that using loops can make the process of writing music simpler and more effective. <br> • To know how to adapt their music while performing. | Beat <br> Buffer <br> Bugs <br> Coding <br> Commands <br> Debug <br> Decompose <br> Error | Format <br> Instructions <br> Live loops <br> Loop <br> Melody <br> Mindmap <br> Music <br> Output <br> Performance | Pitch <br> Play <br> Predict <br> Programming <br> Rehearsal <br> Repetition <br> Rhythm <br> Sleep <br> Sonic Pi | Soundtrack <br> Spacing <br> Tempo <br> Timbre <br> Tinker <br> Tutorials <br> Typing <br> Typo |

Pupils who are **secure** will be able to:
- Iterate ideas, testing and changing throughout the lesson.
- Explain what the basic commands do: 'play', 'slee'p, '2.times do'.

Pupils working at **greater depth** indicated by:
- Using nested loops (loops inside of loops) within their code.
- Making links between changing the style of the music and different coding structures, e.g. "I wanted to create slow music so I included longer 'sleeps' between the played notes".

| | |
|---|---|
| • Explain how their program links to the theme. Include a loop in their work. Correct their own simple mistakes.<br>• Explain their scene in the story. Link musical concepts to their scene.<br>• Include a live loop and explain its function. Use samples effectively to enhance music.<br>• Code a piece of music that combines a variety of structures. Use loops in their programming. Recognise that programming music is a way to apply their skills. | • Discussing which programming structures will allow them to create the musical soundtrack they imagine.<br>• Using additional commands to add to their program's complexity.<br>• Amending code in a 'live' scenario. |

## Spring 1 – Data Handling: Mars Rover 1

| L1: Mars Rover<br><br>L2: Binary code<br><br>L3: Computer architecture<br><br>L4: Using binary – numbers<br><br>L5: Using binary – text | **Key knowledge for this unit**<br>• To know that Mars Rover is a motor vehicle that collects data from space by taking photos and examining samples of rock.<br>• To know what numbers using binary code look like and be able to identify how messages can be sent in this format.<br>• To understand that RAM is Random Access Memory and acts as the computer's working memory.<br>• To know what simple operations can be used to calculate bit patterns. | **Key Vocabulary**<br>8-bit binary<br>Addition<br>ASCII<br>Binary code<br>Boolean<br>Byte<br>Communicate<br>Construction | CPU<br>Data<br>transmission<br>Decimal<br>numbers<br>Design<br>Discovery<br>Distance<br>Hexadecimal<br>Input | Instructions<br>Internet<br>Mars Rover<br>Moon<br>Numerical data<br>Output<br>Planet<br>Radio signal<br>RAM<br>Research | Scientist<br>Sequence<br>Signal<br>Simulation<br>Space<br>Subtraction<br>Technology<br>Transmit |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Identify some of the types of data that the Mars Rover could collect (for example, photos).<br>• Explain how the Mars Rover transmits the data back to Earth and the challenges involved in this.<br>• Read any number in binary, up to eight bits.<br>• Identify input, processing and output on the Mars Rovers.<br>• Read binary numbers and grasp the concept of binary addition.<br>• Relate binary signals (Boolean) to a simple character-based language, ASCII. | • Identifying types of data that the Mars Rover could collect. Explaining some of the purposes of data collection going beyond obvious data. Researching comparative facts about the distance between Earth and Mars and the time it takes to send a signal to Mars.<br>• Reading and calculating binary numbers up to 8 bits. Understanding that numbers are referred to as a 'bit'. Identifying limitations of binary including that there is a maximum number of signals that can be sent and that only numbers can be sent.<br>• The ability to generalise input, processing and output to include other types of computing devices.<br>• Reading 8-bit binary numbers; calculating the addition of more than three bits and explaining their working out.<br>• Explaining how ASCII works and how to use it. |

