

Robots and rules: programming the floor robot

Lesson at a glance

Open by holding up the floor robot and arrow cards to land program, bug and short repeat in ordinary talk. Model one deliberate wrong-turn run on the taped mat so the class hears predict → run → notice → fix. Drive the algorithm-sequencer interactive for Challenge 1 (around the corner), then groups program a route with at least one turn and a short repeat on floor robots or child-robot lanes. Record the working program, bug and fix on the Investigation Journal page before a short talk on everyday machines.

Learning objectives

- Program a floor robot to follow a longer route with a turn and a repeat
- Predict where it stops, then find and fix a bug in the program

Before the bell: prep

Night before: tape a 4×4 floor grid (one Bee-Bot step per square) with clear start and finish needing a turn, plus 2–3 short taped paths or child-robot floor/desk grids so every group can run. Cut arrow cards (forwards, left, right) per group from sticky notes or scrap card.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
Bee-Bot or similar floor robot	1	class (or 1 per group if the school has several)	school kit	a child acting as the robot, moving only when shown arrow cards (expected parallel setup when only one programmable robot is available)
taped floor path or small grid with start and finish squares	2-3 short paths, or 1 class mat plus child-robot lanes	class (plan parallel run space so every group gets a turn)	classroom	masking-tape path of large floor squares in the hall, or desk-top grids for child-robot groups
arrow step cards (forward, turn left, turn right)	about 8-10 cards	group	classroom	arrows drawn on sticky notes or scrap card (this is the main prep, not a fallback)
Investigation Journal page	1	pupil	classroom	plain paper with three headings: Program in order, Bug we found, What we changed

**Safety watch-point**

Clear each lane before Go; robots stay on the mat only; no chasing across the room; child-robots walk carefully on marked squares only.

Teaching moves

- **Getting Started:** Hold up the robot, then one idea at a time: fan arrow cards for program, swap one wrong turn for bug, fan three forwards for short repeat. Ask whose job it is when the robot goes wrong — draw out that the bug is in our program. Show the mat briefly; do not run a full program yet.
- **Watch a program run:** On the real mat, plan aloud forward, forward, turn right, forward, forward, but enter turn left by mistake. Press Go in silence. Ask which step made it miss, change left to right, and rerun so it lands on finish. Revoice: the robot followed the program; we fix the steps.
- **Plan the route on the board:** Drive the algorithm-sequencer interactive in challenge mode; pupils call the next step while you drag and Run. Complete Challenge 1 only (around the corner, ≤6 steps) through predict → run → freeze-and-debug. After a miss, freeze and ask where the bug is. If the class struggles, walk the route with your finger first.
- **Program the floor robot:** Agree start, finish, one turn and a short repeat. Run groups of 3–4 in parallel on taped paths or child-robot lanes so every group gets a predict-run-fix cycle; avoid one shared mat with more than four groups. Before Go, the group says aloud where it will stop; on a miss, change one step at a time.
- **Record our program:** Pupils write or draw on the Investigation Journal only from the real run they just did. Prompt: steps in order, which step was the bug, what changed. First-time success groups can note a near-miss step as extension; groups who never ran do a quick child-robot cycle before writing.
- **Programs in the real world:** Short display-only talk. Lead with the lift example, then take two or three pupil ideas (washing machine, traffic lights, automatic doors). Steer to: real machines need exact programs, and a bug is almost always in the instructions.

What it should show

A successful outcome is a clear sequence with at least one turn and a short repeat (e.g. three forwards), a spoken prediction before Go, and either a first-time finish or one thoughtful single-step fix after a miss. Odd misses usually mean a wrong turn direction, a forgotten forward, or the robot not starting square-on — recheck start facing and change one step only.

Misconceptions & interventions

- **Pupils say the robot is broken or naughty when it misses the finish.** Point at the buttons they pressed and revoice: the robot followed the program perfectly; our job is to find the wrong or missing step and fix it.
- **Pupils change several steps at once after a miss, so they cannot tell which fix worked.** Freeze the group and insist on one change only — swap the suspect turn or add/remove one forward — then rerun and compare.
- **Pupils think a short repeat is a special button rather than the same step said more than once.** Fan three forward arrow cards together and say them aloud: forward, forward, forward — that is the short repeat they already used.

**Differentiation**

Emerging	Developing	Proficient
• Walk the route with a finger on the grid or arrow cards first, saying each step aloud before any buttons are pressed; pair at the teacher path for the first predict-run-fix.	• After a working run, ask which single wrong step would have sent it the other way around the corner, still using the same arrow cards.	• Add one extra improvement on the same Journal page, or watch another group debug and whisper one tip about which step to change.

Cross-curricular hook

Link to Maths shape and space — left/right turns and counting forward steps on a grid path.