Name:_____ Period:_____ Teacher: Mrs. Horton

Living Earth: Week 3 Assignments → 4/20 – 4/24

Summary from previous work: Even though your cells have different shapes and jobs, they all have the exact same DNA. Once a cell has *differentiated*, it is stuck doing only one job and cannot take on another job (for example, a lung cell cannot decided to change jobs and become a liver cell).

Your body cells are organized into different levels: cells → tissues → organs → organ systems → individual. Each *organ system* depends on each other. If one organ system stops functioning or is damaged, the other systems suffer and the organism could die.

Big Ideas We'll Be Discussing: Homeostasis and Feedback

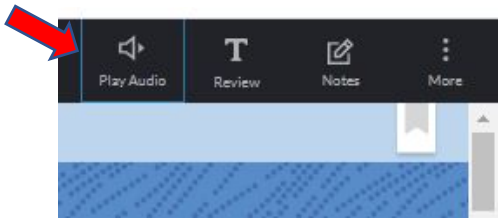
- *While cells, tissues, and organs may perform very different functions, all the cells in the body are similar in their metabolic needs. Maintaining a constant internal environment by providing the cells with what they need to survive (oxygen, nutrients, and removal of waste) is necessary for the well-being of both individual cells and the entire body. The many processes by which the body controls its internal environment are called **homeostasis.** The function of major body systems is what keeps homeostasis.*
- *Homeostasis is an important characteristic of all living things. Keeping a stable internal environment requires constant adjustments as conditions change inside and outside the cell. The adjusting of systems is done by **feedback loops**. Because the internal and external environments of a cell are constantly changing, adjustments must be made continuously to stay at or near the set point (the normal level or range).*
- *Feedback occurs when the response to a stimulus has some kind of effect on the original stimulus. The type of response determines what the feedback is called. **Negative feedback** occurs when the response to a stimulus reduces the original stimulus. **Positive feedback** occurs when the response to a stimulus increases the original stimulus.*

☑ Assignment #1: Mechanisms of Homeostasis

(if you don't want to do the online login and have your textbook with you, read pages 490-495 in place of doing steps 1-4)

1. Log into the HMH Textbook via Clever (login instructions on my website)
2. On the top tab bar in the middle is "Assignments"…click on that.
3. Click on "Student EBook: Explore/Explain 1: Control Systems in Organisms"
4. Read and click/watch the interactives. (I suggest you have the "quiz" open and complete it as you are reading. It will make things go more quickly)
   a. Please skip the Model, Hands on Activity (Modeling Feedback), and Evidence Notebook.

   Get the text read to you by clicking the PLAY AUDIO icon at the top right corner



5. As you are reading the textbook, please complete these questions: (on next page)

Please circle the correct response/answer to each question:

1) A_____ is anything from the internal or external environment that causes an imbalance in the internal conditions of a cell, organ, organ system, or organism.
   a. control center b. effector c. receptor d. stimulus

2) Which two body systems are responsible for communication?
   a. nervous and digestive
   b. muscular and circulatory
   c. circulatory and respiratory
   d. endocrine and nervous

3) Chemicals released into the bloodstream for the purpose of communication are called
   a. receptors. b. effectors. c. hormones. d. nerves.

4) A _____ returns the body to a state of balance (homeostasis).
   a. negative feedback loop
   b. thermostat
   c. positive feedback loop
   d. microprocessor

5) Which of the following is an example of positive feedback?
   a. Human body temperature is normally between 36.7 and 37.1 C.
   b. Platelets and clotting factors increase after a cut.
   c. Blood sugar regulation by insulin and glucagon.
   d. In a normal teenager, a resting heart rate is typically between 60 and 100 beats per minute.

☑ **Assignment #2:** Feedback Loops

These videos do a great job of explaining what homeostasis is and what the difference is between positive vs negative feedback loops.

