STUDENT GUIDE
EXPLORE 1 LESSON 9

Food and Agriculture Center for Science Education

Part 1: Our Motivation

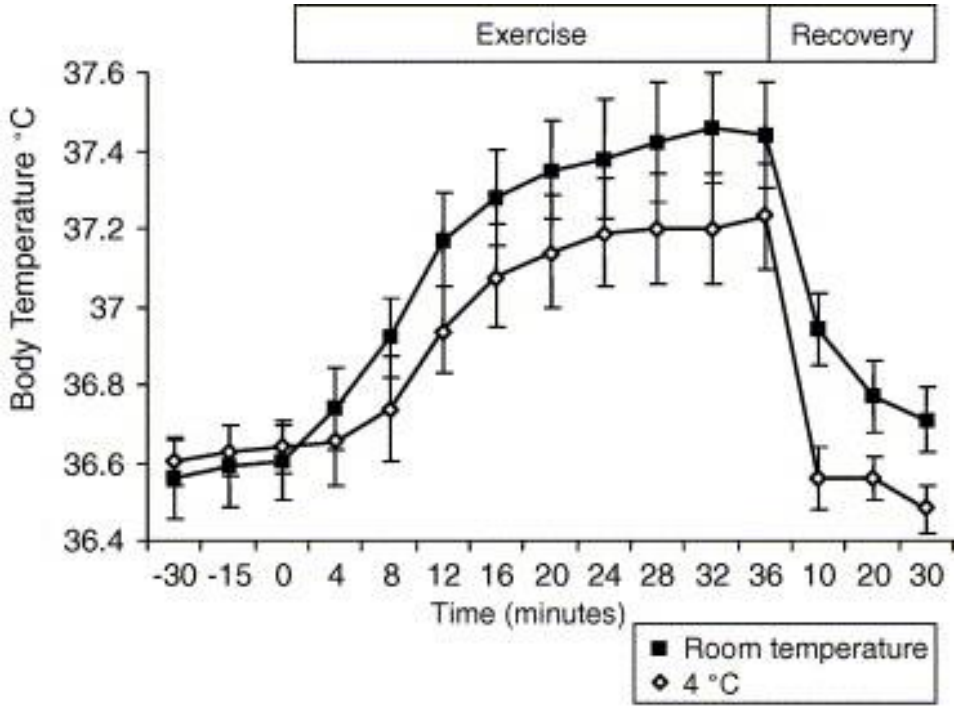
Record what we were trying to figure out that led to this investigation.

Part 2: Analyzing Body Temperature Data

Working in pairs, analyze the following experiment design and data collected.

This study aimed to determine the changes in body temperature that occur before, during, and after exercise in two different temperature conditions. Ten healthy adult male volunteers completed an exercise session on a stationary bicycle. Prior to exercise, a thermocouple probe was inserted into the auditory canal for tympanic membrane temperature measurement (core body temperature). The probe was insulated with cotton wool held in place by a bandage.

The subject entered either the exercise laboratory, at an average temperature of 24 ± 0.5 °C, or the cold room maintained at 4 ± 0.5 °C and waited for 30 min. The −30 min temperature measurement was taken as soon as possible after entering the exercise laboratory or cold room. After 30 min, the subject mounted the bicycle and began cycling at 80 rpm for a 4-minute warm-up at a wattage equivalent to half of the power calculated as 105% of the anaerobic threshold. The exercise intensity was then doubled, and this intensity remained for 32 min before a 4-minute warm-down period, again at an intensity equal to half of 105% anaerobic threshold. The mean work rate during both experiments was 185.2 ± 42.7 W. By design, there was no difference in work rate between the two experiments. After the cessation of exercise, the subjects were rested in the supine position in the exercise laboratory.



Graphic from: https://www.sciencedirect.com/science/article/abs/pii/S1096637406000360?via%3Dihub

Paraphrase the goal and design of this experiment in simpler, yet still accurate terms.

What trends do you see in this data set?

How can you explain the trends in this data with the lens of stability and change?

Part 3: Using a Model of Temperature Change During Exercise

As a class, you will engage in a Science Theater model to determine the mechanism that controls temperature changes in the body.

As you review your role, record a summary of the role your cells and organ will play in the temperature change process. Describe what function your organ has and how specialized cells contribute to its function.

How Specialized Cells Contribute:

Engage in the model. As you **enact** the model, record observations about the actions that other organs and specialized cells take.

Organ & Specialized Cells:
Organ & Specialized Cells:

As you **observe** the model, record how different organs and their specialized cells function to respond to changes in body temperature. Write or sketch your response as you choose.

Organ & Specialized Cells	Role of Organ and Specialized Cells in Changing Body Temperature
Brain: Neurons	
Nerves: Thermoreceptor Neurons	
Skeletal Muscles: Myocytes	
Blood Vessels	
Sweat Glands: Myoepithelial Cells	

Use your observations from the model to explain how the changes to core body temperature occur during exercise and how the body returns to its stable state.

What conditions changed?	What in the body senses the condition change?	What is/are the body's response(s) to the change?	How does the response help the condition return to the stable state?
Core body temperature increases due to exercise.			
Core body temperature increases due to exercise.			
Core body temperature returns to a stable state when at rest.			
Core body temperature returns to a stable state when at rest.			