

Robot Route

Ages 9–14 + parents · 1–4 players · about 30 minutes · no screens

OBJECTIVE

Act 1: write a program that walks the robot through a maze. Act 2: don't program it. Teach it, by showing it what to do in four training mazes. Then let it loose on three test mazes it has never seen. Score 2 for a program that works and 3 for every test maze your robot finishes by itself.

MATERIALS

The 2-page Maze Book (7 mazes and robot tokens), the Habit Sheet, and a pencil.

SETUP

- 1 Lay out the Maze Book. Put the robot token on the start square of Training maze 1, its arrow pointing the way the printed arrow points.
- 2 Play solo, or split into two teams. Each team takes one Habit Sheet table and one Program Strip.
- 3 The robot only ever knows one thing: which of the three squares next to it (left, ahead, right) are open. It can't see the goal.

ACT 1 – PROGRAM IT

- 1 Everyone writes a program for Training maze 1, one move per box, in pencil. Don't touch the robot while you write. The shortest one is 16 moves.
- 2 Run each program move by move. Hit a wall or the edge = crash, and the run is over.
- 3 Reached the goal? +2.
- 4 Now put the robot on Test maze 1 and run the same program. Watch what happens. A program only knows the maze it was written for.

ACT 2 – TEACH IT

- 1 Walk the robot through Training mazes 1, 2, 3 and 4, one at a time. Take turns moving it. Choose any route you like.
- 2 Before every step: look left, ahead and right of the robot. Find the matching row on your Habit Sheet, then tally the move you're about to make.
- 3 A situation not on the sheet? Then the robot has nothing to go on there. Don't tally it.
- 4 Tip: pick one habit and show it every time. A robot shown three different things in the same situation learns nothing useful.

TEST IT

- 1 Put the robot on Test maze 1. Nobody steers now. Each step, find the situation's row and make the move with the most tallies.
- 2 No row for it, no tallies in it, or a tie: the robot freezes. That run is over.
- 3 Goal reached within 30 steps? +3. Still wandering at step 30? It's going in circles. Stop.
- 4 Run Test mazes 2 and 3 the same way. Most points wins. Ties share the win.

WHAT THE ROBOT TEACHES

- 1 Program: exact steps for one problem. Perfect there, useless anywhere else.
- 2 Learning: a rule picked up from examples. It works on mazes it never saw. That's the whole reason to learn instead of program.
- 3 Only what it has seen: Test maze 2 has a crossroads. No training maze does, so there's no row for it, and a habit-taught robot freezes. Real AI gets stuck the same way on situations missing from its training data.
- 4 Edge cases: a habit that works almost everywhere can still fail badly. On Test maze 3 the keep-the-wall-on-your-right habit goes round in circles with the goal two squares away.
- 5 The robot can't see the goal. Neither can a learned rule. It only knows what its sensors tell it.

VARIANTS

- 1 Left hand: train the keep-the-wall-on-your-left habit instead. It beats Test maze 3, which the right-hand habit never can. Neither habit is smarter. They fail in different places.
- 2 More data: add a crossroads row to your sheet in pencil, teach it on Test maze 2, then try again. That's retraining.
- 3 Shortest program race: who can solve each training maze in the fewest moves?

PRINT TONIGHT

Plain paper, one side, Actual Size / 100%. Print one Habit Sheet per two teams. You also need a pencil and a robot token: cut one from the Maze Book, or use a LEGO figure or an eraser with a drawn arrow.

Maze Book: 2 pages. Habit Sheet: 1 page (two teams). Print a fresh Habit Sheet for every game.