Knowledge Organiser – Computing: Algorithms & Programming (Robot Algorithms)

Years 1 & 2

What Is Computing?

- Computing helps us understand how computers, robots and digital devices work.
- Computers do not think for themselves — they follow instructions given by people.
- These instructions must be clear, precise and in the correct order.
- In school, we use computing to solve problems, create programs and think logically.
- Learning about algorithms helps children become confident problem-solvers and digital learners.

Algorithms

- An algorithm is a set of step-by-step instructions.
- Algorithms tell a computer or robot exactly what to do.
- The order of instructions is very important.
- If instructions are missing, unclear or in the wrong order, the program will not work.
- Algorithms are used in everyday life, such as following a recipe or directions.

Programming Robots

- A **program** is an algorithm written for a computer or robot.
- Floor robots (such as Bee-Bots or Blue-Bots) follow button commands.
- Common commands include: forward, backward, turn left and turn right.
- Robots move one step at a time and do exactly what they are told.
- Children test programs to see if the robot reaches the correct place.

Predicting and Debugging

- Before running a program, we can predict what will happen.
- Predictions are based on logical thinking, not guessing.
- If something goes wrong, it is called a bug.
- Debugging means finding the mistake and fixing it.
- Debugging helps children learn from errors and improve their programs.

Designing Mats and Routes

- Programming is not just about pressing buttons.
- Children design **mats**, **routes** and **challenges** for robots.
- A good mat has clear spaces, start and finish points, and safe routes.
- Testing the mat helps make sure the robot can move properly.
- Designing helps children plan before programming.

Breaking Problems Into Parts

- Some programming tasks are big and tricky.
- Children learn to break a big task into smaller steps.
- Each part has its own short algorithm.
- Putting the parts together helps solve the full problem.
- This skill is called **decomposition**.

Key Vocabulary To Explore At Home

Surface Knowledge: instruction, sequence, program, predict, robot, command, bug, debug, test

Deeper Knowledge: precise, logic, reasoning, outcome, route, evaluate**,** prediction

Adventurer Knowledge: procedure, debugging, algorithm, unambiguous, code

Home/School Links

• Talk about everyday algorithms (getting dressed, brushing teeth).
• Give instructions to a family member acting as a “robot”.
• Use arrows to plan routes around the house or garden.
• Play board games that require following steps or directions.
• Discuss mistakes as learning opportunities.
• Ask children to explain how they fixed a problem.
• Explore simple coding games together.

Useful Websites

Programming & Floor Robots

- Bee-Bot online emulator
  https://beebot.terrapinlogo.com
  Great for practising sequences without physical robots.

Teaching Computing Resources

- ScratchJr
  https://scratchjr.org
  Simple block-based programming for beginners (Year 2 onward).