What is Homeostasis?

Worksheet

Homeostasis is the maintenance of a stable internal environment in an organism through self-regulating feedback mechanisms, chiefly negative feedback loops that detect a change and trigger a response to reverse it.

Questions

1. Which of these best defines homeostasis?

A) Constant growth of an organism
B) Maintenance of a stable internal environment
C) Reproduction of cells
D) Breakdown of nutrients

2. What triggers a response in a feedback loop?

A) The effector
B) The stimulus detected by a receptor
C) The set point itself
D) Random cell division

3. Which hormone lowers blood glucose after a meal?

A) Glucagon
B) Insulin
C) Adrenaline
D) ADH

4. Positive feedback differs from negative feedback because it

A) Reverses the original change
B) Amplifies the original change
C) Has no effector
D) Only occurs in plants

5. Explain how the body regulates temperature when you exercise and start to overheat.

6. How does the body respond after you eat a large meal and blood glucose spikes?

7. What happens to water balance after drinking very little water on a hot day?

8. Define: What is homeostasis?

9. Define: What is a negative feedback loop?

10. Define: Name the four parts of a feedback loop.

Answer Key

1. B) Maintenance of a stable internal environment - Homeostasis specifically refers to keeping internal conditions stable, not growth or reproduction.

2. B) The stimulus detected by a receptor - A receptor detects the stimulus (change) and starts the corrective response.

3. B) Insulin - Insulin, released by the pancreas, lowers blood glucose by promoting uptake and storage.

4. B) Amplifies the original change - Positive feedback pushes the variable further from the set point, unlike negative feedback.

5. Stimulus: core body temperature rises above ~37C Receptor: thermoreceptors in the skin and hypothalamus detect the rise Control center: the hypothalamus signals the effectors Effector: sweat glands and dilated blood vessels release heat Result: temperature drops back toward 37C, completing the negative feedback loop

6. Stimulus: blood glucose rises above the normal range (~70-100 mg/dL fasting) Receptor: pancreatic beta cells detect high glucose Control center/Effector: the pancreas releases insulin Insulin signals cells to absorb glucose and the liver to store it as glycogen Result: blood glucose falls back to the normal range

7. Stimulus: blood becomes more concentrated (low water, high solute levels) Receptor: osmoreceptors in the hypothalamus detect the change Control center: the hypothalamus triggers ADH (antidiuretic hormone) release Effector: kidneys reabsorb more water, urine becomes concentrated Result: blood water concentration returns to normal, thirst also increases

8. The maintenance of a stable internal environment despite external changes, achieved through feedback mechanisms.

9. A response that reverses a change, pushing a variable back toward its set point - the main mechanism of homeostasis.

10. Stimulus, receptor, control center, and effector.