Name _____ Date _____

Homeostasis and Feedback Unit Review: How the Body Keeps Temperature and Blood Glucose in Range

Directions: Answer the questions on homeostasis and feedback. The last group of questions uses a table of blood glucose and insulin values measured around a meal.

1. Which statement best describes homeostasis?

A. Keeping conditions inside the body within a narrow range around set points as conditions outside change

B. Changing the conditions inside the body until they match the conditions outside it

C. Holding every condition inside the body at one exact value that never changes, no matter what happens outside

D. Speeding up every process in the body whenever conditions outside the body change

2. In the feedback loop that controls body temperature, match each part of the loop to its role.

Write the letter of the matching answer on each line.

1. _____ Effector
2. _____ Set point
3. _____ Sensor
4. _____ Control center

Choices for question 2

A. A body temperature of about 37 °C

B. The air temperature outside the body

C. The hypothalamus, which compares body temperature with the set point

D. Nerve endings in the skin that detect a rise in temperature

E. Sweat glands, which release sweat when signaled

3. In a negative feedback loop, how does the body's response relate to the change that set it off?

A. The response is called negative because it always harms the body in some way.

B. The response adds to the change, moving the condition farther from the set point.

C. The response happens only once, after which the condition stays fixed for good.

D. The response reverses the change, moving the condition back toward the set point.

4. A home heating system keeps a room near 20 °C. A thermometer in the thermostat measures the room's temperature, the thermostat compares it with the 20 °C setting, and when the room is too cool it switches on the furnace until the room warms up. Which part of this system acts as the effector?

A. The 20 °C setting on the thermostat

B. The thermometer in the thermostat

C. The furnace

D. The cold air outside the house

5. When body temperature drops below its set point, which two responses help bring it back up?

☐ A. Widening of the blood vessels in the skin

☐ B. Lowering the body's temperature set point

☐ C. Sweating

☐ D. Narrowing of the blood vessels in the skin

☐ E. Shivering

6. On a hot day, body temperature starts to rise, and sweat glands release sweat onto the skin. How does sweating help cool the body?

A. As the sweat evaporates from the skin, it carries heat away from the body.

B. The sweat removes extra glucose from the blood, so the cells release less heat.

C. The sweat narrows the blood vessels in the skin, so less warm blood reaches it.

D. The sweat is colder than the body, so it chills the skin as soon as it comes out.

7. Fill in the blanks about how blood glucose comes back down after a meal, using the word bank.

Word bank
oxygen • starch • glucose • glucagon • glycogen • insulin

After a meal, blood sugar rises, and the pancreas releases the hormone _____. This hormone helps body cells take up _____ from the blood, and it signals the liver to store some of it as _____.

8. Several hours after a meal, blood glucose drops below its set point. Which response brings it back up?

A. The hypothalamus releases glucagon, which signals the muscles to start shivering for energy.

B. The liver stores more glucose as glycogen until the amount of glucose in the blood rises again.

C. The pancreas releases glucagon, which signals the liver to break down glycogen and release glucose.

D. The pancreas releases more insulin, which signals body cells to take up even more glucose from the blood.

9. During childbirth, the baby's head pushes against the cervix and stretches it, which triggers the release of the hormone oxytocin. Oxytocin makes the uterus contract more strongly, which pushes the head harder against the cervix and releases still more oxytocin. What kind of feedback is this, and what ends it?

A. Positive feedback, which ends when the baby is born and the stretching of the cervix stops

B. Positive feedback, which never ends once the first contraction has started

C. Negative feedback, which ends when the strength of the contractions returns to its set point

D. Negative feedback, which ends when the body runs out of the hormone oxytocin

10. Which statement about feedback in the human body is accurate?

A. Most homeostatic control uses positive feedback, and negative feedback takes place only during childbirth.

B. Positive feedback never happens in the human body, because it would push conditions away from set points.

C. Most homeostatic control uses negative feedback, though positive feedback also occurs, as in blood clotting.

D. Body temperature and blood glucose are both controlled mainly by positive feedback loops in the body.

Blood Glucose and Insulin After a Meal

In a study, 12 adult volunteers without diabetes ate the same meal after not eating overnight. Blood samples were taken just before the meal began (0 minutes) and at five times afterward, and blood glucose and insulin were measured in each sample. Each value in the table is the mean for the 12 volunteers.

Mean blood glucose and insulin of 12 adults before and after the same meal

Time after the meal began (min)	Mean blood glucose (mg/dL)	Mean blood insulin (microunits per mL)
0	88	7
30	138	54
60	124	62
90	106	38
120	93	19
180	86	8

11. By how much did mean blood glucose rise from just before the meal to its highest value?

A. About 36 mg/dL

B. About 138 mg/dL

C. About 14 mg/dL

D. About 50 mg/dL

12. How did the timing of the peak in mean insulin compare with the timing of the peak in mean glucose?

A. Insulin peaked at 60 minutes, about 30 minutes after glucose peaked.

B. Insulin peaked at 30 minutes, at the same time as glucose peaked.

C. Insulin peaked at 0 minutes, before the meal had raised glucose.

D. Insulin peaked at 120 minutes, once glucose was nearly back to its start.

13. Which claim about blood glucose control is supported by the table?

A. Glucose rose after the meal and then fell back near its starting value while insulin was raised, which fits negative feedback.

B. Insulin rose before glucose did, which shows that the rise in insulin is what made glucose rise after the meal.

C. Glucose rose after the meal and then stayed at its highest value for all 180 minutes of the study, so no feedback took place.

D. These results prove that insulin is the only hormone in the body that can ever lower the glucose in the blood.

14. In type 1 diabetes, the pancreas makes little or no insulin. Suppose a person with type 1 diabetes ate the same meal without taking any insulin for it. Compared with the table, how would this person's results most likely differ?

A. Glucose would rise higher and stay high longer, and insulin would stay low.

B. Glucose would fall below its starting value, because glucagon would do insulin's job.

C. Glucose would rise less than in the table, because insulin is what raises glucose.

D. Glucose and insulin would both follow the table closely, since the meal is the same.