## Spring 2 – Programming 2: Micro:Bit

| L1: Tinkering with BBC Micro:bit<br><br>L2: Programming an animation<br><br>L3: Polling program<br><br>L4: Programming a pedometer<br><br>L5: Programming a scoreboard | **Key knowledge for this unit**<br>• To know that a Micro:bit is a programmable device.<br>• To know that Micro:bit uses a block coding language similar to Scratch.<br>• To understand and recognise coding structures including variables.<br>• To know what techniques to use to create a program for a specific purpose (including decomposition). | **Key Vocabulary**<br>Algorithm<br>Animation<br>App<br>Blocks<br>Bluetooth<br>Code block<br>Connection<br>Create<br>Debug | Designing<br>Desktop<br>Device<br>Download<br>Images<br>Input<br>Instructions<br>Laptop<br>Load<br>Loop | Micro:bit<br>Outputs<br>Pairing<br>Pedometer<br>Polling<br>Predict<br>Program<br>Repetition<br>Reset<br>Sabotage | Scoreboard<br>Screen<br>Systematic<br>Tablet<br>Tinkering<br>USB<br>Variables<br>Wifi<br>Wireless<br>Wires |

| | | Decompose |
|---|---|---|

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| <ul><li>Clip blocks together and predict what will happen. Make connections with previous programming interfaces they've used, e.g. Scratch.</li><li>Create their own images to make the animation and recognise the difference between 'on start' and 'forever'.</li><li>Recognise blocks they've used previously, identifying inputs and outputs used and make predictions about how variables work.</li><li>Choose appropriate blocks to complete the program and attempt the challenges independently.</li><li>Break a program down into smaller steps, suggesting appropriate blocks and match the algorithm to the program.</li></ul> | <ul><li>Using the predict>test>review process to create more complex programs.</li><li>Creating a more complex animation (e.g. more images) and controlling their animation with stop/start inputs.</li><li>Independently explaining the impact of changing the variables within the code.</li><li>Decomposing the program without support, selecting appropriate blocks and understanding different forms of input.</li><li>Independently adding in additional functionality, such as a reset button.</li></ul> |

## Summer 1 – Creating Media - Stop Motion Animation (Stop Motion Studio)

| | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: Animation explored | <ul><li>To know that decomposition of an idea is important when creating stop-motion animations.</li><li>To understand that stop motion animation is an animation filmed one frame at a time using models, and with tiny changes between each photograph.</li><li>To know that editing is an important feature of making and improving a stop motion animation.</li></ul> | Animation | Digital device | Moving images |
| L2: Exploring stop motion | | Animator | Edit | Onion skinning |
| L3: Planning my stop motion project | | Background | Evaluate | Still images |
| | | Character | Flip book | Stop motion |
| L4: Stop motion creation | | Decomposition | Fluid movement | Storyboard |
| | | Design | Frames | Thaumatrope |
| L5: Editing my stop motion project | | | Model | Zoetrope |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| <ul><li>Create a toy with simple images with a single movement.</li><li>Create a short stop motion with small changes between images.</li><li>Think of a simple story idea for their animation then decompose it into smaller parts to create a storyboard with simple characters.</li><li>Make small changes to the models to ensure a smooth animation and delete unnecessary frames.</li><li>Add effects such as extending parts and titles.</li><li>Provide helpful feedback to other groups about their animations.</li></ul> | <ul><li>Creating a toy with increased complexity in the movement of the objects.</li><li>Creating an animation which includes two objects, which both move between individual frames.</li><li>Including two or more scenes that would be easy to animate using the resources provided.</li><li>Creating an animation with multiple scenes or characters, which all move throughout the film, while the camera and set remain stationary.</li><li>An increasingly complex animation with a range of features such as several objects interacting, an extension to the film and use of titles and place holders. They will also be able to explain how groups achieved particular effects and provide advice in their feedback that demonstrates a more advanced technical understanding of how the software works and how to get the best filming effect.</li></ul> |

