

Human Biology: Our Incredible Balanced Body

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Homeostasis, temperature regulation, specific heat of water, systems regulation, external factors and dynamic equilibrium

Summary: To study and observe how homeostasis is maintained in body temperature and spring water temperature even when external factors change.

After completing the field lab, students will be able to:

Objective(s):

1. understand why spring water is a constant temperature year round
2. measure their own heart-rate and body temperature
3. understand the role of water in maintaining homeostasis of body temperature

Ecosystem(s): Freshwater Wetlands, Springs

Equipment (items per group):

- 1 x GPS
- 1 x calculator
- regular thermometers
- 1 x stopwatch
- 1 x digital thermometer
- light meter (optional)

Background:

- **Vocabulary:** temperature, heart rate, homeostasis, groundwater, spring, normal body temperature, specific heat, dynamic equilibrium
- **Reference Material:** Review chapter 2:3, Fresh water flows underground in Mcdougal-Littell Science, 7th grade. Review body systems

Procedure (Engage; Explore; Explain)

1. Divide the class into three groups. Within those groups, make sure that everyone has a partner.
2. At the spring, ask the students, “How does the water feel in summer (when tubing or doing water lab—freezing, cold)? How does it feel now (in winter)?” Explain that the ground water is protected/insulated by the Earth’s surface and this helps it maintain a constant temperature.
3. Have all students feel the water. Have one student take a temperature reading.
4. Explain that the water remains approximately the same temperature year round. (When they return to the classroom or before they come to this lab, have the students look back at their first lab and write down the water temperature.
5. The Hook: Your best friend has been running at PE and suddenly feels very sick. What could have happened and how does this relate to the springs? Lead the students to discuss that our bodies must maintain a constant internal temperature just like the springs. Running causes the heart to beat faster, the body to lose liquids, breathing to increase, and our temperature to increase. Have them record their individual hypothesis.
6. Have the students calculate and record their resting heart rate in beats/minute (count the number of beats in 30 seconds and multiply by 2).
7. Have the students calculate their maximum heart rate. Take 220 minus their age. Record this.
8. Students then calculate and record their target heart rate (take 60 – 75% of their maximum heart rate)
9. Assign each group a job. One group will sit, one will walk, one will run. Within the groups have one person volunteer to do the (sitting, standing or running). Have a partner assigned to that student to record information and to keep time.
10. Have the students (sit, walk or run) in 2 minute intervals. Have them then take a 10 second heart rate and multiply by 6. This gives them their heart rate in beats per minute—bpm.
11. If time, have the students switch with their partners and record the data.

Sunshine State Standards:

Science: SC.F.1.3.4; SC.F.1.3.7; **Language Arts:** LA.A.2.3.7; **Mathematics:** MA.A.1.3.2; MA.A.3.3.2; MA.B.1.3.2; MA.B.4.3.2; **Social Studies:** SS.B.2.3.9

Human Biology: Our Incredible Balanced Bodies Student Data Sheet

Full Name:		Date:	
School (teacher):		Time:	
Latitude:		Longitude:	

Hypothesis: I believe that the body temperature of the (runners, sitters or walkers: circle one) will

(stay the same/ change: circle one) because _____

Field Observations/Measurements/Data

Spring Information	
Temperature of Spring for first lab	
Current temperature of Spring	

Personal Information:	
Resting heart rate: beats in :30 X 2	
Maximum heart rate: 220 minus your age	
Target heart rate: 75% of maximum	

Heart rate chart while (circle one): **RUNNING WALKING SITTING**

Time in minutes	0	2	4	6	8	10	12	14	16	18	20
Heart rate in bpm											

Heart rate chart while (circle one): **RUNNING WALKING SITTING**

Time in minutes	0	2	4	6	8	10	12	14	16	18	20
Heart rate in bpm											

Heart rate chart while (circle one): **RUNNING WALKING SITTING**

Time in minutes	0	2	4	6	8	10	12	14	16	18	20
Heart rate in bpm											

Our Incredible Balanced Bodies

Assessment

1. Where you or your partner able to reach your target heart rate? What group were you in?

2. Our body regulates itself internally (homeostasis) through many processes. List and describe 2 or more direct observations that you made today of your (your partners) body regulating itself.

3. How is the spring similar to the human body in regards to homeostasis.

4. If you were to take temperature readings of a swimming pool in the summer and again in the winter, would you expect the temperature to remain the same or to change? Why?

5. What could happen to our drinking water if the ground water did not maintain a constant temperature? What could happen to our body if it did not maintain a constant temperature?

Lab Performance	EXCELLENT	GOOD	FAIR	POOR
Follows lab procedures carefully and fully.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 - 0
Uses laboratory time productively and stays on task.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 - 0
Works well with partners.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 - 0
Facilitator Signature:				

