

Living Earth: Week 4 Assignment → 4/28 - 5/1

Big Ideas We'll be Discussing: *Homeostasis and the Human Body*

- Each *organ system* contributes to the *homeostasis* of other systems and of the entire organism. No system of the body works in isolation and the well-being of the person depends upon the well-being of all the interacting *organ systems*. A disruption within one system generally has consequences for several additional organ systems. Most of these organ systems are controlled by hormones secreted from the pituitary gland, a part of the endocrine system.
- Here are some examples of homeostasis in our bodies:
 - The regulation of the amounts of water and minerals in the body (mostly by our kidneys). This is known as osmoregulation.
 - The removal of metabolic waste (called excretion). This is done by the excretory organs such as the kidneys and lungs.
 - The regulation of body temperature. This is mainly done by the skin.
 - The regulation of blood glucose level. This is mainly done by the liver and the insulin and glucagon secreted by the pancreas in the body.

Assignment #1: *Homeostasis and the Human Body Readings*

(If you have your textbook you can read pages 496-502 instead of doing the steps in the first step)

1. **Log into the HMH Textbook** via Clever (login instructions on my website)
 - a. On the top tab bar in the middle is "Assignments"...click on that.
 - b. Click on "Student EBook: Explore/Explain 2: Homeostasis and the Human Body"
 - c. **Read and click/watch the interactives.**
 - I suggest you have the "quiz" next to you and complete it as you are reading. It will make things go more quickly
 - Please skip the Language Arts Connection, Hands on Lab, and Evidence Notebook.
2. Please **read the article "The Effect of Exercise on Homeostasis" (page 2)**
 - I suggest you complete it as you're are reading. It will make things go more quickly
3. **Take the Living Earth Week 4 Reading "quiz" Questions (page 3)**

Assignment # 2: *Investigating Homeostasis Lab Activity*

1. Complete the lab activity "Investigating Homeostasis and Exercise" worksheet (page 4-5)

The Effect of Exercise on Homeostasis

By Chris Sherwood Updated September 9, 2019

Whether you're awake or asleep, your body is constantly maintaining a state of balance known as homeostasis. When you exercise, you create a wide range of effects on the systems of your body.

Exercise increases the use of energy by your muscles, which activates a series of reactions to create new energy to keep exercising and maintain homeostasis.

Each system strives to help create enough energy to continue exercising, as well as help the body recover after exercise. This state of energy creation and use has multiple effects on your body's homeostasis including increased heart rate, breathing and sweat rate.

Increased Oxygen Consumption

Exercise increases the use of energy by your muscles, which activates a series of reactions to create new energy to keep exercising and maintain homeostasis.

The first reaction that occurs is an increase in your homeostasis breathing rate during exercise. Energy creation requires significant oxygen. The only way to provide the necessary oxygen is to increase the speed at which your respiratory system is introducing it into your bloodstream.

The harder you exercise, the more energy is used, resulting in your body increasing your breathing rate even more to maintain adequate energy levels for balance, according to the European Lung Foundation.

Increased Oxygen Delivery

Once oxygen is deposited into the bloodstream by the lungs, the body must also increase your homeostasis heart rate during exercise to deliver oxygen to the cells to once again maintain homeostasis. The increase in heart rate boosts the speed at which your arteries and capillaries can deliver oxygen to needy cells.

It also increases how fast these blood vessels can deliver the broken-down components of recent foods you have consumed. Both products are necessary for energy creation to occur through aerobic respiration.

Increased Body Temperature

After energy is created, exercise continues to affect homeostasis by increasing your body temperature during exercise according to John Hopkins Medicine. Energy creation produces three main products — water, carbon dioxide and heat.

Typically, the heat created from aerobic respiration is used to maintain a balanced body temperature of about 98.6 degrees. However, the increased rate of energy production during exercise often creates more heat than is necessary.

