TEACHER GUIDE
EVALUATE LESSON 31

Food and Agriculture Center for Science Education

Module Question: *How does milk help in muscle recovery from soreness induced by intense exercise?*

What We Figure Out:

We know that as athletes move, their muscles contract and experience microtears. We understand that these microtears can cause muscles to feel sore. We know that specialized cells, called satellite cells, go in and repair microtears. We also figured out how the proteins in milk break down into amino acids, which are crucial for repairing skeletal muscle microtears to aid in exercise recovery. We develop a presentation to communicate scientific information that we have learned in the module to answer the Driving Question, ***How can milk help athletes recover from physical exercise?***

3D Learning Objective:	**Time estimate:**	**Materials:**
Students use multiple formats to communicate their final understanding of how the internal conditions of the human body change in response to changes in external conditions (exercise, drinking milk).	100 minutes	Lesson 31 Student Guide Lesson 31 Teacher Resource Rubric Lesson 31 Student Handout Self-Evaluation Lesson 31 Student Handout Peer Feedback Form

Targeted Elements

SEP:	DCI:	CCC:
INFO-H5: **Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed**	**LS1.A-H1**: **Systems of specialized cells within organisms help them perform the essential functions of life.**	**SC-H1:** **Much of science deals with constructing explanations of how things change and how they remain stable.**

process or system) in multiple formats (including orally, graphically, textually, and mathematically).	**LS1.A-H4**: **Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and function even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (through negative feedback) what is going on inside the living system.**	**SC-H3:** **Feedback (negative or positive) can stabilize or destabilize a system.**

Directions

Part 1: Our Motivation

USE OF PHENOMENA
In this lesson, students will use what they have figured out about the Module Phenomenon to return to the Anchor Phenomenon and develop a presentation of this new scientific information to the selected audience.

Prompt students to consider where the class stands in explaining the Module Question, *How does milk help in muscle recovery from soreness induced by intense exercise?* In student responses, listen for the following:

- We know that as athletes move, their muscles contract and experience microtears.
- We understand that these microtears can cause muscles to feel sore.
- We know that specialized cells, called satellite cells, go in and repair microtears.
- We have figured out how the proteins in milk break down into amino acids, which are crucial for repairing skeletal muscle microtears to aid in exercise recovery.

Direct students' attention to their Anchor Phenomenon presentations from Lessons 1, 7, 14, and 24. Ask students how they think what they have figured out since they last updated their presentations will help them modify or add to their presentations. Students can respond to this question on their Lesson 31 Student Guide Part 1: Our Motivation.

- Listen for student responses that indicate students have some new information to communicate how milk nutrients are available to help the body recover from muscle soreness after exercise.

Build off student responses to share what we have figured out about muscle soreness after exercise will help us reassess the presentation and add new scientific information to the original explanations. You can also point to any remaining student questions on the Driving Question Board in the categories "Milk Protein and Muscle Soreness" and "Recovery From Exercise." Direct students' attention to their presentations and share that they will present the new evidence they have gathered in the module to their selected audience.

Part 2: Communicating Scientific Ideas

Share that students will now have an opportunity to revise their presentations to share the new scientific information they gathered about how milk can help athletes recover from exercise. This presentation should include students' ideas about the new scientific mechanisms they have obtained evidence about in the module and how and why they think milk helps the body recover from exercise. Explain that they can build upon their presentations from Lessons 1, 7, 14, and/or 24, revise and/or add to them, or start a new presentation entirely.

Review the list of presentation format requirements and the presentation development steps with students. Remind students that the presentation should be designed for the same chosen audience and with the same format they selected in Lesson 1, and that this is their first opportunity to communicate the scientific ideas they learned in this unit. Reinforce that they will have an additional opportunity to revise and improve their presentations based on feedback. Share that students can use any of the resources from the module to support them in the performance assessment task in this lesson.

To support students in developing their presentations, remind them that in each module they are developing one component of their final presentation for the unit. Clarify for students that each component is like a mini-presentation to share their understanding of the scientific ideas they learned in the module. Explain that this is the final mini-presentation they will develop before combining their mini-presentations about each module's question into one final presentation that reflects their knowledge of the entire system and answers our Driving Question for the unit.

