Computing Learning Journey
Year 6 Autumn 2nd ½

6.2 We are computational thinkers

Mastering algorithms for searching, sorting and maths

Learn about quicksort algorithms.

Learn about selection sort algorithms

Learn about binary search algorithms

Learn about random and linear search algorithms

Find the smallest number of coins needed to make change

Find the shortest route between towns

Software: Google Maps, Scratch (alternative: Snap!) **Hardware:** Laptop/desktop/Chromebook computers or iPads, unplugged resources

Switched on Online Safety Unit:
Social and emotional wellbeing and developing resilience
Unit 6.2 – We will not share inappropriate images
Inappropriate use of technology and the internet

In Key Stage 1:
- Pupils thought about recipes as sequences of instructions in **Unit 1.2: We are TV chefs.**
- Pupils thought about the sets of rules for some simple computer games in **Unit 2.2: We are game testers.**

Unit overview:
The children will learn to:
- develop the ability to reason logically about algorithms
- understand how some key algorithms can be expressed as programs
- understand that some algorithms are more efficient than others for the same problem
- understand common algorithms for searching and sorting a list.

Key Vocabulary
- **Abstraction:** computational thinking approach to managing complexity by simplifying things, through identifying what is important and what detail can be hidden or ignored
- **Algorithm:** a sequence of precise instructions or steps (sometimes a set of rules) to achieve an objective
- **Binary search**: search algorithm that identifies repeatedly which half of the list of possible elements the target belongs to
- **Decomposition:** breaking a problem down into smaller parts
- **Divide and conquer**: class of algorithms in which the problem is decomposed into smaller, simpler parts, to which the same algorithm can then be applied
- **Graph**: data structure showing the connections between elements
- **Greedy algorithm:** algorithms that work on a 'biggest first' basis, applying divide and conquer methods to reduce the problem rapidly to a simpler problem
- **Linear search**: search algorithm that looks at each element in turn to see if it meets the criteria
- **Quicksort**: 'divide and conquer' sort algorithm which partitions a list into elements smaller than and larger than a pivot element, and then applies the algorithm to sorting each of these lists
- **Search**: to identify an element of a list that meets specified criteria
- **Search algorithm**: the way results for a search are selected and ranked, typically through the presence of key words, and by the number and quality of inbound links
- **Selection sort**: sort algorithm which looks for the largest element, then the next largest and so on, until the list is in order
- **Sort**: to put a list into order

Online safety:
If we create our own Scratch accounts at home we need to ask our parents first.
We know how to act appropriately whilst online and know what to do if we see anything inappropriate
Appropriate filters and monitoring are in place at school when we are online and are using Google Maps

In Key Stage 2:
Pupils used logical reasoning to detect and correct errors in programs in **Unit 3.2: We are bug fixers.**
- Pupils were introduced to the idea of a graph linking locations in an interactive adventure game in **Unit 5.5: We are adventure gamers**.
- Pupils are introduced to some of the algorithms for machine learning and other aspects of artificial intelligence in **Unit 6.6: We are AI developers.**