## Summer 2 – Skills Showcase: Mars Rover 2

| | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: Pixels | <ul><li>To understand that bit patterns represent images as pixels.</li><li>To understand that the data for digital images can be compressed.</li><li>To know the difference between ROM and RAM.</li></ul> | 3D | Drag and drop | Output |
| | | Algorithm | Fetch, decode, execute | Pixels |
| L2: Compressing images | | Binary image | ID card | RAM |
| | | | Input | Responsible |

| L3: Fetch, decode, execute | • To understand various techniques that will improve the design of a 3D object (using CAD software). | CAD Compression CPU Data | JPEG Memory Online community Operating system | RGB ROM Safe |
|---|---|---|---|---|
| L4: Tinkering with CAD | | | | |
| L5: TinkerCAD tutorials | | | | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Create a pixel picture, explaining that a pixel is the smallest element of a digital image and that binary is used to code and transfer this data. <br> • Save a JPEG as a bitmap and recognise the difference in file size, as well as explain how pixels are used to transfer image data. <br> • Explain the 'fetch, decode, execute' cycle in relation to real-world situations. <br> • Create a profile with a safe and suitable username and password and begin to use 3D design tools. <br> • Independently take tutorial lessons, applying what they have learnt to their design and understand the importance of using an online community responsibly. | • Explain in detail the process of capturing digital images, data transfer and digital display; recall previous lessons and link 'input, memory and output' to digital image capture, processing and display. <br> • Identify that changing the quality of the colour can affect the file size of the image and recognise how compression works at a basic level (by reducing replication). <br> • Give a more detailed explanation, use computer architecture terms, such as CPU, RAM and ROM. <br> • Use more complex 3D design tools and use the site to learn new skills independently. <br> • Take greater responsibility for independent learning, including taking the initiative to self-learn more skills; create a more detailed design that more closely matches the needs of a Mars Rover tyre; discuss the positives and negatives of using an online community and suggesting how to use it responsibly. |

## E-Safety

| L1: Online protection | **Key knowledge for this unit** <br> • Identifying possible dangers online and learning how to stay safe. <br> • Evaluating the pros and cons of online communication. <br> • Recognising that information on the Internet might not be true or correct and learning ways of checking validity. <br> • Learning what to do if they experience bullying online. <br> • Learning to use an online community safely. | **Key Vocabulary** Accurate information Advice App permissions Application Apps Bullying Communication Emojis Health In-app purchases | Information Judgement Memes Mental health Mindfulness Mini-biography Online communication Opinion Organisation Password | Personal information Positive contributions Private information Real world Strong password Summarise Support Technology Trusted adult Wellbeing |
|---|---|---|---|---|
| L2: Online communication | | | | |
| L3: Online reputation | | | | |
| L4: Online bullying | | | | |
| L5: Online health | | | | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Understand that passwords need to be strong and that apps require some form of passwords. <br> • Recognise a couple of the different types of online communication and know who to go to if they need help with any communication matters online. <br> • Search for simple information about a person, such as their birthday or key life moments. <br> • Know what bullying is and that it can occur both online and in the real world. <br> • Recognise when health and wellbeing are being affected in either a positive or negative way through online use. <br> • Offer a couple of advice tips to combat the negative effects of online use. | • Know that strong passwords need to be of certain lengths and have various characters. Also, that they know what 'app permissions' are and how these settings protect private information. <br> • Develop their own negative scenarios which they can then turn into positives so they can gain further insight into the differences and the way a phrase can be turned from negative to positive. <br> • Know that information online about people is often somebody's opinion or judgement and not always factually true. <br> • Incorporate multiple anti-bullying organisations into their group's role-plays. <br> • Create a section on the document for 'mindfulness', which they can research on the internet with adult supervision. |

# Implementation: Medium Term Plan – Year 6 (Kapow)

## Autumn 1 - Computing Systems And Networks: Bletchley Park (Office 365)

L1: Secret codes

L2: Brute force hacking

L3: Bletchley Park

L4: Computing heroes

L5: Computing heroes part 2

**Key knowledge for this unit**
- To understand the importance of having a secure password and what "brute force hacking" is.
- To know that the first computers were created at Bletchley Park to crack the Enigma code to help the war effort in World War 2.
- To know about some of the historical figures that contributed to technological advances in computing.
- To understand what techniques are required to create a presentation using appropriate software.

| Key Vocabulary | Contribute | Pig Latin |
|---|---|---|
| Acrostic Code | Convince | Pigpen cipher |
| Brute force hacking | Date shift cipher | Present |
| Caesar cipher | Discovery | Scrambled |
| Chip and pin system | Hero | Secret |
| Cipher | Invention | Secure |
| Code | Nth Letter Cipher | Technological |
| Combination | Password | advancement |
| | | Trial and error |

Pupils who are **secure** will be able to:
- Explain that codes can be used for a number of different reasons and decode messages.
- Explain how to ensure a password is secure and how this works.
- Create a simple website with information about Bletchley Park including the need to build electronic thinking machines to solve cipher codes.
- Explain the importance of historical figures and their contribution towards computer science.
- Present information about their historical figure in an interesting and engaging manner.