STUDENT SUPPORT
To share the value of revising presentations, share with students that scientists often gather new information through research and experiments that can add to or alter their original thinking. It is important for students to use a process of evaluating scientific information after they have obtained it and share it with others to present new ideas and receive feedback. You may ask:

- How will this new information change what you previously presented on?
- How might you present this new scientific evidence?
- What new ideas or understanding might it bring up for the intended audience?

Encourage conversations between students before they begin revising their presentations.

STUDENT SUPPORT
The scaffold table for preparing a presentation previously included in Lessons 7 and 14 is intentionally not included in the Lesson 31 Student Guide. This is to give students an opportunity to develop their script independently. You have the option to share the scaffold table with any students who may still need the additional support.

Direct students to the Look Fors on their Lesson 31 Student Guide Part 2: Communicating Scientific Ideas as a checklist or outline to help draft their presentation. Read the Look Fors together, and share that students can use these as a guide on how to achieve proficiency on the task. You can use the Lesson 31 Teacher Resource Rubric to assess students' performance on this task.

TEACHER SUPPORT
In this lesson, students are only evaluated on the new module content. This is reflected in the sample student responses in the Lesson 31 Teacher Resource Rubric. Students may, however, choose to incorporate information from other modules into their presentation.

Remind students to add their presentation draft to their portfolio.

Ask students to use the space on their Lesson 31 Student Guide Part 2: Communicating Scientific Ideas to prepare their presentation script or written report so it is ready to deliver and record. Do a quick review of each group's script or outline prior to allowing time for students to develop their full presentation. As students work, circulate the room and ask pressing questions such as:

- Where in the module did you find this new scientific information?
- Why are you including this new scientific information in your presentation?

- Is there any evidence that you are still unsure of? Which ones? Why?
- What do you now know about milk's role in exercise recovery?
- How has your thinking about milk's role in exercise recovery changed because of this new scientific information?

CCSS SUPPORT

WHST 9-10.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing the most significant for a specific purpose and audience.

Utilize the questions above to provide additional support. If needed, meet individually with students to offer specific feedback in regard to the writing process.

After you review and approve each group's script or outline, let students know they can continue to develop their full presentation. If doing a written presentation, direct students to create the formal writing product. If doing a video presentation, direct them to rehearse and record the video product.

Part 3: Sharing Presentation Drafts and Receiving Feedback on Our Presentations

You can now use a peer feedback protocol to have students provide feedback on each other's presentations. Refer to the last page of the Lesson 31 Teacher Resource Rubric for guidance on how to discuss and norm on what features of high-quality student presentations look like and how to support students in using the Lesson 31 Student Handout Peer Feedback Form. Use either or both to have students reflect on and improve their work should you decide that additional steps are needed for your class to achieve proficiency. Alternatively or additionally, you can collect student presentations and provide feedback to each group using the provided rubric and Look Fors.

STUDENT SUPPORT

If needed, return to the class list of norms developed in Lesson 1 for how students engage in productive and respectful classroom discussions. Remind students of the class list with the norms the class generated and hold students accountable for participating in these norms throughout the unit.

TEACHER SUPPORT

In the peer feedback protocols, you might consider having students pair in the same partner groups across Lessons 7, 14, 24, and 31 for consistency. This may make the feedback students receive more meaningful as their peer groups will become more familiar with each other's presentations over time. Alternatively, you could have students rotate partner groups to make the process more challenging.

Explain that in the next lesson, students will complete a final assessment. Tell students they will have an opportunity to revise their presentations and make a final presentation summarizing all of the scientific information they have learned in the unit. Remind them that this is an opportunity to refine their presentations, weaving together all the scientific insights they've gathered throughout this unit into a comprehensive presentation called the Performance Task.

STUDENT SUPPORT

Give students the opportunity for self-assessment by having them complete Lesson 31 Student Handout Self-Assessment, which includes the SEP Engagement Self-Reflection and Presentation Self-Reflection. This is an **optional activity** to help students reflect on their learning in this module and their engagement with the communicating information SEP. This self-assessment can give insight into how students feel engaging with this SEP. It also offers insights into how the students improve on this practice throughout each module. After completing this form, students may share their responses with an elbow partner or submit them directly to the teacher.