What are Feedback Mechanisms and Homeostasis?

Worksheet

Homeostasis is a stable internal environment maintained by feedback loops. Negative feedback opposes change (thermostat), while positive feedback amplifies it (childbirth). Both are essential for survival.

Questions

1. What is the primary advantage of negative feedback?

A) Amplifies small changes
B) Maintains stability
C) Speeds up processes
D) Prevents homeostasis

2. Which is an example of positive feedback?

A) Temperature regulation
B) Blood clotting cascade
C) Insulin regulation
D) Thirst response

3. What happens if negative feedback fails?

A) System stays stable
B) System spirals out of control
C) Positive feedback starts
D) No change occurs

4. In thermoregulation, sweating is triggered by

A) Cold sensors
B) Hypothalamus detecting high temperature
C) Shivering
D) Hibernation

5. Body temperature rises to 38.5C. How does negative feedback bring it back to 37C?

6. Blood glucose rises to 150 mg/dL after a meal. Explain the negative feedback response.

7. Childbirth: How is positive feedback used during labor contractions?

8. Define: What is homeostasis?

9. Define: What is negative feedback?

10. Define: What is positive feedback?

Answer Key

1. B) Maintains stability - Negative feedback counteracts changes, keeping the internal environment stable - essential for homeostasis.

2. B) Blood clotting cascade - Blood clotting amplifies - thrombin activates more platelets, accelerating coagulation until bleeding stops.

3. B) System spirals out of control - Without negative feedback, disturbances cannot be corrected, leading to disease or death (e.g., uncontrolled diabetes).

4. B) Hypothalamus detecting high temperature - The hypothalamus detects core temperature above 37C and activates sweat glands to increase heat loss.

5. Hypothalamus detects 38.5C > 37C setpoint Sweat glands activate, blood flow to skin increases Heat loss via sweating and radiation Temperature drops to 37C, response stops

6. Pancreatic -cells detect 150 mg/dL > 100 mg/dL normal Insulin secretion increases Cells take up glucose, liver stores glycogen Blood glucose falls to ~100 mg/dL, insulin stops

7. Uterine muscle stretches Oxytocin is released from pituitary Oxytocin stimulates stronger uterine contractions More stretch more oxytocin (amplification until delivery)

8. The maintenance of stable internal conditions (temperature, pH, glucose) despite external changes.

9. A response that opposes change and restores the system to its original state (thermostat example).

10. A response that amplifies change to accelerate a process (childbirth, blood clotting).