Pupils working at **greater depth** indicated by:
- Exploring and using various codes; making connections between the codes they have looked at and binary codes transmitted by computers.
- Showing a clear understanding of how brute force attacks work; explaining how they can be avoided.
- Creating a detailed and informative poster; including information about the people who worked at Bletchley during the war.
- Using persuasive text in presentations about historical figures; embed relevant videos or links to websites.
- Providing detailed and comprehensive feedback on why one of the historical figures should be chosen above the others when discussing this at the end of the lesson.

## Autumn 2 - Programming: Intro To Python

L1: Tinkering with Logo

L2: Nested loops

L3: Using Python

L4: Using loops in Python

L5: Coding Mondrian

**Key knowledge for this unit**
- To know that there are text-based programming languages such as Logo and Python.
- To know that nested loops are loops inside of loops.
- To understand the use of random numbers and remix Python code.

| Key Vocabulary | Instructions |
|---|---|
| Algorithm | Loop |
| Code | Output |
| Command | Patterns |
| Design | Random |
| Import | Remix |
| Indentation | Repeat |
| Input | Shape |

Pupils who are **secure** will be able to:

Pupils working at **greater depth** indicated by:

- Iterate ideas, testing and changing throughout the lesson and explain what their program does.
- Use nested loops in their designs, explaining why they need two repeats.
- Alter the house drawing using Python commands; use comments to show a level of understanding around what their code does.
- Use loops in Python and explain what the parts of a loop do.
- Recognise that computers can choose random numbers; decompose the program into an algorithm and modify a program to personalise it.

- Incorporating nested loops (loops inside of loops) into their program; predicting what will happen; debugging quickly and effectively.
- Adapting and experimenting with a nested loop to change the outcome (rather than starting from a blank screen).
- Discussing which part of the code does what; adding colours to their code and controlling which part of the drawing they are filling.
- Including nested loops in Python; explaining what will happen if they change different values in their code.
- Making substantial changes to the original program; applying code snippets from previous lessons.

## Spring 1 - Data Handling: Big Data 1

| | | | | |
|---|---|---|---|---|
| L1: Barcodes | **Key knowledge for this unit**<br>• To know that data contained within barcodes and QR codes can be used by computers.<br>• To know that infrared waves are a way of transmitting data.<br>• To know that Radio Frequency Identification (RFID) is a more private way of transmitting data.<br>• To know that data is often encrypted so that even if it is stolen it is not useful to the thief. | **Key Vocabulary**<br>Algorithms<br>Barcode<br>Binary<br>Boolean<br>Brand<br>Chips<br>Commuter | Contactless<br>Data<br>Encrypted<br>Infrared<br>MagicBand<br>Privacy<br>Proximity<br>QR code | QR scanner<br>Radio waves<br>RFID<br>Signal<br>Systems/data analyst<br>Transmission<br>Wireless |
| L2: Transmitting data | | | | |
| L3: RFID | | | | |
| L4: Using RFID | | | | |
| L5: Transport data | | | | |

Pupils who are **secure** will be able to:
- Understand why barcodes and QR codes were created.
- Create (and scan) their own QR code using a QR code generator website.
- Explain how infrared can be used to transmit a Boolean type signal.
- Explain how RFID works, recall a use of RFID chips, and type formulas into spreadsheets.
- Take real-time data and enter it effectively into a spreadsheet.
- Presenting the data collected as an answer to a question.
- Recognising the value of analysing real-time data.
- Analyse and evaluate transport data and consider how this provides a useful service to commuters.

