

Name _____

Class _____

Date _____

By the end of this worksheet I can...

- ☐ draw a universal system diagram (input, process, output) for a given system
- ☐ draw sub-system diagrams, including feedback paths
- ☐ describe the difference between open loop and closed loop control
- ☐ recognise time-based (fixed loop) and sensor-based control
- ☐ draw and describe a closed loop control diagram: comparator, controller, driver, output, sensor

I DO**Worked example** Read how a full-mark answer is built

An automatic hand dryer switches on when hands are detected under it and switches off after 10 seconds.

1 Draw a universal system diagram for the hand dryer. (3 marks)**Full-mark answer** each ✓ is one mark

Input: presence of hands ✓ → Process: control/timing ✓ → Output: heat and moving air ✓.

Why marks are not awarded

"Input: IR sensor → Process: microcontroller → Output: heater and fan."

0 marks: these are components, not system-level inputs and outputs.

WE DO**Guided practice** Use the starters and word bank to help you

A flowchart flashes a warning lamp exactly 8 times.

2 State the type of loop used in the flowchart. (1 mark)**Sentence starters**

1. ...

Word bank

Fixed loop

Tip: 1 marks = 1 separate, developed points.

YOU DO**On your own** No notes. Check your answers afterwards.**3 Quick check: tick one box for each.**

- a) A toaster that pops up after a fixed time is...
☐ Closed loop ☐ Sensor-controlled ☐ Open loop ☐ Feedback-controlled
- b) On a universal system diagram, the middle block is labelled...
☐ Process ☐ Control ☐ Driver ☐ Sensor
- c) In a closed-loop heater, which component measures the actual temperature?
☐ The heater element ☐ The relay contacts ☐ The comparator ☐ Temperature sensor

4 Key terms: write the letter of the matching description next to each term.

1. Universal system diagram	___	A One block of a system, e.g. sensor, controller, driver, output device.
2. Sub-system	___	B The signal from the output returned to the input/controller for comparison.
3. Open loop control	___	C Input → process → output.
4. Closed loop control	___	D No feedback: the output is not checked.
5. Feedback	___	E A sensor feeds back the actual output; the controller compares it with the set level and adjusts.

The hand dryer runs for 10 seconds every time it is triggered.

5 State whether the dryer uses open loop or closed loop control, and justify your answer. (2 marks)

A greenhouse heater keeps the temperature at 22 °C using a thermistor.

6 Describe how the closed loop control system keeps the temperature at 22 °C. (3 marks)

An automatic car park barrier has a car sensor, a motor, and two micro switches that detect when the barrier is fully up or down.

7 Draw a sub-system diagram for the barrier, including feedback. (4 marks)

Check and reflect

Mark your answers with the answer sheet. Go back to the checklist on the site and re-rate each “I can” statement above. Which one still needs work?
