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| **Year 4 – Autumn – What did is more precious: Water or Gold**   * Create an input and output using symbols rather than numbers * Convert symbols to numbers   CS4 IT4 | | | **Key vocabulary:**  Input: information added into a program / algorithm by the user  Output: information displayed to the user by the program / algorithm  Symbols: ways of representing information pictorially  Counting: adding up and down  Place value: maths link Ones, Tens etc.  Processing: inputs being fed into a program before being outputted  Formulae: Another word for commands mostly used in spreadsheets | | |
| **Objective and Success Criteria** | **Coverage** | **Key Questions** | | **Children should be able to** | **Resources** |
| To understand inputs and outputs | * Understand that information is fed into a computer (INPUT) * Understand that the computer converts the information into language it can understand * Understand that a computer processes that information * Understand that computers convert the information to a format humans can understand * Understand that computers then return information to the user (output) | Why do we need inputs and outputs?  What does a computer do with the inputs? | | * Create non-digital inputs and outputs, using themselves as computers e.g. paper computer, sign language, dance commands etc. * Convert inputs to a different output | YouTube sign language videos  Additional information – Egyptian numbers  Additional information – Sign language |
| To use inputs and outputs | * Identify what information needs processing by the computer * Identify the information the user needs to INPUT into the program * Create a system for inputting the information * Add commands to the program to process the information * Create a system for displaying the OUTPUT in a format that is legible to the reader | How are we going to input the information?  What needs to happen to the inputted information?  How are we going to display the output so the reader can understand it? | | * Create inputs using images and counting buttons * Create formulae (code) to process the information * Create an output in numeral form |
| To evaluate the program | * Decide if the program can recognise inputs, process them and display outputs that are legible to the reader * Identify tests to ensure program runs correctly * Identify any errors in processing the information correctly * Identify problems with the user interface * Suggest improvements to a later version | Is the program accurate?  Does it allow us to process the information?  Can the reader understand the output?  Could it be improved? | | * Identify the place values in a binary block * Identify the numbers to add together and find the value of the block * Break numbers into place values and add 0 or 1 to a binary block to represent a number |
| E-Safety  Skill: How to recognise techniques for persuasion  Harm: Persuasive design | * Discuss how online videos may contain adverts for products * Discuss how to recognise when a video is trying to persuade you to do or buy something * Discuss what to do if the children feel someone is trying to persuade them | Are you being shown a product that can be purchased?  Are you being shown someone’s opinion? | | * Identify when attempts are being made to persuade them * Understand how to respond to these attempts |
| **Assessment Questions**  Can you create an input function?  Can you create a program to process the information?  Can you create an output function? | | | | | |

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| **Year 4 – Spring – What did the Romans do for me?**   * Create a playable game for a user * Create loops of commands within algorithms * Debug the algorithm | | | **Key vocabulary:**  Algorithm: a collection of commands to achieve a given goal  Commands: parts of an algorithm that have a specific purpose  Loop function: a command that allows other commands or algorithms to be repeated  Variable: a function that allows a user to input information to be used by an algorithm  Navigate: to move in specific directions  Efficiency: how much processing power needs to be used to run the algorithm  Debug: to identify code that does not achieve a given goal and adapt it | | |
| **Objective and Success Criteria** | **Coverage** | **Key Questions** | | **Children should be able to** | **Resources** |
| To understand what a loop function is | * Recap what an algorithm and commands are * Discuss and practically model repeated commands e.g. rather than saying walk forward a step 10 times you say walk forward 10 steps. * Explore how this is more efficient in coding as there is less code needed * Model and explore simple loop functions using non-digital methods | What is an algorithm and what are commands?  Why do we need to use loops in code? | | * Explain why we use loops in coding * Create simple non-digital loop functions | KUBO robots  Roman roads maps (teacher made) |
| To understand what a variable is | * Discuss how we knew to walk forward 10 steps with the loop * Understand this is because the variable of number of steps was set to 10, but it could have been set to any number * Discuss how computers use variables to allow users to input the number of times they want something looped * Model and explore variables using simple KUBO programs | Why do we use variables in code?  How does a variable affect the running code? | | * Explain the purpose of a variable * Create an add a variable to KUBO |
| To create a program with loops and a variable | * Explain to the chn that they are going to create a program where a KUBO needs to navigate Roman roads across Britain * Explore how we could use loops and variables to traverse the road rather than needing lots of commands | How are you going to improve the efficiency of your code using loops? | | * Add loop functions to a program * Use variables in the program |
| To debug a program | * Identify which commands are not working as intended * Identify the relevant section of code and evaluate it * Alter the code and test it | How is it not working?  Which code do you need to adapt?  How are you going to adapt it? | | * Identify where the code is not achieving the given aim * Identify the code that is at fault * Adapt the code and retest |  |
| **Assessment Questions**  How can you use a loop function to improve efficiency in your code?  How can you use a variable to allow a user to input information for your algorithm to use? | | | | | |

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| **Year 4 – Summer – What makes Britain’s coasts great?**   * Understand how information is send over the internet * Learn about devices used in networks   CS3 DL3 | | | **Key vocabulary:**  Packets: pieces of data pertaining to an instruction  IP address: Internet Protocol address – the address of a computer or server on the internet  Switch: connects to a network to direct packets to their destinations  Server: a computer that manages centralised resources  Requests: information asked for via packets send on the internet | | |
| **Objective and Success Criteria** | **Coverage** | **Key Questions** | | **Children should be able to** | **Resources** |
| * Understand information is sent in packets | * Explore the concept of packets of information to send around the internet * Explore what is contained within a packet (IP addresses, information on how to put them back together and request) * Explore IP addresses (link to binary in year 3) | What is a packet of information?  What is their purpose?  What is an IP address? | | * Explain what is contained within a packet of information and why they are used * Explain the purpose of an IP address | [BBC Bitesize - how the internet works](https://www.bbc.co.uk/bitesize/topics/z7wtb9q/articles/z3tbgk7)  [IP Addresses](https://computer.howstuffworks.com/internet/basics/what-is-an-ip-address.htm)  [Example of lesson](Resources/Summer%20-%20sending%20packets.docx) |
| * Understand how requests are made to web pages | * Explore how the packets of information are sent across the internet * Explore the role of switches and routers * Explore how computers and servers are able to send information across the internet using these packets | What is the purpose of a switch and router?  How are packets used to send requests across the internet? | | * Explain how switches and routers are used to direct packets of information * Explain how packets are directed and used by computers |
| * Create non-digital packet delivery using addresses | * Use knowledge of packets, routers, switches and IP addresses to create a paper based internet connection. * This could link to areas around the country that are being covered in the curriculum * See this resource | How are you going to send the information?  How do you know how to direct the packets? | | * Transport packets of information around the classroom to other children using IP addresses * Put the packets of information together to assemble the request |
| **Assessment Questions**  How are requests send across the internet?  How does information get to the correct computer? | | | | | |