STUDENT GUIDE
EXPLAIN 1 LESSON 10

Food and Agriculture Center for Science Education

Part 1: Our Motivation

Record what we are now trying to explain about the Module Phenomenon.

We are trying to explain why our body temperature increases, why we get sweaty when we exercise, and why it decreases and sweating stops when we stop exercising.

Part 2: Developing an Explanation of Sweat and Temperature Changes During Exercise and Recovery

Using the evidence gathered, construct an explanation as to why we get hot and sweaty during exercise. In your explanation, be sure to include the following:

- Use at least two sources of evidence obtained from the data sets and/or the Science Theater models in Module 2.
- Describe how you think exercise changes the body temperature conditions of the body, including temperature change and sweat.
- Describe how a negative feedback mechanism responds to body temperature change and brings body temperature back to a stable state.
- Describe how specialized cells in each organ contribute to the function of the system or organ.

We observed the changes in body temperature due to exercise in the scientific study from Lesson 9 Part 2. Before exercise, the body temperature starts at a normal, stable state at about 36.5° C. When exercising, body temperature increases by about 0.5 - 1.0° C. Then, after exercise, body temperature returns to about 36.6° C.

These changes happen because when exercising, the muscle cells expand and contract to move and also generate excess heat. Thermoreceptors (specialized nerve cells) in the muscles and skin sense and report the temperature increase that occurs during exercise. The thermoreceptors send nerve signals to the brain that communicate that body temperature is rising. The hypothalamus detects the signal from the nerves. To respond to the change and try to bring the body temperature down, the hypothalamus sends signals via nerves to sweat glands to release sweat and cool the body. Sweat cools the body to decrease body temperature back to its stable state. The hypothalamus also sends signals via nerves to the vasodilatory nerves to

increase blood flow from the body's core to the body's surface. Blood flow to the body's surface makes heat move from the body to the body's surroundings, cooling the body to bring body temperature back to its stable state (Source - Lesson 9 Science Theater Cards).

Part 3: Updating the Class Models

We will update the class Models to help explain the different experiences we have after exercise, including sweat. List 2-3 additions you would make to the class model in the space below. These may be:

- Organs and their function
- Specialized cells and their function
- Signals or molecules and where they move

- Add the sweat cell glands that take up water and sodium from the bloodstream and release it onto the skin as sweat to cool the body.
- Add the thermoreceptors to detect the change in body temperature and send the signal via nerves to the brain..
- Add the brain and hypothalamus to respond to the nerve signals from the thermoreceptors.

Part 4: Asking New Questions

Individually brainstorm 5 questions that you still need to ask to gain clarity around the Module Questions, "*Why do we get sweaty and thirsty after exercise? Why does the color of our urine change? How does milk help us recover from these effects?*"

Write them in the space below.

5 Questions: Why *do we get sweaty and thirsty after exercise, and why does the color of our urine change?*	1. How is sweat related to thirst? 2. How does your body control the feeling of thirst? 3. Does the body have a way to control hydration, which impacts thirst and urine color? 4. How does being thirsty change as you exercise? 5. How does consuming milk help you feel less thirsty while working out/after working out?

Share your list with a partner. Combine both lists and decide on the three best questions that would help you gain the most clarity around the Module Questions. Write them in the space below.

3 Most Important Questions (partner consensus)	

Make a group of four. Share your questions with one another. Choose the best/most significant question to share with the class to gain clarity around the Module Questions.

Best Question (small group consensus)	