Pupils working at **greater depth** indicated by:
- Discussing how QR codes could replace manual registers in schools.
- Comparing infrared data transmission to QR code data transmission and thinking of potential new applications.
- The ability to compare RFID to other methods of wireless data transfer, think of a new use of RFID and manipulate and enhance cells in a spreadsheet.
- Taking data and comparing it with longer-term data. Thinking of new uses for data. Imagining new uses of RFID chips.
- Completing six customer scenarios and explaining how data analysis provides a useful service to consumers. Creating their own scenarios based on the data for each other to solve.

## Spring 2 - Creating Media: History Of Computers

| | | | | |
|---|---|---|---|---|
| L1: Playing with sound | **Key knowledge for this unit**<br>• To know that radio plays are plays where the audience can only hear the action so sound effects are important.<br>• To know that sound clips can be recorded using sound recording software.<br>• To know that sound clips can be edited and trimmed. | **Key Vocabulary**<br>Background noise<br>Byte<br>Computer<br>Devices | Hard drive<br>Hardware<br>Kilobytes<br>Megabyte<br>Memory storage<br>Mouse | Processor<br>Radio play<br>RAM<br>Raspberry Pi<br>Record<br>Reverb | Smartphone<br>Sound<br>Sound effects<br>Terrabytes<br>Touch screen<br>Track |
| L2: Radio plays | | | | |
| L3: First computers | | | | |

| L4: Computers that changed the world | | File | Operating | ROM | Trackpad |
|---|---|---|---|---|---|
| | | FX | system | Script | Trailer |
| L5: Future computer | | Gigabyte | Overlay | | |
| | | Graphics | Play | | |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Explain how to record sounds and add in sound effects over the top. <br> • Produce a simple radio play with some special effects and simple edits which demonstrate an understanding of how to use the software. <br> • Create a document that includes correct date information and facts about the computers and how they made a difference. <br> • Demonstrate a clear understanding of their device and how it affected modern computers, including well-researched information with an understanding of the reliability of their sources. <br> • Describe all of the features that we'd expect a computer to have including RAM, ROM, hard drive and processor, but of a higher specification than currently available. | • Explaining and showing how to cut part of a sound clip and move it to a different place with the track, as well as experimenting with reverb, etc. <br> • Producing a more complex radio play that uses a variety of sounds layered up to make their piece more interesting including background noises and musical effects. <br> • Presenting information in an interesting way, including pictures and details about each machine expressing how and why it changed the face of computing. <br> • Explaining how devices impacted each other and led to a chain reaction of hardware development. <br> • Designing a realistic computer of the future by justifying why they have included certain features and referencing their research of modern computers. |

## Summer 1 - Data Handling: Big Data 2

| L1: Transferring data <br><br> L2: Data usage <br><br> L3: The Internet of Things <br><br> L4: Designing a smart school <br><br> L5: Smart school presentation | **Key knowledge for this unit** <br> • To know that data can become corrupted within a network but this is less likely to happen if it is sent in 'packets'. <br> • To know that devices or that are not updated are most vulnerable to hackers. <br> • To know the difference between mobile data and WiFi. | **Key Vocabulary** <br> Big Data <br> Bluetooth <br> Corrupted <br> Data <br> Energy <br> GPS <br> Improve | Infrared <br> Internet of Things <br> Personal <br> Privacy <br> QR codes <br> Revolution <br> RFID <br> SIM | Simulation <br> Smart city <br> Smart school <br> Stop motion <br> Threat <br> WiFi <br> Wireless |

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| • Recognise that data can become corrupted within a network and that data sent in packets is more robust, as well as identify the need to update devices and software. <br> • Recognise differences between mobile data and WiFi and use a spreadsheet to compare and identify high-use data activities and low-use data activities. <br> • Make links between the Internet of Things and Big Data and give a basic example of how data analysis/analytics can lead to improvement in town planning. <br> • Explain ways that Big Data or IoT principles could be used to solve a problem or improve efficiency within the school and prepare a presentation about their idea, considering the privacy of some data. <br> • Present their ideas about how Big Data/IoT can improve the school and provide feedback to others on their presentations. | • Explaining some of the methods which cause data corruption and how the use of packets creates a more robust system of data transfer; recognising that updated software can help to prevent data corruption and hacking. <br> • Ranking or ordering online activities according to data use and putting this information into a spreadsheet as well as finding out the cost of mobile data and weighing up the pros and cons of WiFi and mobile data. <br> • Giving a more detailed explanation of how the IoT could be used to gather data; identifying new ways this data could be used to improve towns and cities. <br> • Choosing a data transfer method that is most suitable for their idea; considering the data which will need to be collected; using the best technology for the most persuasive and illustrative presentation. <br> • Persuading their audience of the possibilities and challenges associated with their idea; providing |