This means your body has to somehow release this heat to prevent your temperature from becoming dangerously high. To maintain homeostasis, your body activates the sweating process, which helps remove the heat from your body and release it into the surrounding environment.

Increased Release of Carbon Dioxide

Along with increasing the amount of oxygen available in the bloodstream, your body must also get rid of carbon dioxide from your blood at a similar rate. When your cells make energy, they produce carbon dioxide as a waste product according to Mayo Clinic.

This carbon dioxide is transported back into the bloodstream, where it flows through the veins back to your lungs. Your lungs then exhale the carbon dioxide out of the body.

To maintain balance, your breathing rate must continue to stay at an elevated level so your lungs can expel the excess carbon dioxide being produced by the muscle cells during exercise. Once you stop exercising and the cells return to normal energy needs, less carbon dioxide is created, allowing your breathing rate to return to normal.

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Distance Learning Week 4

Teacher _____

Reading Quiz #1 → Please circle the correct response/answer to each question:

- Which two body systems work together to control blood pressure?
 - circulatory and respiratory
 - circulatory and excretory
 - circulatory and endocrine
 - circulatory and nervous
- Maintaining carbon dioxide levels is the job of which two body systems?
 - respiratory and digestive
 - respiratory and nervous
 - reproductive and endocrine
 - muscular and digestive
- As you become more active, _____ levels increase and blood becomes more acidic.
 - oxygen
 - glucose
 - carbon dioxide
 - pH
- What process allows gas homeostasis to occur across the smallest blood vessels (called capillaries)?
 - Active transport
 - Phagocytosis
 - inhalation
 - diffusion
- Exercise creates three main products within the body which must be managed to keep the body in a state of homeostasis. These products are
 - oxygen, sugar, and water.
 - carbon dioxide, water, and heat.
 - carbon dioxide, sugar, and water.
 - oxygen, water, and heat.

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Distance Learning Week 4

Experiment: Investigating Homeostasis and Exercise

1. Think back to “The Effect of Exercise on Homeostasis” article you read earlier this week. In order to supply the body with enough ATP to do exercise, what changes must occur within the body to supply muscle cells with adequate sugar and oxygen?

_____.

_____.

_____.

2. You will now investigate the effect of exercise on homeostasis by designing and conducting a simple experiment. Begin your experiment by gathering the resting heart rate of 3 volunteers (or take your own heart rate 3 times).

Data Table 1: Resting Heart Rate

	Volunteer 1	Volunteer 2	Volunteer 3
Resting Heart rate (beats/min)			
<i>Easy tip: find your pulse, count beats for 15 seconds and multiply by 4</i>			

3. Create a sentence comparing the 3 different resting heart rates. _____
- _____
4. How do different levels of exercise affect heart rate? _____
- _____.
5. Decide on a form of light exercise (ex: walking in place): _____
6. Decide on a form of heavy exercise (ex: jumping jacks): _____
7. What can you use as a control group that will allow you to compare normal heart rate to heart rate during light and heavy exercise? _____
8. Decide how long exercise should be performed for (ex: 3-5 mins): _____
9. Independent Variable (IV): The variable you changed is _____.
10. Dependent Variable (DV): The variable that will respond to the independent variable is _____
- _____ (Hint: this is the variable that you will measure).
11. Finish this Hypothesis (use If-then-because): If different types of exercise are performed, _____
- _____

_____.

12. Procedure (number and list your steps):

Data

Type of Exercise	Volunteer 1	Volunteer 2	Volunteer 3
13. Control			
14. Light			
15. Heavy			

16. Explain why heart rate changes during exercise. _____

17. What other changes did you observe during your exercise? _____

_____.

18. List any evidence you collected in this investigation that suggests the body was able to maintain homeostasis after exercise was finished. _____

19. Predict what would happen if your heart rate failed to increase during exercise and describe why.

20. Evaluate what would happen if your body failed to return to normal after exercise.
