

Answers and marking guidance

Award one mark per correct, developed point unless stated. Other valid answers should be credited.

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

- Open loop
- There is no feedback: it runs for a set time whether the hands are dry or not

3 Quick check

- a) Set – feedback
- b) Proportional
- c) Process
- d) Open loop

4 Key terms

- 1 – F
- 2 – E
- 3 – A
- 4 – D
- 5 – C
- 6 – B

5 Explain why two-state (on/off) control is unsuitable for the incubator.

- The heater switches fully on or off, so the temperature overshoots and undershoots the set level
- The temperature would go outside the ± 0.2 °C tolerance, which could damage the eggs

No marks for: "Proportional is more accurate" without linking to the incubator

6 Describe how proportional control works.

- The size of the controller's output depends on the size of the error
- A large error gives a large output; as the error reduces, the output reduces, giving smooth control

7 Describe how the closed loop control system keeps the temperature at 22 °C.

- The thermistor (sensor) measures the actual temperature and feeds it back
- The controller/comparator compares the actual temperature with the set level of 22 °C
- If it is too low the heater is switched on; when 22 °C is reached it switches off

No marks for: "It uses feedback" with no sensor or comparison