

TEACHER GUIDE

Lesson 4: Assessment



Time Estimate: Six 45-minute class periods

Items needed:

- Protein Product Assessment Student Guide
- Protein Product Assessment Phenomenon Cards Handout
- Protein Product Assessment Rubric
- Protein Product Assessment Planning Document
- Protein Product Assessment Student Guide KEY

NGSS:

DCI Connections

LS1.C-H2: The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.

LS1.C-H3: As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.

SEP Connections

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 process or system) in multiple formats (including orally, graphically, textually, and mathematically).

CEDS-H2: Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

CCC Connections

PAT-H1: Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

CE-H2: Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

Driving Question: Why might someone who exercises consume whey protein?

Goals:

- Complete the final explanation of the unit driving question.
- Create a presentation from information gained in the unit.
- Reflect individually on the experience of the unit.

Overview:

Students will return to the anchor phenomenon and observe new phenomenon cards that represent what they have learned about whey protein. Students work individually to complete an explanation of the lesson-driving question “why would someone who exercises consume whey protein?” Students will then collaboratively create a protein product and a presentation to answer the driving question, “why might someone who exercises consume whey protein?” Finally, students will individually reflect on their unit experience.

Instructional Approach

Part 1: Revisiting the Phenomenon

1. Introduce the unit assessment by sharing with students that they will use what they have learned in their lessons to complete an individual final explanation and group presentation. Explain to students that they will now take everything they’ve learned throughout the unit and work to create an explanation that answers the Driving Question: Why might someone who exercises consume whey protein? To do so, we first need to revisit the Anchor Phenomenon.
2. Provide small groups of students with the “phenomenon cards”. These should be cut prior to class using the Lesson 4: Assessment Phenomenon Cards teacher resource. This set of cards will include the cards students engaged with in the anchor phenomenon and additional cards. Ask students to look at the cards and organize them however they see fit based on what they have learned throughout these lessons. Some groups may decide to put them in categories as they did in the anchor lesson, and some may decide to put them in sequential order. Allow them to take the direction that suits them. Students will write their reflections in Part 1 of their Student Guide.
3. Once groups have completed organizing the phenomenon cards, have them share them. This will allow you to highlight pertinent ideas that will help them finalize their thoughts about the unit before constructing their final explanation.

Part 2: Creating an Explanation of Whey Protein

1. Next, students will individually construct an explanation using what they have learned throughout the unit to answer the Driving Question: Why might someone who exercises consume whey protein?
2. Student explanations should include:
 - a. Describe the pattern in the energy flow between homeostatic changes in the body. (CEDS-H2, LS1.C-H2, PAT-H1)
 - b. Link patterns of bodily changes (heart rate, temperature, body pressure, etc.) and as matter and energy flow through different organizational levels of living systems. (CEDS-H2, LS1.C-H3, PAT-H1)
 - c. Clearly depict how and where muscle growth occurs, and explain the underlying reasons. (CEDS-H2, LS1.C-H2, CE-H2)
3. Use evidence from multiple sources in your explanation and explicitly reference the resources or data incorporated into your revisions. (CEDS-H2)
4. Provide time for students to think through what it means to assess the credibility of a source, how the author's experience is relevant to the validity of a source and determine if it is necessary for experts to agree on the content being presented by the source.
5. Direct students to the Look Fors on their Assessment Student Guide. They can use these as a checklist to help draft their explanation. Read the Look Fors together and share that students can use them as a guide to achieving proficiency on the task.
6. You can use the Teacher Resource Assessment Rubric to assess students' performance on this task. Give students time to develop and complete their explanations.

STUDENT SUPPORT

As a part of this SEP, students will construct and revise an explanation using reliable scientific evidence to help explain the connection between whey protein and exercise. To support students in demonstrating their proficiency with this SEP element and in making their comparisons, you may wish to review examples of scientific writing, including students' work, and remind them they can record their thoughts using written explanations and/or annotated models.

Part 3: Sharing Explanations

1. After students record their individual explanations, provide time for them to share them with their peers using a Mingle-Pair-Share Routine.
 - a. Students will move around the classroom and find a peer.
 - b. Students will take turns sharing their ideas.
 - c. Students will then find a new peer and share their ideas again.
2. Once students have discussed their explanation with two to three other students. Have them share with the whole class. As students share, record the different ideas students have about why people consume whey protein. From this list, highlight any ideas that

describe the cause-and-effect relationship between whey protein and exercise. The cause and effect CCC is not evaluated in the explanation but is required in the presentation, and at this time, you can solidify accurate connections for the next step. Students' ideas may vary, and any idea is accepted and encouraged. The point here is to make sure that even though a student's individual response might be inaccurate, they have heard accurate connections before moving to the assessment's final step.

3. Conclude the discussion by sharing with students that the final activity of this unit is to create a protein product and presentation.

