

COMPUTING · GRADES K–3

# Algorithms Unplugged

Coding without computers

## Why unplugged computing?

An ALGORITHM is just a list of clear instructions in the right order. Children can learn this without screens. Once they understand algorithmic thinking, real coding becomes much easier later. These five activities cover the core ideas: sequence, precision, debugging, decomposition and abstraction.

## Activity 1 — Sandwich algorithm

### What you do

Tell the children: 'I'm a robot. I will only do EXACTLY what you tell me. Write me an algorithm to make a jam sandwich.' Children write step-by-step instructions.

### What happens (it's hilarious)

Children write 'put jam on bread'. You unscrew the lid, put the JAR on the bread. They protest. They rewrite. 'Use a knife to put jam on bread.' You stab the bread. The class laughs. They learn that algorithms must be EXACT.

## Activity 2 — Robot directions

One child is the 'robot'. Another is the 'programmer'. Set a goal — get from desk to door, picking up a book on the way. The robot only follows EXACT commands: • FORWARD 1 (one step) • TURN LEFT • TURN RIGHT • PICK UP If an instruction is unclear, the robot freezes. Programmers have to write a precise sequence. Add obstacles to make it harder.

## Activity 3 — The sort line

Five children stand in a line in random order. The class writes an algorithm to sort them by HEIGHT. INTRODUCE 'BUBBLE SORT': Compare child 1 and child 2. If child 1 is taller, swap them. Compare 2 and 3. Swap if needed. Continue down the line. Repeat until no swaps happen. It looks slow but works perfectly. Children love the moment they realise it's actually



finished.

### Activity 4 — Bug hunt (debugging)

Give children an algorithm with a deliberate mistake. Example: 1. Get bread 2. Get butter 3. Spread butter on bread 4. Put bread on plate 5. Get knife Children find the BUG (knife should be earlier — you need it for step 3) and fix it. Debugging is finding errors in instructions. It's a real coding skill.

### Activity 5 — Decomposing the day

DECOMPOSITION = breaking a big problem into smaller parts. Ask: 'How do you get ready for school in the morning?' Children list dozens of small steps: • Wake up • Get out of bed • Brush teeth • Wash face • Put on uniform... Then: 'Group them into stages.' (Wake up, get clean, get dressed, eat, leave.) That's decomposition. Big jobs are easier when broken down.

### Vocabulary to use throughout

ALGORITHM (a clear set of steps), SEQUENCE (the order of steps), PRECISION (being exact), BUG (a mistake in instructions), DEBUG (find and fix the bug), DECOMPOSE (break a big task into smaller ones).

