Lesson Plan: Robot Teacher

Year Group: 7 | **Duration:** 50 minutes | **Topic:** Algorithms

1. Overview

Core Concept: Algorithms — a precise, ordered set of instructions that must be followed exactly.

Learning Objectives:

- Define what an algorithm is
- Write unambiguous, step-by-step instructions for a simple task
- Test instructions by acting as a "robot" and identify where they fail
- Revise (debug) instructions to remove ambiguity

Key Vocabulary:

Term	Definition
Algorithm	A precise, step-by-step set of instructions for completing a task
Instruction	A single, clear command
Precise	Leaving no room for interpretation or guessing
Ambiguous	Open to more than one meaning; unclear
Debug	Find and fix errors in an algorithm

2. Before the Lesson

Print:

- ☐ `worksheet-instruction-sheet.md` — 1 copy per student

Gather:

- ☐ Blank paper (1 sheet per student for the robot to draw on)
- ☐ Pencils or pens for all students
- ☐ Ruler (optional — for measuring 5 cm sides)

Room Setup:

- Arrange desks so students sit in pairs, facing each other
- Keep aisles clear so robots can hold up their paper for the class to see

Teacher Preparation:

- Practice giving deliberately vague instructions: say things like "draw a house" — let the robot draw something silly/wrong

3. Timed Lesson Flow

0–5 min — Hook: The Bad Robot

1. Pick a volunteer to be your robot.
2. Tell the robot: *"Draw a house."*
3. The robot draws something reasonable — celebrate its weirdness.
4. Be deliberately vague: *"Make the house bigger. Add a door. Put a window somewhere."*
5. Ask: *"What went wrong? Why didn't the robot draw exactly what I imagined?"*
6. Key point: **The robot followed your instructions exactly. The problem was the instructions, not the robot.**

5–15 min — Introduce the Challenge

1. Today everyone will write instructions for a robot to draw a specific shape.
2. **The task:** Write instructions for drawing a square with 5 cm sides, with a triangle sitting on top. No diagrams — words only.
3. Distribute `worksheet-instruction-sheet.md`.
4. Students write individually. Remind them: "If you don't say it, the robot won't do it."

15–25 min — Robot Test Round 1

1. Students swap worksheets with their partner.
2. The partner follows the instructions EXACTLY — no interpretation, no helping.
3. Observer (original writer) watches silently.
4. Writer marks on worksheet: which steps failed?

25–35 min — Debug Round

1. Writers get their worksheets back.
2. Rewrite failing instructions — add steps, change wording, split steps.
3. Swap again. Robot follows revised instructions.

35–45 min — Extension Activity

For pairs who have succeeded:

- Write instructions for walking from the classroom door to the teacher's desk and back.
- Or: write instructions for the first 3 folds of a paper airplane.

45–50 min — Class Debrief

- *"What made your first instructions fail?"*
- *"What would happen if a computer program had ambiguous instructions?"*
- *"Can a computer ever 'guess' what you mean?"*

Close: **"Computers follow instructions exactly — every time. Precision is everything."**

4. Teacher Facilitation Notes

What to look for:

- Students writing vague instructions ("draw a line" — which direction? how long? from where?)
- Students assuming their partner will "just know"
- Robots who interpret charitably — encourage robots to be pedantic!

How to intervene minimally:

- Don't fix students' instructions — ask questions:
    - *"Does your instruction say LEFT or RIGHT?"*
    - *"Your instruction says 'draw a line' — how long? From what starting point?"*
    - *"If I have never seen a square before, how do I know when to stop?"*

Common misconceptions:

- "The robot will understand what I mean" — computers only do what they are told
- "My instructions are clear enough" — encourage students to follow their own instructions literally
- Debugging means starting over — it means finding the specific broken step

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5. Extension / Early Finisher Tasks

1. **Tea-making algorithm:** Write step-by-step instructions for making a cup of tea. Which steps could a machine do? Which require human judgement?
2. **Shortest algorithm:** Can you complete the task in the fewest possible steps?
3. **Deliberate ambiguity:** Write instructions with exactly ONE ambiguous step. Can a partner find it?

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6. Key Takeaway

> **An algorithm is a precise, step-by-step set of instructions. Computers follow them exactly — there is no guessing, no common sense, no interpretation. Every word matters.**