1. Watch **Amoeba Sisters Video** on YouTube "Homeostasis and Negative/Positive Feedback" https://www.youtube.com/watch?v=Iz0Q9nTZCw4 **6:24 min video**

2. Watch the **GCSE Biology Video** on YouTube titled "Control of Blood Glucose Concentration" https://www.youtube.com/watch?v=OHrX3X3LGzI&t=110s **4:33 min video**

3. As you are watching both videos, take the **Week 3: Assignment #2 Video questions**:

Please circle the correct response/answer to each question:

1) The organs in your body make up different organ systems that have to work together to maintain
   a. movement b. growth. c. metabolism. d. homeostasis.

2) Which type of feedback loop is used by endotherms (like humans) to maintain their body temperature?
   a. negative b. positive c. both of these d. neither of these

3) What was the example of the positive feedback loop discussed in the Amoeba Sisters video?
   a. puberty b. blood clotting c. childbirth d. blood glucose

4) Glucose is used during cell respiration to make _____.
   a. blood b. glucagon c. insulin d. ATP

5) What hormone fixes high levels of sugar in the blood?
   a. glycogen b. glucagon c. insulin d. pancreas

☑ **Assignment #3:** Diabetes Feedback Loop

This assignment is applying concepts from the first two assignments in a real example of homeostasis and feedback loops. Diabetes is a disease that occurs in people that don't produce enough insulin (a hormone that helps keep sugar levels in our blood balanced so we don't overdose and die from sugar).

Please read the information, examine the data and then circle the correct response/answer to each question:

Diabetes is a disease affecting insulin production by the pancreas. A normal blood glucose level is approximately 90ml/L blood. After eating a meal, the amount of glucose in the blood increases until the pancreas releases the hormone insulin. Insulin messages cells of the body (especially muscle and nerve cells) to take in glucose, which causes blood glucose levels to drop and return to normal (90 ml/L). This usually happens 1.5 to 2 hours after eating.

If there is not enough insulin being produced by the pancreas, the amount of glucose in the blood will remain high. A blood glucose level above 140 for an extended period of time is associated with the conditions hyperglycemia (pre-diabetes) and diabetes. If these conditions are not brought under control, they can lead to serious complications and even death.

The following data was collected from two patients who were given glucola (a drink with a very high sugar content). Their blood was then collected and analyzed every 30 minutes for 4 hours.

Time After Eating (hrs.)	Glucose Level in ml/liter of blood in Patient A	Glucose Level in ml/liter of blood in Patient B
0.5	170	180
1	155	195
1.5	140	230
2	135	245
2.5	135	235
3	135	225
4	130	200

1) The data in the chart can be used to answer which of the following questions:
   a. Which patient has diabetes? c. Which patient has low blood sugar?
   b. Which patient experienced a headache? d. Which patient has pancreatic cancer?

2) Which of the following is the best CLAIM based on the data in the chart?
   a. Patient A has diabetes. c. both patients have diabetes.
   b. Patient B has diabetes. d. neither patients have diabetes.

3) What EVIDENCE supports the claim that Patient A is NOT diabetic?
   a. The glucose level of Patient A 1.5 hours after drinking glucola was 140 ml/L.
   b. The glucose level of Patient A was below 140 ml/L two hours after drinking glucola.
   c. The glucose level of Patient A was 155 ml/L 1.5 hours after drinking glucola.
   d. The glucose level of Patient A was 170 ml/L 30 minutes after drinking glucola.

4) What would be a probable blood sugar level for Patient B at 3.5 hours?
   a. 225 b. 212.5 c. 200 d. 133

5) Which of the following is the best reason for why the blood sugar levels of Patient A decreased after 2 hours?
   a. In Patient A, insulin was released into the blood. The insulin caused cells to take glucose out of the blood, causing levels to go down.
   b. In Patient A, insulin caused cells to release glucose into the blood. This caused glucose levels to go up.
   c. In Patient A, the high levels of insulin in the blood caused hunger. After eating a bag of chips and apple, the levels of glucose in the blood went down.
   d. In Patient A, the high levels of insulin in the blood caused hunger. After eating a bag of chips and apple, the levels of glucose in the blood went up.