## Summer 2 - Skills Showcase: Inventing A Product

| | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: Invention design | • To know what designing an electronic product involves.<br>• To know which programming software/language is best to achieve a purpose.<br>• To know the building blocks of computational thinking e.g. sequence, selection, repetition, variables and inputs and outputs. | Adapt<br>Advert<br>Algorithm<br>Bugs<br>Coding<br>Debugging<br>Design<br>Edit<br>Electronic<br>Evaluate<br>Facts | Image rights<br>Images<br>Influence<br>Information<br>Inputs<br>Loops<br>Manipulation<br>Opinions<br>Output<br>Photos<br>Product<br>Program | Repetition<br>Screenshot<br>Search engine<br>Selection<br>Sequence<br>Snippets<br>Software<br>Structures<br>Variables<br>Video<br>Website |
| L2: Coding and debugging | | | | |
| L3: Computer Aided Design (CAD) | | | | |
| L4: My product's website | | | | |
| L5: Video advert | | | | |
| L6: Persuasive advertisements | | | | |

Pupils who are **secure** will be able to:
- Evaluate code, understanding what it does and adapt existing to code for a specific purpose.
- Debug programs and make them more efficient using sequence, selection, repetition or variables.
- Design appropriate housing for their product using CAD software, including any input or output devices needed to make it work.
- Create an appealing website for their product, aimed at their target audience which explains what their product is and what it does, using persuasive language.
- Create an edited video of their project, articulating the key benefits.
- Describe and show how to search for information online and be aware of the accuracy of the results presented.

Pupils working at **greater depth** indicated by:
- Predicting how the code works; adapting code to suit their project; exploring javascript code.
- Incorporating selection, repetition and variables in their programs.
- Using a variety of shapes and holes to create their design and articulating the purpose of each component.
- Using ideas from other websites with a similar audience and including embedded links and multiple webpages.
- Adding multiple elements to their edited video and embedding it in their website.
- Describing and showing how to search for information online and identifying how search results appear and are ranked on screen; understanding persuasive techniques in advertisements, such as opinions, facts, influence, manipulation and persuasion.

## E-saftey

| | Key knowledge for this unit | Key Vocabulary | | |
|---|---|---|---|---|
| L1: Life online | • To know that a digital footprint means the information that exists on the internet as a result of a person's online activity.<br>• To know what steps are required to capture bullying content as evidence.<br>• To understand that it is important to manage personal passwords effectively.<br>• To understand what it means to have a positive online reputation.<br>• To know some common online scams. | Anonymity<br>Antivirus<br>Biometrics<br>Block and report<br>Consent<br>Copy<br>Digital footprint<br>Digital personality<br>Financial information | Malware<br>Online bullying<br>Online reputation<br>Password<br>Paste<br>Personal information<br>Personality<br>Phishing<br>Privacy settings<br>Private | Report<br>Reputation<br>Respect<br>Scammers<br>Screengrab<br>Secure<br>Settings<br>Software updates<br>Two-factor authentication |
| L2: Sharing online | | | | |
| L3: Creating a positive online reputation | | | | |
| L4: Capturing evidence | | | | |
| L5: Password protection | | | | |

| L6: Think before you click | | | Hacking<br>Inappropriate | Reliable source | URL<br>Username |
|---|---|---|---|---|---|

