

Feedback

Learning objective 4.4.A Explain how feedback mechanisms maintain homeostasis.

Name: _____

Date: _____

Period: _____

Use the tool **Push Back, Push On**. Parts 1 and 2 use **Run the loop**, Part 3 uses **Six real loops** and Part 4 uses **Why 37 is never 37**. The two kinds of feedback differ by one thing only — the **direction** of the response relative to the change. Everything else follows from it.

Part 1 · Two loops, the same disturbance

Leave the response strength at **0.45**. Set the starting value to each figure below, once with **Negative feedback** selected and once with **Positive feedback**.

Starting value	Negative: after 5	Negative: after 40	Positive: after 5	Positive: after 40
43.0				
40.0				
37.0				
34.0				

1. Describe what the negative feedback loop does to the variable, and what the positive feedback loop does.

2. One row of your table shows nothing happening under either loop. Identify it and explain why.

3. With negative feedback, the correction was downward from 43 and upward from 34. Explain how one mechanism produces both.

Part 2 · What every loop is made of

Open **The parts every loop has** and read it, then fill this in for body temperature from what you already know.

Part of the loop	For body temperature	What it would be for blood glucose
What detects the change		
What responds to it		
The set point		
Direction of the response		

4. Name the three parts every feedback loop needs.

5. Explain why a positive feedback loop does not have a set point.

Part 3 · Six real loops

Switch to **Six real loops**. For each system, decide which kind of feedback it is **before** you read the label, then record what ends it.

System	Your prediction	Actual	Set point?	What ends it
Body temperature				
Blood glucose				
Blood water concentration				
Childbirth				
Blood clotting				
Fruit ripening				

6. All three positive feedback loops in your table are ended by something. State the pattern in what ends them.

7. A student writes that positive feedback is harmful and negative feedback is helpful. Evaluate that claim using two of your examples.

Part 4 · Why 37 is never exactly 37

Switch to **Why 37 is never 37**. Set the delay to each value and record what happens. Start at zero.

Delay	Times it crosses the set point	Furthest overshoot (°C)	Do the swings shrink or grow?
0			
1			
2			
3			
4			

8. A healthy core body temperature is quoted as a range rather than a single number. Explain why, using your table.

9. Explain what causes the overshoot, given that the loop is doing exactly what a negative feedback loop should.

10. Predict what happens to blood glucose if the cells that release insulin stop working, and explain your prediction in terms of the loop.

What the model simplifies

Both loops are run with a single response strength and a single variable. Real regulation uses several effectors at once, often with different strengths and different delays, and several variables are usually being regulated together.

The positive feedback curve has no ceiling, so it runs off the top of the graph. Every real positive feedback loop meets a limit — the baby is born, the clot is complete, the fruit is ripe — and the tool names that limit for each example rather than drawing it.

Time is in arbitrary ticks. A real temperature correction takes minutes and a real clotting cascade takes seconds, so the horizontal axis is a sequence of events rather than a clock.

The set points are the values usually quoted for a healthy adult at rest. They are not fixed constants: a set point can be shifted deliberately, which is what a fever is.