



HOMEOSTASIS

How the body keeps its internal environment stable

What Is Homeostasis?

Homeostasis is the body's ability to keep its internal environment relatively stable and constant, even when conditions inside or outside the body change.



Dynamic, not static

The body constantly makes small adjustments, pulling variables back toward a normal range (the set point).



Driven by feedback loops

Most homeostatic control happens through negative feedback — the mechanism this deck focuses on.



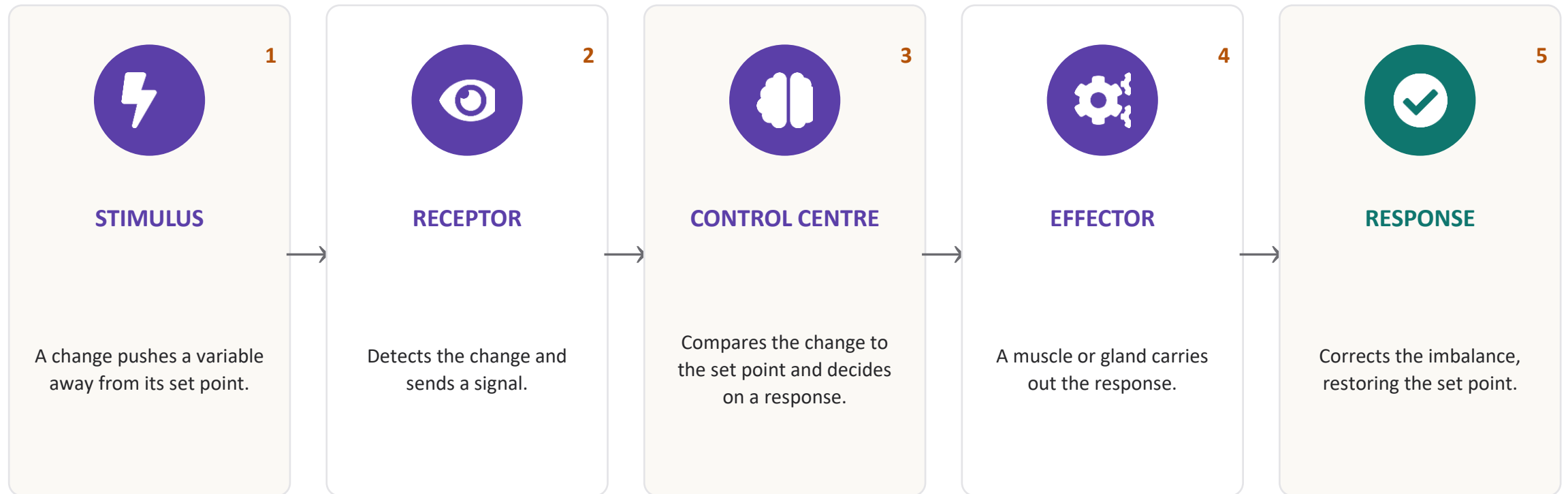
Essential for survival

Cells and enzymes only function properly within narrow physiological ranges.

Think of a thermostat: it doesn't just switch the heater on once — it constantly checks the temperature and makes small corrections to stay near the target. The body works the same way.

The Negative Feedback Loop

Five components work together to detect a change and correct it.



Once the response restores the set point, the stimulus fades — switching the loop off.

Homeostasis in Action

Three examples from the O-Level Biology syllabus.



Thermoregulation

STIMULUS

Body temperature drifts from 37°C

CONTROL CENTRE

Hypothalamus

RESPONSE

Shivering, sweating, vasoconstriction/vasodilation of skin vessels



Blood Glucose

STIMULUS

Glucose rises after a meal

CONTROL CENTRE

Pancreas

RESPONSE

Insulin release — cells take up glucose from the blood



Water Balance

STIMULUS

Blood becomes more concentrated

CONTROL CENTRE

Hypothalamus & pituitary

RESPONSE

ADH release — kidneys reabsorb more water

Why It Matters



Without homeostasis...

Enzymes denature outside narrow temperature and pH ranges. Cells can't function properly if their surrounding fluid drifts too far from normal — reactions slow, stop, or go wrong entirely.

1

Keeps enzymes working

Most enzymes have an optimum temperature and pH — homeostasis keeps conditions close to that optimum.

2

Protects cell function

Stable glucose, water, and ion levels let cells carry out normal metabolic processes.

3

Enables independence

Stable internal conditions let organisms function across a wide range of external environments.



See It in Action

Ben's Bad Day walks through five real negative-feedback loops — blood pressure, temperature, pH, water balance, and blood glucose.

STIMULUS → RECEPTOR → CONTROL CENTRE → EFFECTOR → RESPONSE