Part 4: Creating a Protein Product Presentation

1. Students will work collectively to prepare a presentation to show their answer to our Driving Question: Why would someone who exercises consume whey protein?

TEACHER SUPPORT

Another way to make this final assessment more robust is to have the students create their own protein product. This can be done in your class or partnering with a Food Science or FACS class. Students would take their learnings and combine foods to create a protein product. Steps for this activity are outlined in Step 5 of this Teacher Guide.

If you plan to have students cook/bake/make their own protein product using Part 5, inform them of your requirements for the protein product. For example, if you have access to an oven or refrigeration, allow them those parameters. If you need students to create a no-bake recipe like energy bites, make sure they know that before allowing them to create the protein product as this might influence their choices.

2. Students should use their response from Part 2: Creating Explanations of Whey Protein or revise it based on feedback from their peers. It is important to note that students may not have teacher feedback on their explanations during this part of the lesson. They need to work together to ensure their presentation is clear and factual.
3. Part of your presentation will include designing a product that the group finds optimal for a person wanting to consume protein. Student groups will create a design for their product to share in their presentation—this includes a name, label, ingredients, etc. Students should develop a description to include on a website or on a shelf sign in a store.
4. Review the presentation guidelines and protein product guidelines with students. Direct them to their Student Guide Lesson 4 Part 4: Creating a Protein Product Presentation. Give them time to fill in the presentation format and targeted audience by circling the option they selected or writing in their response in the space labeled “Other”.

Presentation Guidelines:

- Presentation includes multiple methods of communication (i.e., video plus graphics/diagrams, written report plus graphics/diagrams, or video with the narration of a slideshow).
- Length requirements:
 - Videos cannot exceed three minutes.
 - Written reports cannot exceed five paragraphs.
- The presentation is designed specifically for a chosen audience.

Protein Product Guidelines (to be included in the presentation):

- Protein Products include a name, label, ingredients, etc. Develop a description to include on a website or on a shelf sign in a store.
 - Must provide an explanation of why the ingredients would be optimal for the audience you chose.
5. Give students time to plan and develop their presentations. As students are working, circulate the room to address any concerns or answer any student questions related to the project details.
 6. As students complete their presentations, direct them to their Student Guide Lesson 4 Part 4: Creating a Protein Product Presentation. Have students review their work using the Look Fors. They should check them off when they are sure their presentation has included that requirement.

Part 5: Creating a Protein Product

TEACHER SUPPORT

This portion of the assessment is meant to not be assessed. If you choose to assess it, please note that there are no included assessment rubrics with the lesson materials. The goal of this part is to allow students to create something new and provide a hands-on, creative learning experience. The development and creation of the physical protein product connects to other courses and could be done as a collaborative learning activity.

If you are choosing NOT to complete this activity, please move directly to Part 6: Reflection.

1. Share with students that they will now create a physical protein product based on what they have learned. The timing of this activity will consist of 1 day for planning and 1 day to create the physical product. The product should reflect their understanding of macromolecules and their role in health and exercise. Students can bring ingredients from home to create their protein products or the school could provide these. If necessary and available, connect with your FACS or Food Science teacher to use their kitchen space. This

activity might need to be modified based on the materials available in your school. If you do not have access to a kitchen, allow students to create protein products that are no-bake.

2. To start the planning day, distribute Lesson 4: Protein Product Assessment Planning Document handout. Give students time to complete it within their groups. This will help the students map out their protein product creation. They should also use the protein product items from their presentation in Part 4 as they think about ideas. Allow about half a class period for students to brainstorm, research, and plan their protein product creation. Encourage students to share their proposed plan with another group in an informal peer review if there is time available. If you are planning on providing materials for student groups, it might be important at this time to get ingredients and supply lists from them to ensure that you have the materials gathered for when they begin to make the protein product the next day.
3. To start the creation day, allow students to gather their materials and set up a workspace. Students will have half the class period to create their protein product and the other half to taste test. To add competition to the activity, you can allow students to vote on their favorite products. Categories could include the best tasting, best presentation, most creative use of ingredients, healthiest option, etc.

Part 6: Reflection

1. Share with students that they have now completed all of the unit lessons. Take some time to congratulate students on their progress and for students to engage in a metacognitive reflection about how their thinking about how whey protein has an effect on body systems has changed since the beginning of the lessons. To guide students through a brief self-reflection experience about their learning in the unit, consider asking students the following:
 - a. How have ideas about consuming whey protein changed since the start of your learning?
 - b. How does what you learned in this unit make you think differently about macromolecules and exercise?
 - c. How does what you learned in this unit make you think differently about how your body functions to maintain homeostasis?
 - d. How do you think you can use the science practices (e.g., analyzing scientific literature, creating an explanation using scientific evidence) you engaged in in this unit in other ways in your learning?
2. In addition, you can have a celebration share-out in which you encourage students to give a shout-out to their peers about something they did well in preparing and creating their explanations and presentations.