| Pupils who are **secure** will be able to: | Pupils working at **greater depth** indicated by: |
|---|---|
| <ul><li>Discuss a range of issues online that can leave pupils feeling sad, frightened, worried or uncomfortable and can describe numerous ways to get help.</li><li>Explain how sharing online can have both positive and negative impacts.</li><li>Be aware of how to seek consent from others before sharing material online and can describe how content can still be shared online even if it is set to private.</li><li>Explain what a 'digital reputation' is and what it can consist of.</li><li>Understand the importance of capturing evidence of online bullying and can demonstrate some of these methods on the devices used at school.</li><li>Describe ways to manage passwords and strategies to add extra security such as two-factor authentication.</li><li>Explain what to do if passwords are shared, lost, or stolen.</li><li>Describe strategies to identify scams.</li><li>Explain ways to increase their privacy settings and understand why it is important to keep their software updated.</li></ul> | <ul><li>The ability to discuss negative feelings associated with issues online. Describing how to get help both online and online and the importance of persistence until we get the help we need.</li><li>Explaining, with examples, how sharing online can have both positive and negative impacts. Discussing how content shared that was set to private can make someone feel and how they can get help if this happens.</li><li>Children explaining strategies in developing a positive online reputation.</li><li>Children can explain why it is important to capture evidence of online bullying. They can demonstrate some of these methods on the devices used at school and research how to do this on the devices they use at home.</li><li>Children can describe effective ways to manage passwords. They understand the importance of not sharing passwords and can describe why others may want your passwords. They can explain what to do if passwords are shared, lost or stolen and the importance of doing this quickly.</li><li>Pupils being able to describe ways in which online content is used to target people to gain money or information and describe a number of ways to help identify this content. They will be able to share tips on ways to increase privacy on apps and will begin to put these into practice on their own devices at home.</li></ul> |

## Impact

The expected impact of following the Kapow Primary Computing scheme of work at St Alban's is that children will:

- ✓ Be critical thinkers and able to understand how to make informed and appropriate digital choices in the future.

- ✓ Understand the importance that computing will have going forward in both their educational and working life and in their social and personal futures.

- ✓ Understand how to balance time spent on technology and time spent away from it in a healthy and appropriate manner.

- ✓ Understand that technology helps to showcase their ideas and creativity. They will know that different types of software and hardware can help them achieve a broad variety of artistic and practical aims.

- ✓ Show a clear progression of technical skills across all areas of the National curriculum - computer science, information technology and digital literacy.

- ✓ Be able to use technology both individually and as part of a collaborative team.

- ✓ Be aware of online safety issues and protocols and be able to deal with any problems in a responsible and appropriate manner.

- ✓ Have an awareness of developments in technology and have an idea of how current technologies work and relate to one another.

- ✓ Meet the end of key stage expectations outlined in the National curriculum for Computing.

## Appendix 1

Link to Computing skills progression – Kapow Primary (login required)
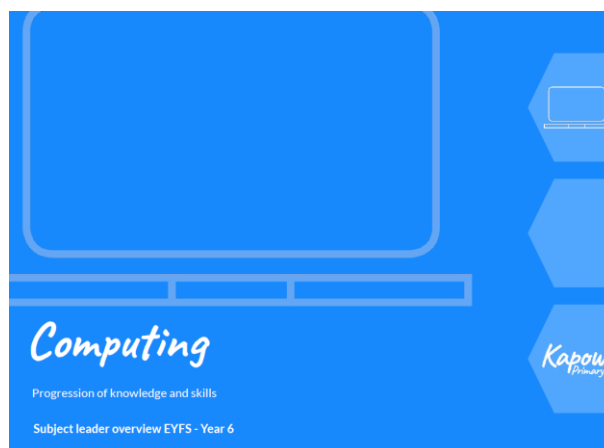


Hard copy available on :\\Staff Share\Computing\Kapow Documentation

## Appendix 2

On the next few pages is an example of a unit title page, Knowledge Catcher, Knowledge Organiser and End of Unit Quiz in one document.

