



Heart Rate & Homeostasis Investigation

Use a virtual heart-rate investigation to collect evidence of the body responding to exercise and recovering toward a stable condition.

NGSS: HS-LS1-3 - Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Name: _____ **Class / Period:** _____ **Date:** _____

Driving Question

How does heart rate respond when the body is challenged by exercise, and what happens as the body recovers?

Before You Begin

1. In your own words, what does **homeostasis** mean?
- _____
- _____
2. Predict what will happen to heart rate across three repeated activity sets and then during the three-minute recovery period. Explain why.
- _____
- _____
- _____

Virtual Investigation

Open the **Heart Rate & Homeostasis Lab**. Choose one virtual student profile and one movement activity. Keep the same student and activity for the entire first trial.

Setup		Your selection	
Virtual student profile			
Movement activity			

Measurement	Heart rate (bpm)	Change from rest (bpm)	What is happening?
Resting			Baseline
After Set 1			
After Set 2			
After Set 3			
1-min recovery			
2-min recovery			
3-min recovery			

Calculate: Change from rest = measured heart rate - resting heart rate.

Analyze the Pattern

3. Which measurement had the highest heart rate? How many bpm above the resting value was it?

4. Describe the pattern across the three activity sets. Did the heart rate increase by the same amount each time?

5. Compare the 1-minute and 3-minute recovery values to the resting value. What evidence shows the system moving back toward baseline?

6. During exercise, muscles use more oxygen and nutrients and produce more carbon dioxide. Explain why increasing heart rate helps the body respond to this change.

Claim - Evidence - Reasoning

Claim: Write a claim about how heart-rate changes during exercise and recovery demonstrate homeostasis.

Evidence: Use at least three specific numbers from your data table.

Reasoning: Explain how your evidence supports the idea that feedback mechanisms help maintain stable internal conditions.

Extension: Change One Variable

Reset the model. Change **only one** factor: either the virtual student profile or the activity. Repeat the investigation and compare the peak heart rate and the 3-minute recovery value.

Trial	What changed?	Resting bpm	Peak bpm	3-min recovery bpm
Original				
New trial				

7. How did changing one factor affect the response or recovery pattern?