# Year 6 Computing Autumn 2

# Programming: Intro to Python

# Year 6 - Introduction to Python

Use this image to answer the following questions:



```
<>  main.py                                    + ± ▣
 1  import turtle #get turtle
 2  tina = turtle.Turtle() #name the turtle tina
 3
 4  def home(): #create some code to tell the turtle where to start
 5    tina.penup()
 6    tina.setx(-140)
 7    tina.sety(15)
 8
 9  home() #run the code to start turtle in the right place
10  tina.clear() #always start with a clean page
11
12  tina.pendown() #pen down - get ready to draw
13
14
15
16  for i in range(4):
17    tina.pendown()
18    tina.circle(50)
19    tina.penup()
20    tina.forward(80)
21
```

Result                                    ☰ Instructions

Powered by 🔵trinket                                    ⊘

👆 Interactions 0        ⚑ Remixes 0        </> Views 0        👥 Shares 0        📖 Click To Publish

| 1 | What is the name of the program shown in the image above? Can you explain what would happen if you ran the circled code? |
|---|---|
| | _____ |
| | _____ |

| 2 | What coding language do you think is most commonly used – Logo or Python? Why? |
|---|---|
| | _____ |
| | _____ |

| 3 | Would you rather code with a block coding program (e.g. Scratch) or Python? Why? |
|---|---|
| | _____ |
| | _____ |

*Kapow Primary*

# Kapow Primary

## Introduction to Python

| | |
|---|---|
| Algorithm | A sequence of instructions which, when followed, solve a problem. |
| Code (computer) | A set of instructions written in programming language, to tell a computer what to do. |
| Computer command | To give an order or instruction to a computer, to complete a particular task. |
| Decompose | To break something down into smaller chunks. |
| Import (software) | To pull another file into software, to place, edit and manipulate. |
| Indentation (programming) | In programming (for example Python), indentation is used to define a block of code. |
| Loop | A repeated sequence of instructions. |
| Nested loop | A loop, within a loop. |
| Random numbers | An unpredictable sequence or reveal of numbers. |
| Remix | Something that has been reworked to produce a varying version of the original. |
| Script libraries | A series of pre-written, functional codes that can be accessed and imported into a program to save time. |
| Variable | This could be a number or text, that can change each time the program is run and often in combination with selection to change the end result of the program. |

## Did you know?



Python is used to teach computers how to think for themselves!

This is sometimes known as artificial intelligence (AI) or machine-learning.

They can learn skills such as speech recognition.

## Key facts

Python program to display times tables:

Try this Python code out yourself, and change the variable (input = 'x') to display a different times table chart.



```
# Times tables in Python
input = 10
# Iterate 10 times from i = 1 to 10
for i in range (1, 11) :
    print (input, 'x', i, '=', input *i)
```

Indentation
Variable
Loop

Algorithm to make a cup of tea:

The steps in the algorithm must be followed, if we ignored step one, we would have no hot water!

| | |
|---|---|
| 1. Mug and hot water | 2. Add teabag |
| 3. Remove teabag | 4. Dash of milk |
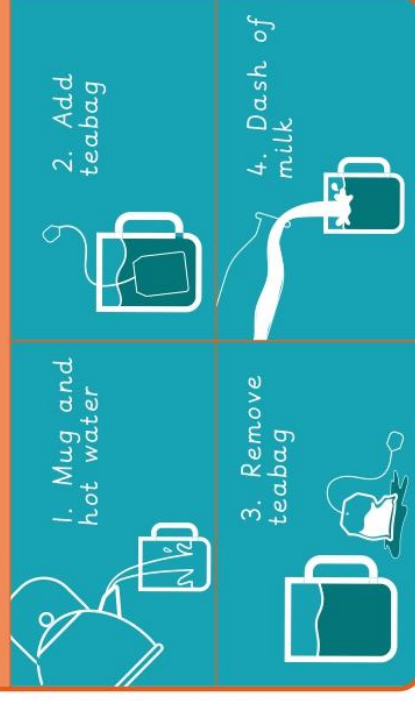
# Quiz

Unit title: _____

Name: _____    Date: _____

Question 1: [A] [B] [C] [D]

Question 2: [A] [B] [C] [D]

Question 3: [A] [B] [C] [D]

Question 4: [A] [B] [C] [D]

Question 5: [A] [B] [C] [D]

Question 6: [A] [B] [C] [D]

Question 7: [A] [B] [C] [D]

Question 8: [A] [B] [C] [D]

Question 9: [A] [B] [C] [D]

Question 10:

_____

_____

_____

_____

Score: _____

**Kapow** Primary